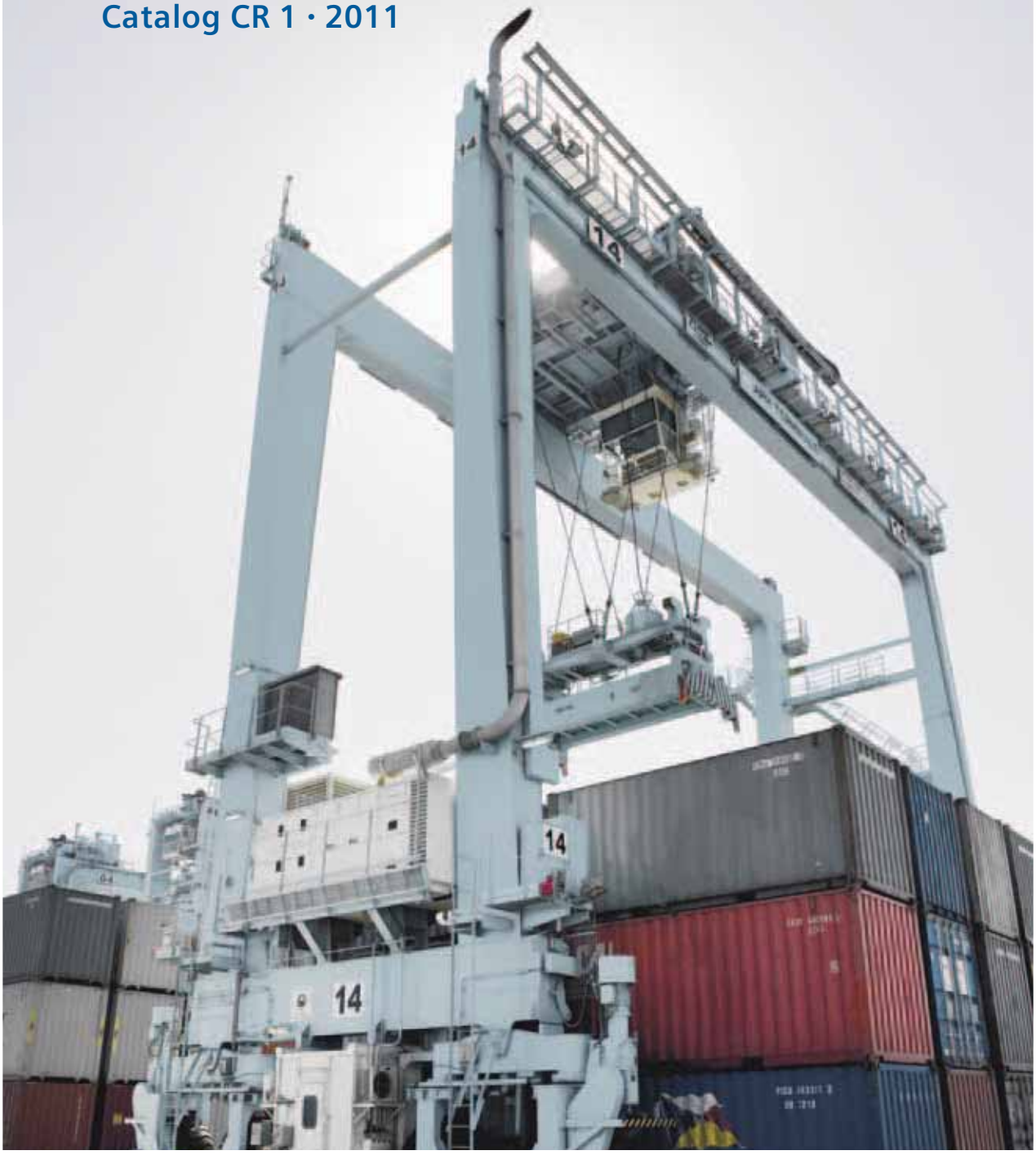
Drive and Control Components for Cranes

Catalog CR 1 · 2011



Cranes

Answers for industry.

SIEMENS

Related catalogs

Motion Control PM 21
SIMOTION, SINAMICS S120 and Motors for Production Machines

E86060-K4921-A101-A2-7600

SINAMICS S120/SINAMICS S150 D 21.3
Chassis Format Units and Cabinet Modules/ Converter Cabinet Units

E86060-K5521-A131-A2-7600

Low Voltage Motors D 81.1
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E86060-K5710-A111-A3-7600

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Industry Mall
Information and ordering platform in the Internet:
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Additional documentation

You will find all information material, such as brochures, catalogs, manuals and operating instructions up-todate under the addresses

www.siemens.com/cranes

www.siemens.com/automation/infocenter

www.siemens.com/motioncontrol/doku

You can order the listed documentation or download it in common file formats (PDF, ZIP).

[1)] Language: German

Cranes
Drive and Control Components for Cranes

Catalog CR 1 · 2011

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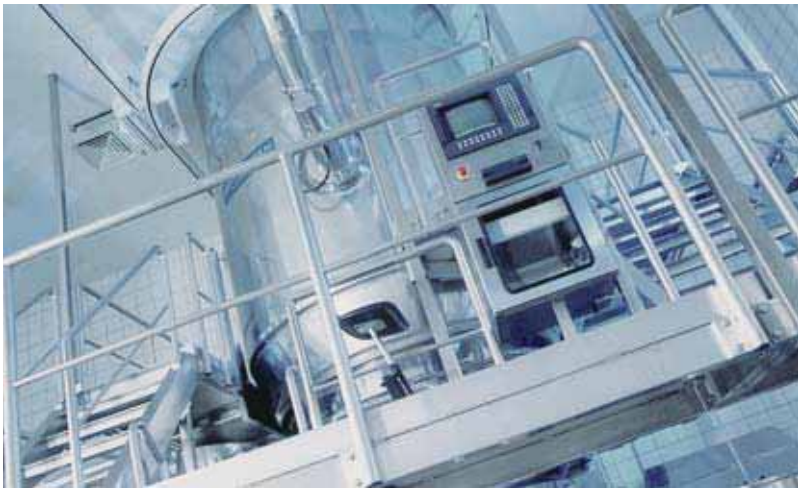
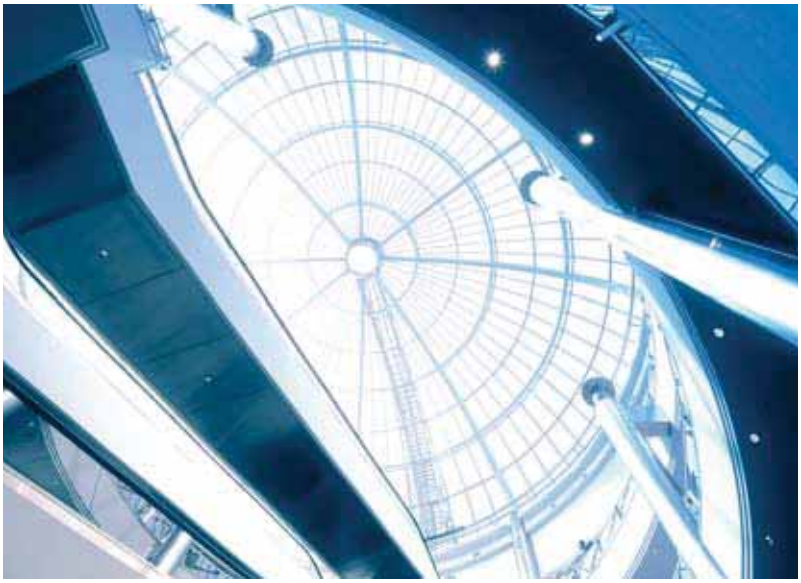
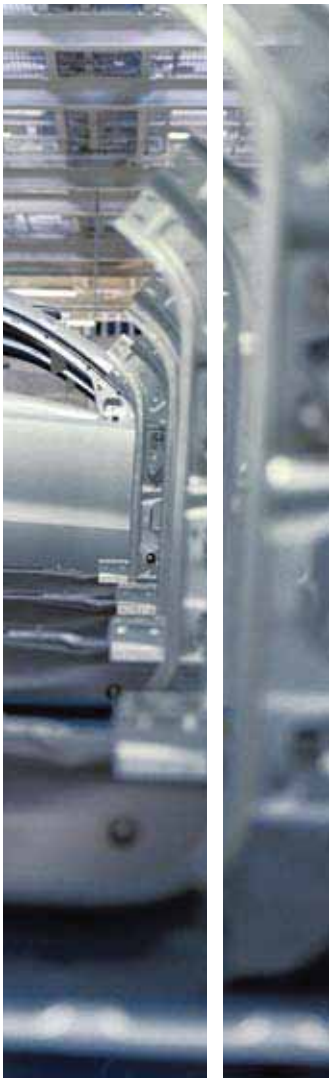
Catalog News HE 1 N, February 2007







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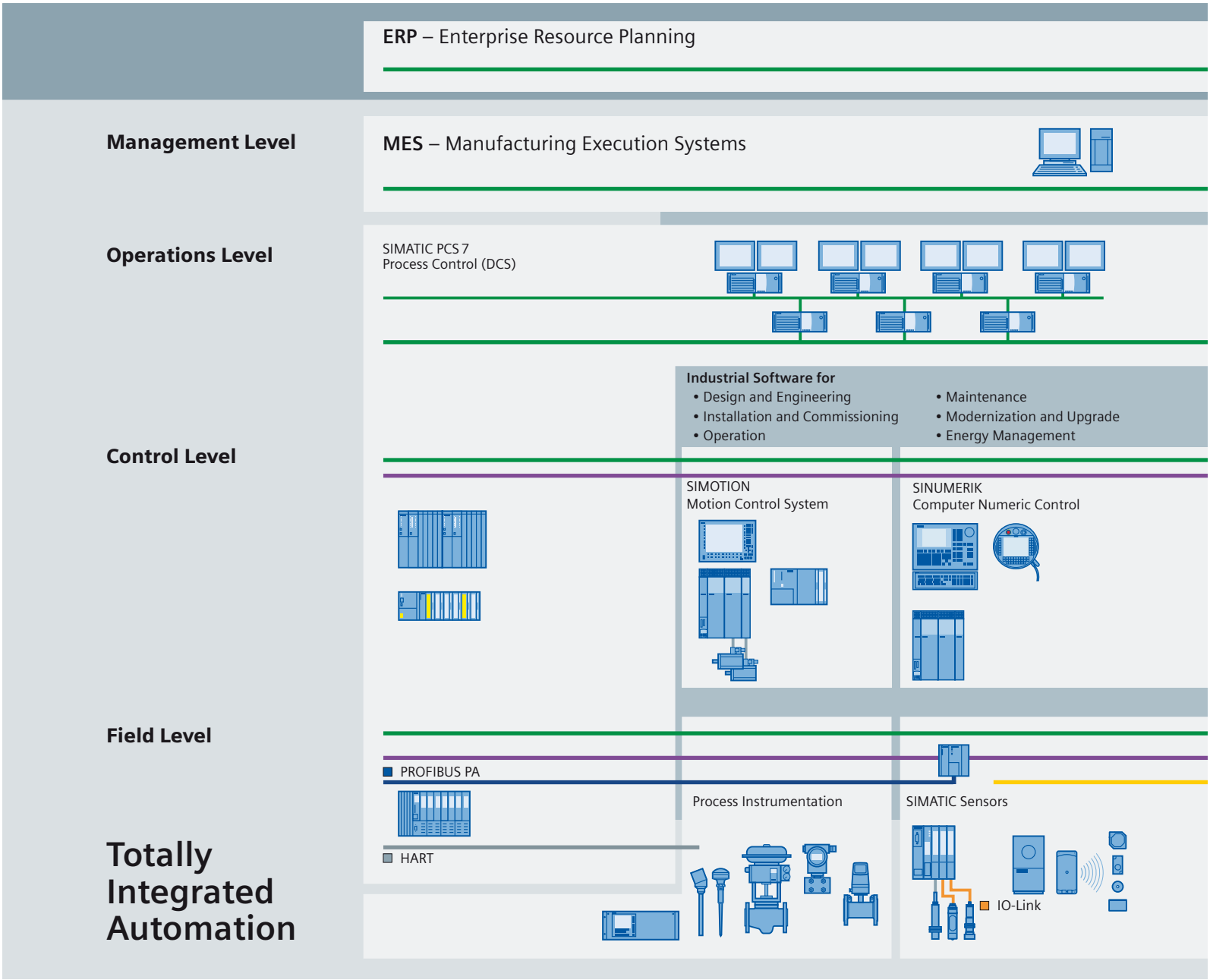
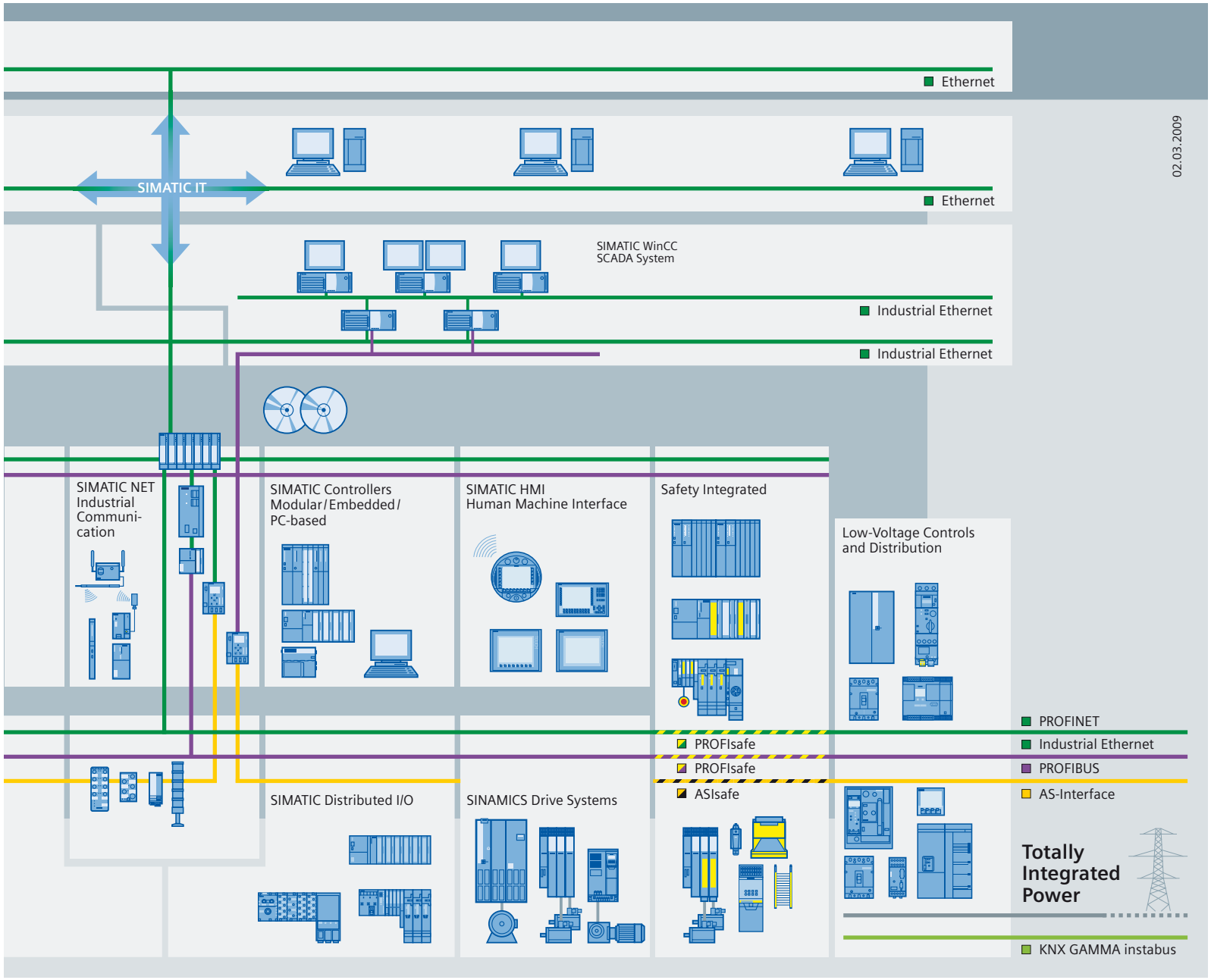


Setting standards in productivity and competitiveness.

Totally Integrated Automation.

Thanks to Totally Integrated Automation, Siemens is the only provider of an integrated basis for implementation of customized automation solutions – in all industries from inbound to outbound.



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You have a catalog in your hands that will serve you well for selecting and ordering your products. But have you heard of the electronic online catalog (the Industry Mall) and all its benefits? Take a look around it sometime:

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Convinced? We look forward to your visit!

SIMOCRANE
crane technology platform

1

Preconfigured crane control modules and automation of every type of crane

Overview

Competent and innovative

Crane technology and lifting gear at SIEMENS have a long tradition. As far back as 1891, SIEMENS had equipped a 1.5 tonne slewing crane with regenerative feedback into the line supply.

With our drive technology today we can achieve a lifting capacity of much more than 14,000 tonnes and a hoisting gear speed exceeding 180 m/min.

Trends and requirements

We create significant customer benefits through savings in fuel costs and reduction of CO_2 emissions with our rubber-tyred gantry cranes thanks to our ECO concept. With our automation and safety concepts we implement automatic guided crane operation.

The rapid growth of worldwide container transport with ever shorter cargo handling times results in new demands for crane manufacturers, system integrators and operators of harbor cranes. Coping with large dimensions, high speeds and heavy loads despite highly demanding precision and safety requirements and all imaginable climatic environmental conditions is a characteristic challenge for this field of application.

The industrial environment is characterized by a wide variety of crane types and load suspension devices. Precision and safety is crucial here, but throughput of goods and availability are also important factors. Depending on the type of goods to be transported, careful transport and damage prevention can be a decisive factor. Industrial cranes are often part of a process chain (e.g. ladle crane) or are integrated into system landscapes of a logistical type (e.g. warehouse management).

Siemens is setting standards in energy efficiency and energy management

Rising energy costs and reduction of CO_2 emissions are also concerns that demand innovative economical and environmentally sound solutions. Regenerative systems, energy-efficient motors, as well as hybrid drives with intelligent energy management system are today's solutions for the future.

Platform concept

In order to meet these requirements, SIEMENS has developed the SIMOCRANE Technology Platform. With the solutions developed by Siemens we cope with the challenge of shorter and shorter handling times for loads combined with energy-saving requirements.

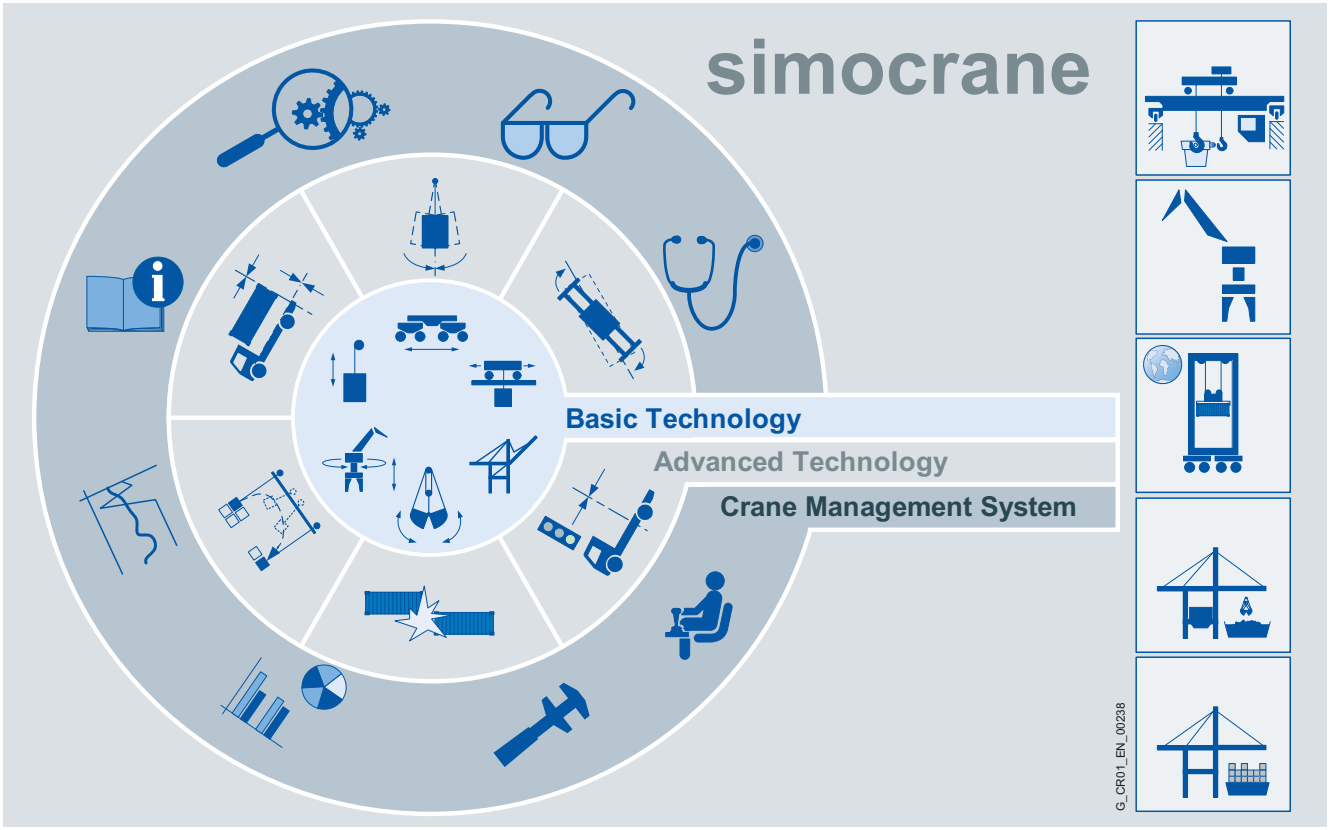
Standardization and specialization

As a leading sector specialist, SIEMENS offers the innovative SINAMICS drive and control systems for this purpose. On this platform the modular, maintenance-friendly drive and control components of SIMOCRANE form the basis for controlling the motion of a crane.

The portfolio is supplemented with a series of technology options of SIMOCRANE Advanced Technology which, in a suitable combination, optimize operation of a crane and increase the availability.

The concept of a modular technology platform also contributes to the shortening of the configuring and commissioning times.

Preconfigured crane control modules for controlling and automating all types of crane



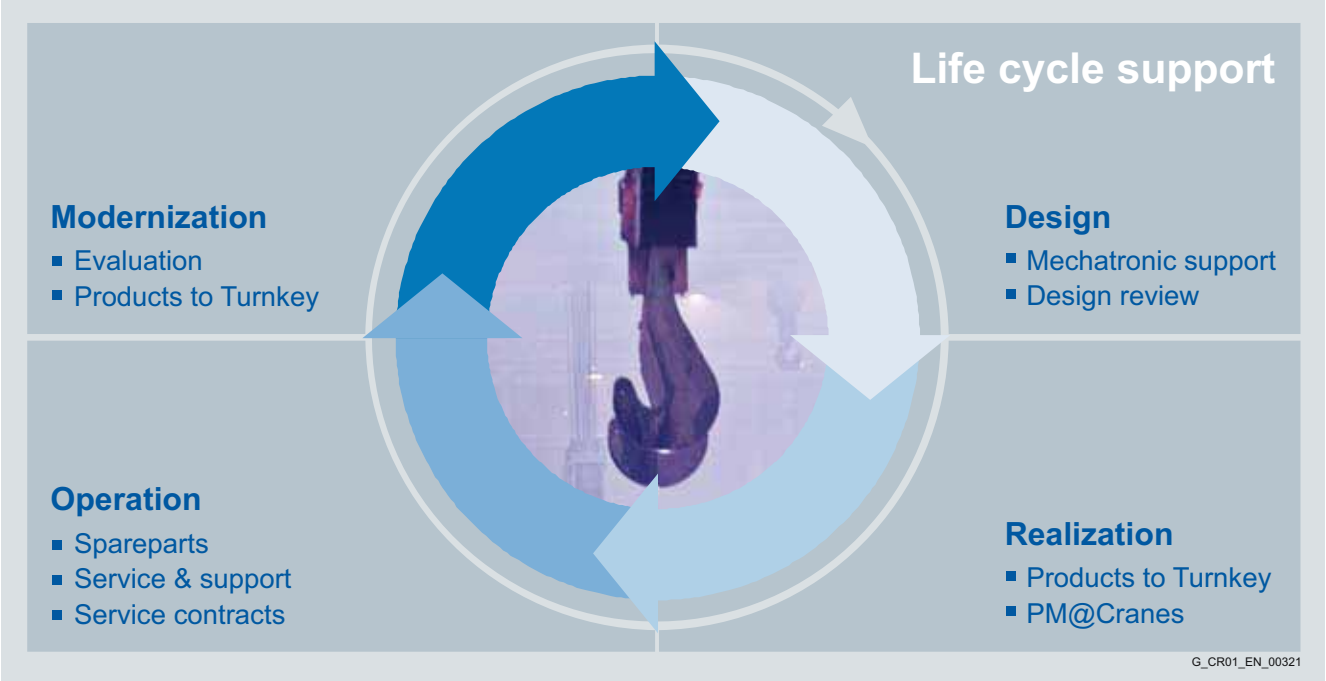
Overview (continued)

Scalable in hardware and software

Our products and solutions cover the requirements of cranes in dockside applications (container loading and unloading, stack mode and grab mode), as well as in industrial applications in the steel and paper industries (ladle cranes, winding applications), in shipbuilding (Goliath cranes) and in numerous other industrial applications. Due to their scalability they support customers both in the implementation of complex large cranes with high drive outputs of up to several 1000 kW and demanding functional scope (sway control, automation), as well as simpler crane types with lower outputs of just a few kW and a low degree of automation (manual operation).

Continuous consulting

We accompany you over the complete lifecycle of your crane. With engineering and mechatronic support for the creation of the optimal solution for your crane. During the implementation, installation and commissioning phases as well as during service work this is achieved by provision of spare parts, on-site service (local) and the appropriate maintenance contracts. In the creation of the optimal solution for your crane through to implementation and handover to the plant as well as during servicing work on site or via Teleservice.
In cooperation with you, we also develop concepts for modernizing and converting old crane systems.



Catalog CR 1 offers products and solutions for all crane applications

Catalog CR1 describes the portfolio of products and solutions for implementation in cranes. In addition to the detailed product descriptions, it is demonstrated in the applications chapter what a complete crane application can look like. This section illustrates what is covered by standard products and where the application component is relevant in the application.

Note:
A glossary of terms for SIMOCRANE can be found in the appendix.

Overview (continued)

Harbor cranes

Applications:

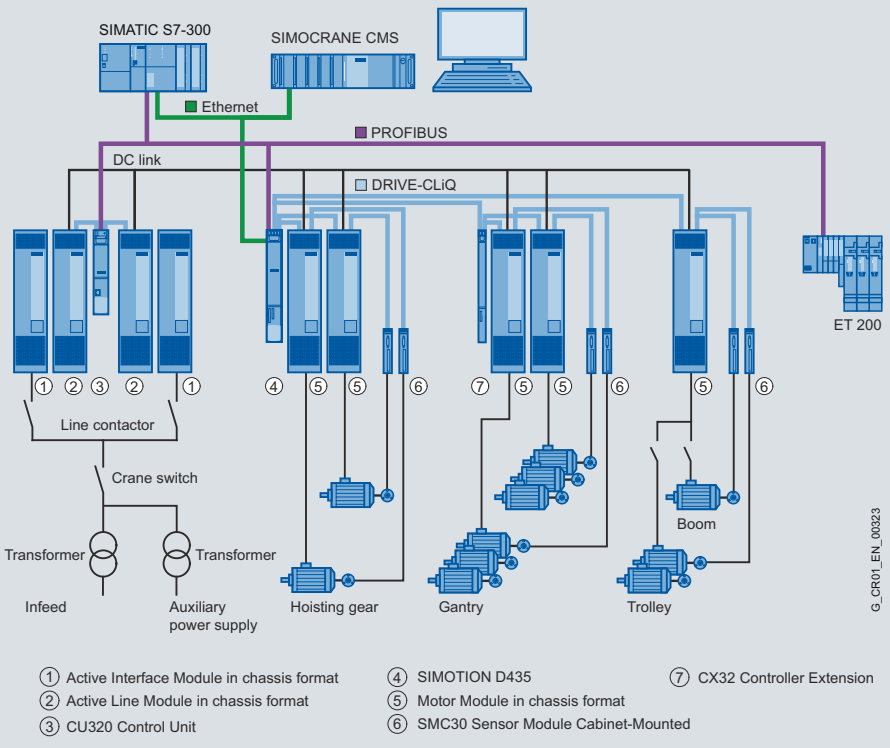
Container cranes
- STS cranes (Ship-to-Shore Crane)

Grab cranes
- GSU cranes (Grab Ship Unloader)

Stacking cranes
- ASC cranes (Automated Stacking Crane)
- RTG cranes (Rubber Tired Gantry Crane)
- RMG cranes (Rail Mounted Gantry Crane)

Example: STS crane, lifting capacity up to 120 t, trolley speed up to 250 m/min

Crane topology



Drive system:
SINAMICS S120

Controller:
SIMOTION D
SIMATIC S7

I/O:
PROFIBUS / PROFINET

HMI/diagnostics:
SIMOCRANE CMS

Overview (continued)

	Harbor cranes
Drive systems	**SINAMICS S120 high-performance multi-axis drive system**
	**Chassis units**
	Infeed/regenerative feedback modules from 16 kW to 900 kW (up to 3420 kW through parallel connection)
	Motor Modules for the operation of three-phase squirrel-cage motors from 1.6 kW to 800 kW
	Cabinet units
	Line Connection Modules for connecting line-side components to the supply system
	Active Line Modules for the input/regenerative feedback of 300 kW to 900 kW (up to 3420 kW through parallel connection)
	Motor Modules for the operation of three-phase squirrel-cage motors from 110 kW to 800 kW
	Switch-Over Modules for connecting Motor Modules to motors for optimal utilization and/or redundancy of the drive components
	Multi Motor Connection Modules for connecting several motors to a common Motor Module in multiple-motor applications for gantries
	Motor Double Choke Modules for interconnecting motor reactors in applications with long motor cables, e.g. gantries

Motors	**Three-phase squirrel-cage motors for use with SINAMICS S120**
	**Hoisting gear motors**
	1PH8 motors, IP23/IP55, S3-40 %, 340 - 1970 kW, 3961 - 18225 Nm
	1PH7 motors, IP55, S3-40 %, 140 - 228 kW, 2228 - 3629 Nm
	1PL6 motors, IP23, S3-40 %, 345 - 566 kW, 3295 - 5405 Nm
	1LG4/1LG6 motors, IP55, S4-40 %, 127 - 418 kW, 1265 - 2939 Nm
	Gantry motors
	1LP4/1LP6 motors, with a spring-operated brake, IP55, S3-40 %, 2.4 - 105 kW, 23.9 - 695 Nm

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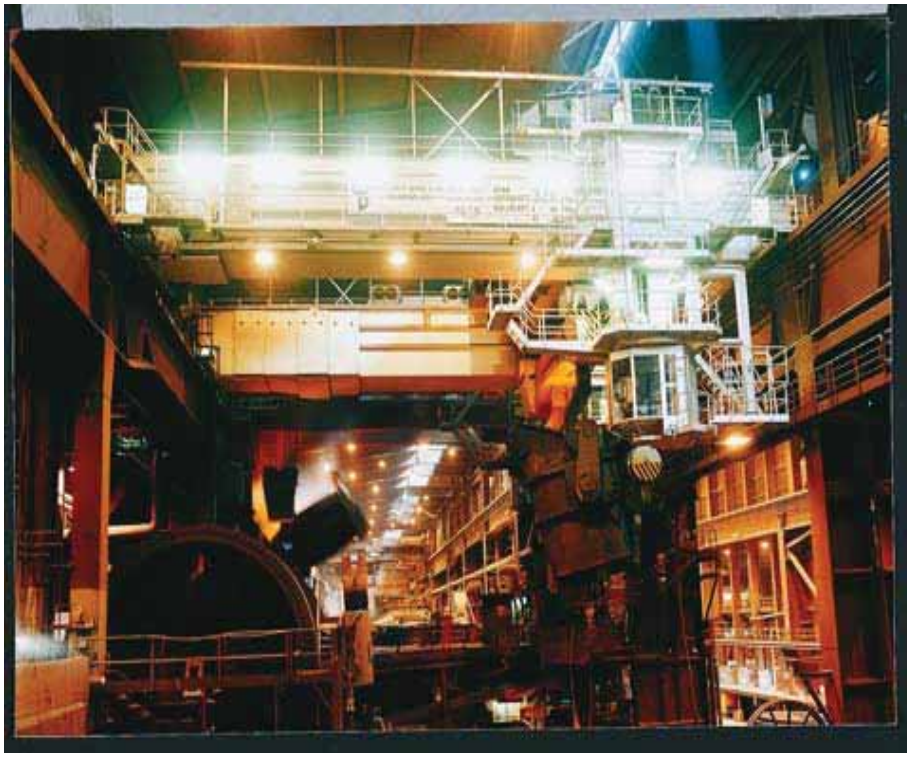
Crane Solutions – Components in the application

Overview (continued)

Industrial cranes



Example: Ladle crane, hoisting capacity 200 - 500 t, gantry speed approx. 60 m/min

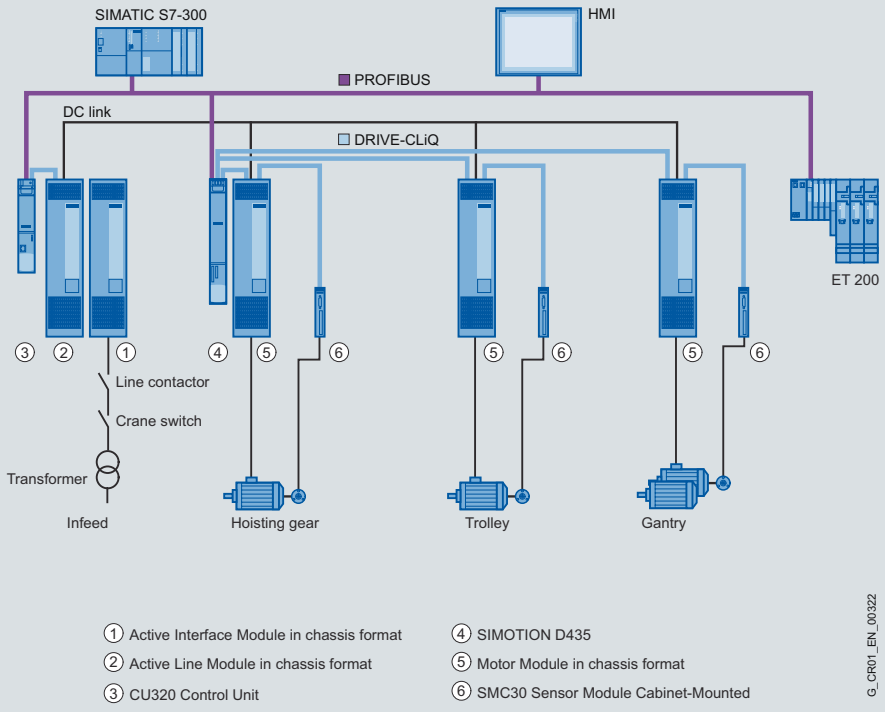
Applications:

Ladle cranes

Bridge cranes
- OHBC
  Overhead bridge crane

Goliath cranes

Crane topology



Drive system:
SINAMICS S120

Controller:
SIMOTION D
SIMATIC S7

I/O:
PROFIBUS / PROFINET

HMI/diagnostics:
WinCC flexible

Overview (continued)

	Industrial cranes
Drive systems	**SINAMICS S120 high-performance multi-axis drive system**
	**Chassis units**
	Infeed/regenerative feedback modules from 16 kW to 900 kW (up to 3420 kW through parallel connection)
	Motor Modules for the operation of three-phase squirrel-cage motors from 1.6 kW to 800 kW
	Cabinet units
	Line Connection Modules for connecting line-side components to the supply system
	Active Line Modules for the input/regenerative feedback of 300 kW to 900 kW (up to 3420 kW through parallel connection)
	Motor Modules for the operation of three-phase squirrel-cage motors from 110 kW to 800 kW
	Switch-Over Modules for connecting Motor Modules to motors for optimal utilization and/or redundancy of the drive components
	Multi Motor Connection Modules for connecting several motors to a common Motor Module in multiple-motor applications for gantries
	Motor Double Choke Modules for interconnecting motor reactors in applications with long motor cables, e.g. gantries
	SIMOTRAS HD
	Chassis units Thyristor AC power controllers from 20 kW to 580 kW for three-phase slip ring motors
Motors	**Three-phase squirrel-cage motors for use with SINAMICS S120**
	**Hoisting gear motors**
	1PH8 motors, IP23/IP55, S3-40 %, 340 - 1970 kW, 3961 - 18225 Nm
	1PH7 motors, IP55, S3-40 %, 140 - 228 kW, 2228 - 3629 Nm
	1PL6 motors, IP23, S3-40 %, 345 - 566 kW, 3295 - 5405 Nm
	1LG4/1LG6 motors, IP55, S4-40 %, 127 - 418 kW, 1265 - 2939 Nm
	Three-phase slip-ring motors for use with SIMOTRAS HD
	Hoisting gear motors
	1LT9 motors, IP54, S3-40 %, 1.5 - 29 kW, 15 - 200 Nm
	1LT8 motors, IP54, S3-40 %, 20 - 315 kW, 246 - 2200 Nm
	Gantry motors
	1LV9 motors with disk brake, IP54, S3-40 %, 1.9 - 29 kW, 15 - 200 Nm

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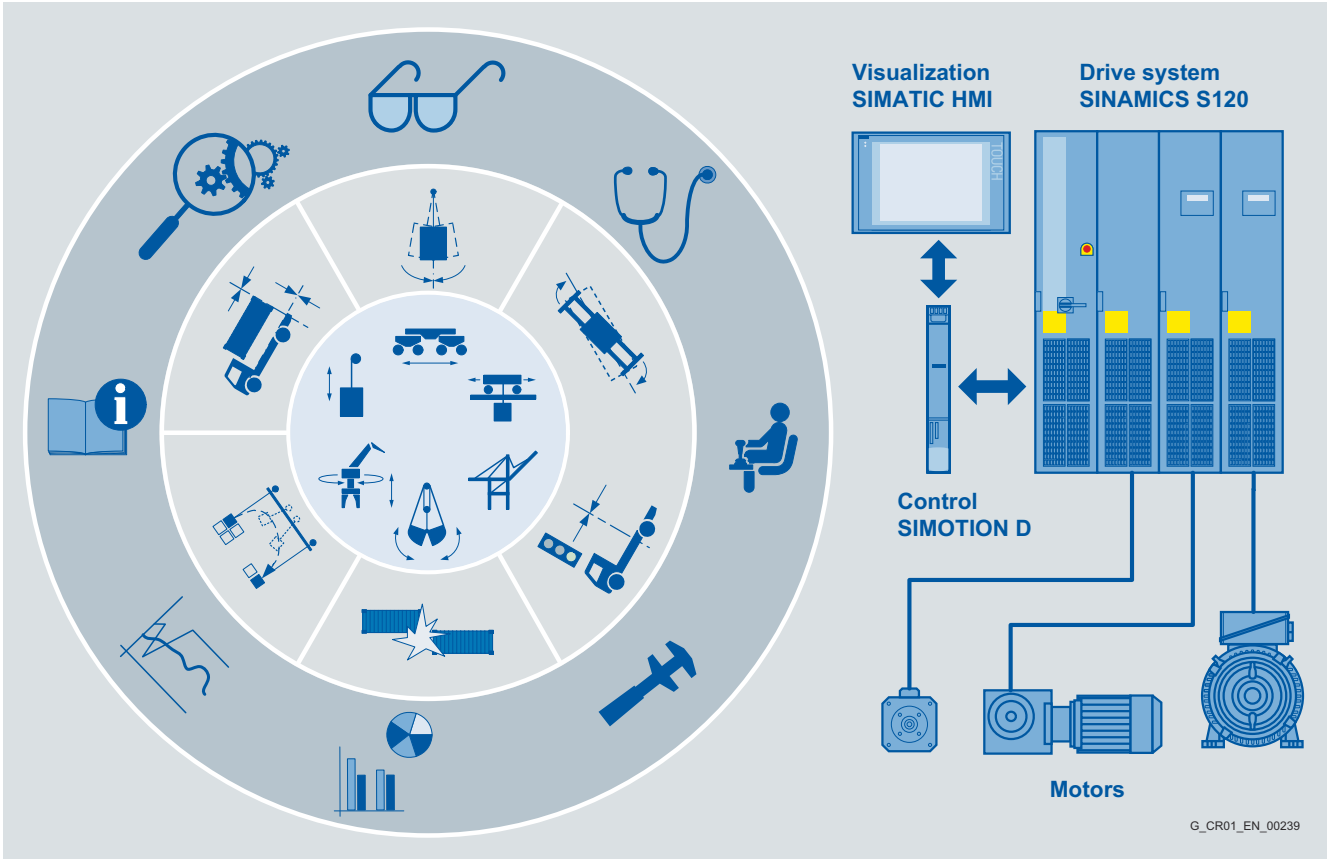
SIMOCRANE Basic Technology

Overview (continued)

SIMOCRANE Basic Technology

SIMOCRANE offers scalable technology modules for crane automation to increase productivity. The technology module basis is SIMOCRANE Basic Technology which is expanded with the Advanced Technology modules such as Sway Control, Skew Control and Truck Positioning.

The different modules enable the applications required in the crane environment for automation of manual, semi or fully automatic cranes to be represented.



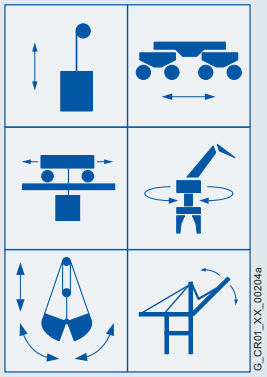
SIMOCRANE Basic Technology enables and optimizes the motion control of the different axes of a crane, also interactively. The software concept is modular, which makes it easier to implement different crane types.

The hardware platform for SIMOCRANE Basic Technology is the drive-based Motion Controller SIMOTION D. Together with the SINAMICS S120 drives family, SIMOCRANE offers a high-performance drive system for total control of the motion and therefore provides the platform for automation of the crane.

SIMOCRANE Basic Technology includes the following software modules for the drives:

- Hoisting gear
- Gantry
- Trolley
- Slewing gear
- Grab
- Boom – hoist or luffing gear

SIMOCRANE
Basic Technology
Hardware: SIMOTION D435 and CX32
Software: SIMOTION Scout engineering system



Overview (continued)

SIMOCRANE Advanced Technology

Apart from the drive technology, technological supplementary functions and sensor-based automation components are gaining in importance in the fulfillment of current market requirements. An important trend with cranes is the increasing degree of automation. SIMOCRANE Advanced Technology comprises optional additional components for increasing productivity, and increasing safety for personnel and machines.

These perfectly interacting function modules can be combined to achieve different degrees of automation.

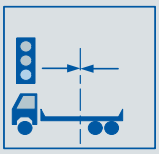
SIMOCRANE Sway Control Systems

Each movement of a crane with cable guides results in the load swaying and therefore represents a risk to humans and property. Transport processes also take longer to complete. A sway control system can be used to make the transport processes more effective and safer.

SIMOCRANE offers a high-performance sway control system with hoist control that ensures a high degree of safety for persons, transport goods and equipment. Automatic sway control relieves the crane driver and also ensures faster and more accurate positioning of the load.

In the case of automated motion control, a sway control system is essential for avoiding the risk of collisions and accidents. In the case of grab cranes, a completely controlled sway is necessary.

SIMOCRANE Truck Positioning System



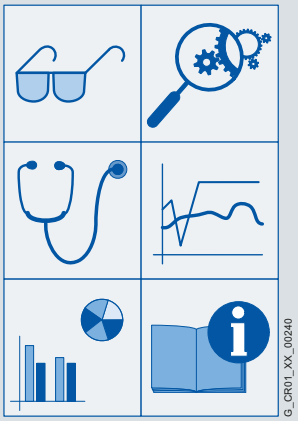
Truck positioning is a task that affects the duration of transport of the load.

At terminals which use trucks for transportation, drivers are instructed manually or must rely on their judgment. This has a detrimental effect on personnel safety and on the duration of positioning tasks. Truck Positioning increases safety, optimizes the positioning process and indirectly reduces the wear on the materials of cranes and trucks.

Overview (continued)

SIMOCRANE Crane Management System

SIMOCRANE CMS
Hardware: SIMOTION PCs (Rack PC, Touch PC)
Software: SIMATIC WinCC + options/AddOns



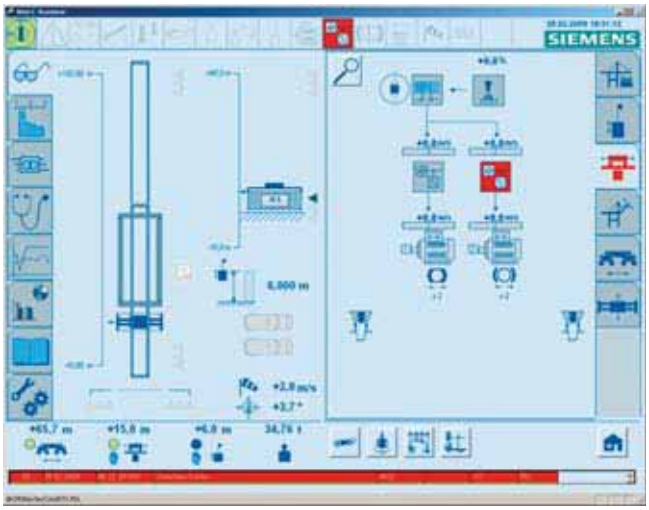
The SIMOCRANE CMS Crane Management System is a PC-based visualization application (SCADA) for crane drivers, maintenance personnel, and plant operators. It provides the following functions:

- Graphical visualization of the crane system
- Condition monitoring and real-time trace
- Alarm/event reporting system and support for diagnostics
- Recording measured values for various operating parameters
- Recording and analysis of cargo handling data
- Recording and evaluation of operating hours and counters
- Direct call of referenced information

SIMOCRANE CMS is a graphics-based, user-oriented system that supports users in a simple manner during operation as well as with troubleshooting and rectification of faults. This reduces the downtime for a crane. SIMOCRANE CMS provides the crane operator with important data for analysis. Critical states are signaled to the crane driver preemptively to prevent damage.

The system architecture is based on conventional standards and thus offers the facility for integrating into existing IT and automation landscapes. WinCC has a number of available communication channels for connecting to automation systems of different manufacturers. The connection to higher-level logistics systems is also possible thanks to the openness of the system.

Status display



Graphical condition monitoring – Fault status

DataMonitor

Graphic DataMonitor

SIMOCRANE application examples

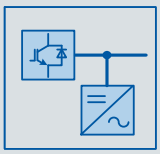
SIMOCRANE offers a range of coordinated products that, in different combinations, fulfill a wide range of different requirements.
The high degree of scalability is a decisive advantage in the implementation of simple manual crane applications through to semi or fully automated crane applications.
The diversity and combination possibilities of SIMOCRANE products for implementing the different requirements will be illustrated here.

Through the use of Basic Technology and different Advanced Technology functions, different applications can be implemented and various degrees of automation can be achieved.

Overview (continued)

Drive systems

SINAMICS S120
SIMOTRAS HD
Resistor units
Contactors



SINAMICS is the new drive platform from Siemens designed for mechanical and plant engineering.

Crane applications place demanding requirements on the dynamic response and integration capability of additional technology functions.

SINAMICS S120 provides the solution for these demanding tasks in combination with the crane motors listed in Chapter 3 of this catalog. SINAMICS S120 is characterized by the following properties:

- Modularity
- Combination
- High performance in terms of output and closed-loop control

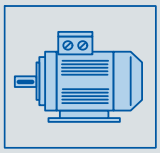
Multi-axis drive solutions with higher-level motion control for cranes can be implemented using the SINAMICS S120 system components.

SIMOTRAS HD drive components and the 1LT series of slip-ring motors are ideally suited to retrofitting in industrial crane applications. The SIMOTRAS HD three-phase AC controllers can be easily integrated into existing, conventional crane control systems (contactor controls).

They are easy to handle, smooth in operation, and therefore protect the complete mechanical system of the crane. Their extreme ruggedness makes these components ideally suited to applications in harsh industrial environments, e.g. in steelworks and foundries.

Motors

Three-phase squirrel-cage motors
Three-phase slip-ring motors



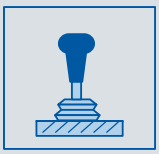
This new range of Siemens motors was designed to fulfill the special requirements of motors for lifting gear. This resulted in the compact, forced-ventilated, three-phase 1PH8, 1PH7 and 1PL6 motors in the top-end performance range. Their specific characteristics such as high power density, low moment of inertia, and high overload capability make these motors ideally suited to applications in hoists, holding gear and closing gear.

The 1LG4 and 1LG6 motor series are ideally suited as hoist motors in the mid-performance range. The axially-mounted external fan (natural or forced ventilation) supports the operation of motors, also over long periods at rated torque, at low speeds.

For gantries - or motorized trolleys - naturally cooled motors without fans of the 1LP4 and 1LP6 series with built-on spring-operated brakes are available. All crane motors are specially designed for operation on converters, such as SINAMICS.

Crane components

Crane components
Controllers
Double master switches
Controller monitors



Crane components such as crane controllers, master switches and controller monitors complete the portfolio in the segment of drive and control components.

1

Notes

SIMOCRANE
Standard Technology

2

Motion control

Overview

Crane applications

The SIMOCRANE Basic Technology sector solution has been available since mid-2007. The SIMOCRANE Basic Technology is a system of hardware and software packages for automating cranes that supports you in achieving maximum performance with crane applications. The new solution has the following features:

- The basic technology comprises the following standard functions and covers the motion control of all of the main drives of a crane:
  - Hoist
  - Gantry
  - Trolley
  - Slewing gear
  - Grab
  - Boom – hoist or luffing gear
- All of the functions proven in practice are found again on the SIMOTION platform. Furthermore, the latest requirements have been taken into account.
- New closed-loop control concept for synchronous operation and positioning with position controller
- Adaptation to customized requirements; a package supports both:
  - "Ready-to-run" (for parameterization only) as well as
  - "Ready-to-apply" (for adapting by the user)
- The technological basis is the SIMOTION D motion control system.

Benefits

SIMOCRANE Basic Technology provides the following benefits:

- Standard applications significantly reduce the time for engineering ("Ready-to-run")
- Easy adaptation and expansion for customized requirements ("Ready-to-apply")
- One platform for all crane technologies (different crane technologies such as sway control are systematically added to the SIMOCRANE Basic Technology)

Consequently:

- The number of interfaces is reduced with SIMOTION D
- Engineering and commissioning costs are reduced
- Standardization is made easier.

Applications

The SIMOCRANE Basic Technology has a modular software structure. The application solution can be flexibly implemented for different types of crane, e.g. for

- Harbor cranes
  - STS (container quay crane, also for double spreader in tandem mode)
  - RMG (Rail Mounted Gantry) cranes
  - GSU (ship unloaders) etc.
- High and medium-performance industrial cranes with crane-specific technology
  - Coil cranes
  - Gantry cranes
  - Waste incineration cranes, etc.

Design

Structure of an axis grouping with the SIMOTION D435 motion control system in the crane application

A SIMOTION D435 crane application comprises the following components:

- A SIMOTION D435 Control Unit, designed for open and closed-loop control of a multiple axis line-up
- A SIMOTION CX32 Controller Extension when using more than 4 axes (see "Topology of container quay crane", Page 2/9)
- Several SINAMICS S120 Motor Modules (power units)
- Other drive components, such as
  - Power supply
  - Filter
  - Reactor, etc.
- The connection between SIMOTION D435 and the SINAMICS S120 Motor Modules which is implemented with DRIVE-CLiQ in a star topology to ensure axis redundancy (see "Topology of container quay crane", Page 2/9).
- A CU320 Control Unit for open and closed-loop control of the parallel infeed (up to 4 infeed units)
- One or more SINAMICS S120 Line Modules (in SIMOCRANE Basic Technology, the infeed unit is separately controlled by the SIMATIC S7, see "Topology of container quay crane", Page 2/9).

SIMOCRANE Basic Technology software

The SIMOCRANE Basic Technology package not only provides the basic functionality, the SIMOTION Motion Control technology package (for positioning, synchronous operation, etc.) and standard libraries, but also the Crane Basic Technology package complete with two libraries. The package also contains several complete standard applications for cranes.

Selection and ordering data

Scope of delivery

The SIMOCRANE Basic Technology package offers a control system with hardware and software for various crane applications.

It includes:

Hardware:

- SIMOTION D435

CompactFlash card:

- Current firmware version
- Licenses:
  - SIMOTION Multi-Axes (for motion control)
  - SIMOTION IT (for service, diagnostics and commissioning through an Internet browser)
  - SIMOTION Crane Basic Technology (for functions in the crane DCC library)

Software on CD:

- Setup with crane DCC library and online help
- Crane FB library
- Standard applications, e.g. for a container quay crane (STS) or a ship unloading crane (GSU), etc.
- Documentation

	Order No.
SIMOCRANE Basic Technology	**6AU1660-4AA10-0AA0**

Supplementary components

Depending on the application, the following components can be supplied for open-loop and closed-loop control:

	Order No.
SIMOTION CX32 (SINAMICS Controller Extension)	**6SL3040-0NA00-0AA0**
SINAMICS DRIVE-CLiQ Hub Module DMC20	**6SL3055-0AA00-6AA0**
SINAMICS Sensor Module Cabinet-Mounted SMC 30	**6SL3055-0AA00-5CA1**
SINAMICS Terminal Module TM31	**6SL3055-0AA00-3AA0**
SIMOTION SCOUT V4.1 SP5	**6AU1810-1BA41-5XA0**
Optional package Drive Control Chart (DCC) V2.0 SP5 for SIMOTION/SINAMICS	**6AU1810-1JA20-5XA0**

SINAMICS S120 drive systems, motors and connection systems are not included in the package (see Chapter 6 "Drive Systems"). These components must be ordered separately.

Further information on selection and ordering of supplementary components can be found in the following catalogs:

- PM21 – SIMOTION, SINAMICS, and motors for production machines
- D81.1 – Low-voltage motors, IEC squirrel-cage motors
- IK PI – Industrial communication, distributed I/O, PROFIBUS

Further information

Notes on licensing

Licensing is in accordance with the serial number of the memory card (CompactFlash card), but is not specific to the software version. The crane application software cannot run without licenses. The licensing is via Siemens Motion Control Web License Manager.

Training

Siemens Cranes offers crane-specific training:

www.siemens.nl/training/cranes

Hardware
SIMOTION D435 Control Unit

Overview

SIMOTION D435 platform

SIMOTION D435

SIMOTION D is a compact, drive-based version of SIMOTION based on the SINAMICS drives family. With SIMOTION D, the motion control functionalities of SIMOTION as well as the drive software of SINAMICS S120 run on a shared control hardware. With the integrated drive computing functions it allows the D435 Control Unit to operate up to 4 vector axes.

Motion tasks can be easily and uniformly resolved using SIMOTION. The IEC 61131-3-compliant PLC integrated in SIMOTION D means that the system is not just capable of controlling sequences of motions, but the entire machine as well. The technology packages, function libraries and multi-layer architecture of the runtime system combine to achieve the scalable functionality of SIMOTION. This results in the following benefits:

- Directly uses the innovative structure of SINAMICS S120 - compact construction to reduce the cabinet volume
- Versatile networking thanks to onboard PROFIBUS DP and Industrial Ethernet interfaces, as well as via PROFINET IO (optionally via CBE30 Communication Board)
- Easy to service thanks to CompactFlash card, which can be easily replaced and contains all data (programs, data, drive parameters)

Option Modules

The following Option Modules are available for SIMOTION D4x5 Control Units:

- CBE30 Communication Board for connection to PROFINET IO
- TB30 Terminal Board for the expansion with 4 digital inputs, 4 digital outputs, 2 analog inputs and 2 analog outputs

Design

Display and diagnostics:

- LEDs to display operating states and errors
- 3 measuring sockets

Integrated I/O:

- 8 digital inputs
- 8 digital inputs/outputs (max. 8 as high-speed cam outputs, max. 6 as high-speed probe inputs)

Communication:

- 4 x DRIVE-CLiQ
- 2 x Industrial Ethernet
- 2 x PROFIBUS DP
- 2 x USB

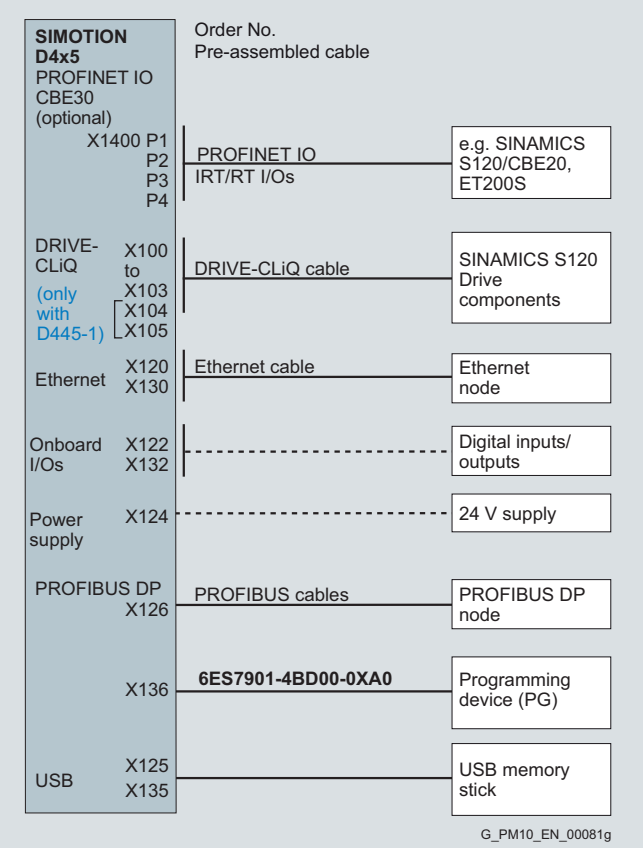
Data backup:

- 1 slot for SIMOTION CompactFlash card

Further interfaces:

- Terminals for 24 V electronics power supply

Integration



SIMOTION D435 connection overview

Technical data

	SIMOTION D435 STANDARD Performance
PLC and motion control performance	
Maximum number of axes	32
Minimum PROFIBUS cycle	1 ms
Minimum PROFINET transmission cycle	0.5 ms
Minimum servo/interpolator cycle clock	1.0 ms
Integrated drive control	
Max. number of axes for integrated drive control (servo / vector / *U/f*)	6 / 4 / 8 (alternative) (drive control based on CU320, firmware version 2.x)
Memory	
RAM (work memory) (+ 20 MB for Java applications)	35 MB
RAM disk (load memory)	23 MB
Retentive memory	364 KB
Persistent memory (user data on CF)	300 MB
Communication	
DRIVE-CLiQ interfaces	4
USB interfaces	2
Ethernet interfaces	2
PROFIBUS interfaces	2 • Equidistant and isochronous • Can be configured as master or slave
PROFINET interfaces	Optionally over CBE30: • 1 interface with 4 ports • Supports PROFINET IO with IRT and RT • Can be configured as PROFINET IO controller and/or device
General technical data	
Fan	Optional fan/battery module (single fan)
Supply voltage	
• Rated value	24 V DC
• Permissible range	20.4 ... 28.8 V
Current consumption, typ. (excluding digital outputs and DRIVE-CLiQ supply)	600 mA
Starting current, typ.	6 A
Power loss, typ.	15 W
Permissible ambient temperature	
• Storage and transport	–40 ... +70 °C
• Operation	0 ... 55 °C Maximum installation altitude 2000 m above sea level. Above an altitude of 2000 m, the max. ambient temperature decreases by 7 °C every 1000 m; maximum 5000 m above sea level.
Permissible relative humidity (without condensation)	5 ... 95 %
Atmospheric pressure	700 ... 1060 hPa
Degree of protection in accordance with EN 60529 (IEC 60529)	IP20
Dimensions (W x H x D)	50 mm x 380 mm x 230 mm
Weight	
• SIMOTION D	2600 g
• CompactFlash card	10 g

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Technical data (continued)

	SIMOTION D435 STANDARD Performance
Digital inputs	**8**
• Input voltage	
- Rated value	24 V DC
- For "1" signal	15 ... 30 V
- For "0" signal	-3 ... +5 V
• Galvanic isolation	Yes, in groups of 4
• Current consumption, typ. at 1 signal level	10 mA at 24 V
• Input delay, typ. (hardware)	L → H: 50 µs H → L: 100 µs
Digital inputs/outputs (parameterizable)	**8 (max. 6 as high-speed probe inputs, max. 8 as high-speed cam outputs)**
If used as an input	
• Input voltage	
- Rated value	24 V DC
- For "1" signal	15 ... 30 V
- For "0" signal	–3 ... +5 V
• Galvanic isolation	No
• Current consumption, typ. at 1 signal level	10 mA at 24 V
• Input delay, typ. (hardware)	L → H: 50 µs (5 µs as probe input) H → L: 100 µs (50 µs as probe input)
• Probe input, accuracy	5 µs
If used as an output	
• Rated load voltage	24 V DC
- Permissible range	20.4 ... 28.8 V
• Galvanic isolation	No
• Current load, max.	500 mA per output
• Residual current, max.	2 mA
• Output delay time, typ./max. (hardware, with 48 Ω load)	L → H: 150 µs/400 µs H → L: 75 µs/100 µs
• Cam output, accuracy (reproducibility)	125 µs
• Switching frequency of the outputs, max.	
- For resistive load	100 Hz
- With inductive load	2 Hz
- For lamp load	11 Hz
• Short-circuit protection	Yes
Other technical data	
Non-volatile data backup [1]	
• Backup time, min.	5 days (real-time clock/SRAM backup)
• Charging time, typ.	A few minutes
Approvals, according to	cULus

[1] Alternative: Longer buffer duration using fan/battery module or permanent buffering on a CompactFlash card with system command.

Overview

SIMOTION CX32 Controller Extension

SIMOTION CX32 Controller Extension

In the crane application (see "Topology of container quay crane"), the SIMOTION CX32 Controller Extension is implemented for the function module group, e.g. 2 x gantry or 2 x trolley. Thus communication between the function modules, such as master-slave torque control between gantry 1 and gantry 2, is performed within a CPU.

The SIMOTION CX32 Controller Extension is a component in SINAMICS S120 format and supports scaling of the drive-end computing performance of the SIMOTION D435 Control Unit. Each CX32 can control up to four additional vector axes. The data for the CX32 is stored exclusively on the SIMOTION D435 Control Unit, which means no action has to be taken when the module is replaced.

The controller is connected to SIMOTION D with DRIVE-CLiQ which ensures high-performance isochronous control of the drives without additional modules.

Technical data

	SIMOTION CX32 Controller Extension
Integrated drive control	
Max. number of axes for integrated drive control (servo / vector / *U/f*)	6 / 4 / 8 (alternative) (drive control based on CU320, firmware version 2.x)
Communication	
DRIVE-CLiQ interfaces	4
General technical data	
Supply voltage	
• Rated value	24 V DC
• Permissible range	20.4 ... 28.8 V
Current consumption, typ. (excluding digital outputs and DRIVE-CLiQ supply)	800 mA
Starting current, typ.	1.6 A
Power loss	20 W
Permissible ambient temperature	
• Storage and transport	–40 ... +70 °C
• Operation	0 ... 55 °C Maximum installation altitude 2000 m above sea level. Above an altitude of 2000 m, the max. ambient temperature decreases by 7 °C every 1000 m; maximum 5000 m above sea level.
Permissible relative humidity (without condensation)	5 ... 95 %
Atmospheric pressure	700 ... 1060 hPa
Degree of protection in accordance with EN 60529 (IEC 60529)	IP20
Dimensions (W x H x D)	25 mm x 380 mm x 230 mm
Weight	2200 g

Technical data (continued)

	SIMOTION CX32 Controller Extension
Digital inputs	**4**
• Input voltage	
- Rated value	24 V DC
- For "1" signal	15 ... 30 V
- For "0" signal	-3 ... +5 V
• Galvanic isolation	Yes, in groups of 4
• Current consumption, typ. at 1 signal level	10 mA at 24 V
• Input delay, typ. (hardware)	L → H: 50 µs H → L: 100 µs
Digital inputs/outputs (parameterizable)	**4 (max. 3 as high-speed measuring inputs)**
If used as an input	
• Input voltage	
- Rated value	24 V DC
- For "1" signal	15 ... 30 V
- For "0" signal	–3 ... +5 V
• Galvanic isolation	No
• Current consumption, typ. at 1 signal level	10 mA at 24 V
• Input delay, typ. (hardware)	
- 3 inputs (can also be used as measuring inputs)	L → H: 5 µs H → L: 50 µs
- 1 input	L → H: 50 µs H → L: 100 µs
• Measuring input, accuracy (reproducibility)	5 µs
If used as an output	
• Rated load voltage	24 V DC
- Permissible range	20.4 ... 28.8 V
• Galvanic isolation	No
• Current load, max.	500 mA per output
• Residual current, max.	2 mA
• Output delay time, max. (hardware) (hardware, with 48 Ω load)	L → H: 150 µs/400 µs H → L: 75 µs/100 µs
• Short-circuit protection	Yes
Other technical data	
Approvals, according to	cULus

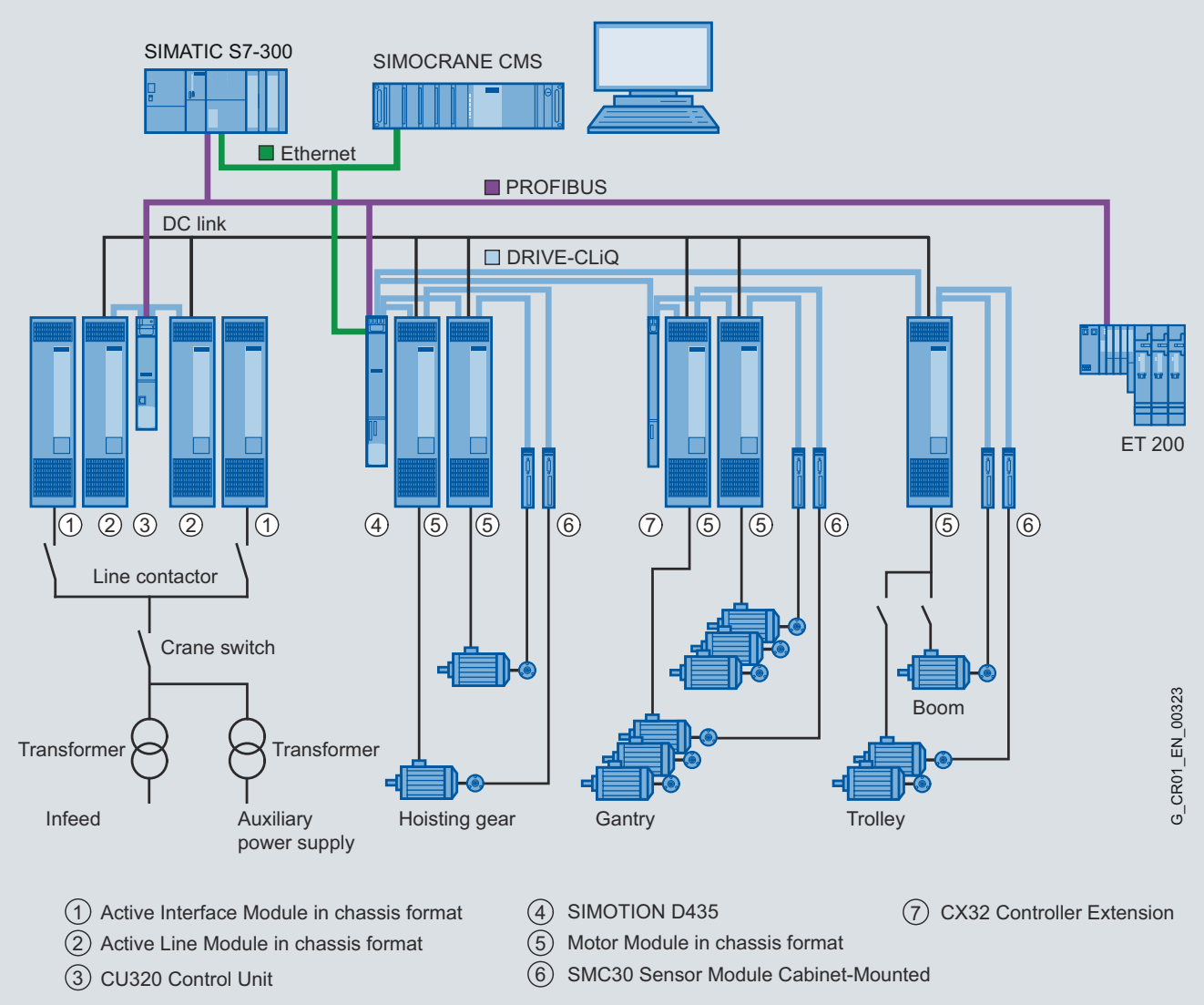
Note:
The SIMOTION CX32 Controller Extension comes with pre-installed spacer.

Application example

Hardware configuration

The hardware configuration based on the example of a container quay crane on the SIMOTION/SINAMICS platform is shown in the figure below.

The performance of the SIMOTION D hardware allows all cranes technology, not only Basic Technology, but also Advanced Technology, e.g. sway control, to be operated via a controller. The individual crane technologies build on each other systematically. Further crane technologies of SIMOCRANE are described in the chapters SIMOCRANE Advanced Technology and SIMOCRANE Crane Management System.



Topology of container quay crane

Overview

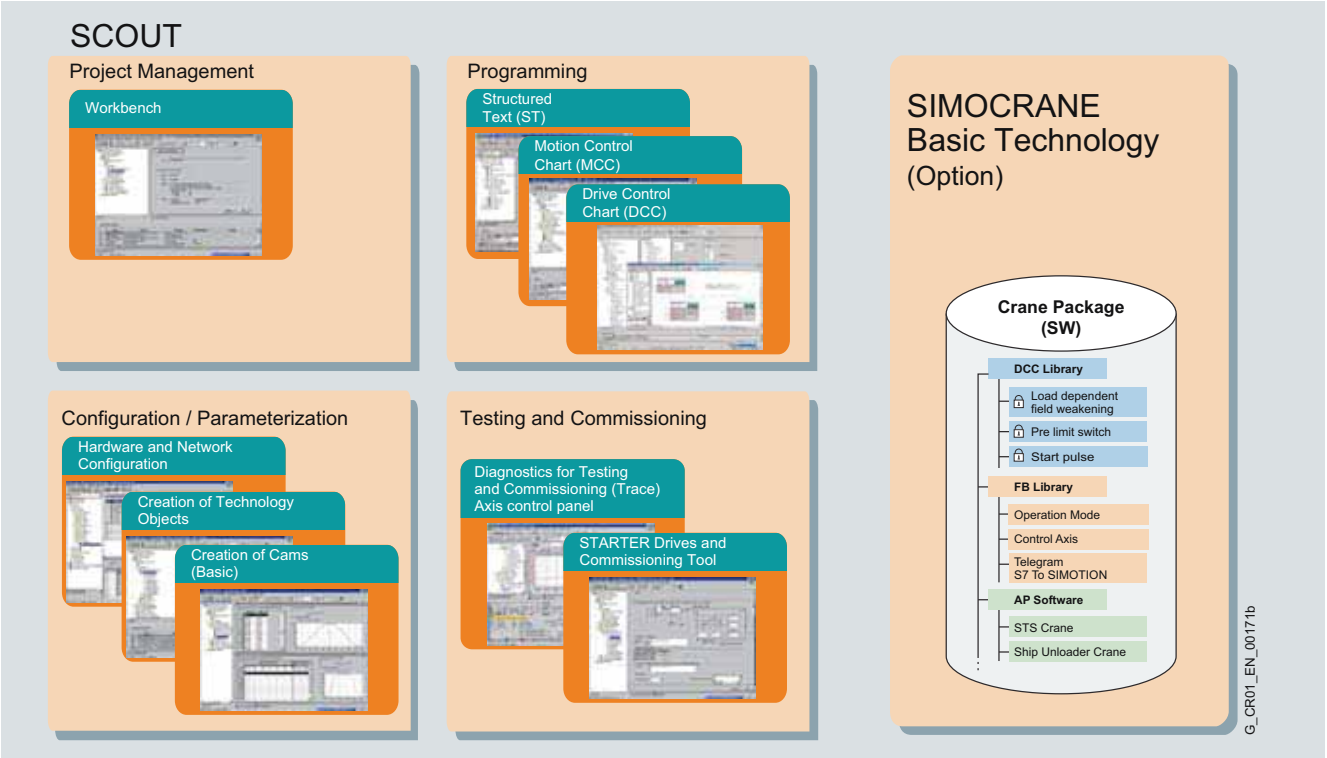
SCOUT is the engineering software for SIMOTION that is integrated in STEP 7. SCOUT contains all the tools required for configuration, parameterization, programming, testing, diagnostics and commissioning of SIMOTION and SINAMICS.

Structured text

The high-level language ST (Structured Text) provides all language elements as text commands. This enables well-structured applications to be created.

Crane-specific operations, such as operating mode assignment and management, message frame processing, etc. have been programmed in ST as function blocks and are stored in the "Crane FB library".

SIMOTION SCOUT



SIMOTION SCOUT with crane application

Overview

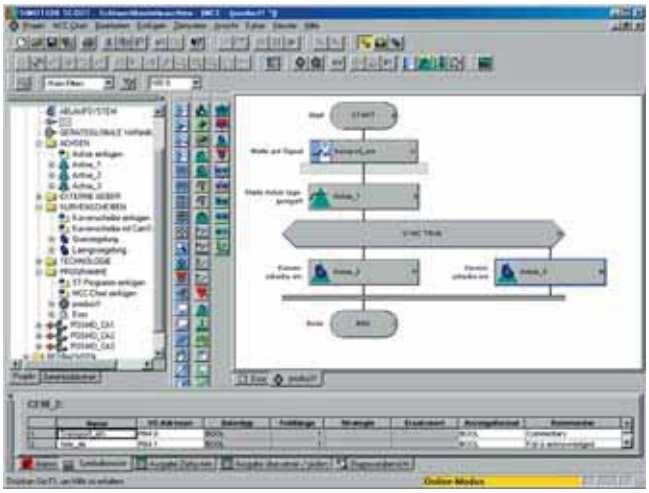
Motion Control Chart (MCC)

Motion Control Chart (MCC) is a "flow diagram language" that can be used to graphically formulate the process procedures in machines or cranes in a simple manner. The result is one or more flow diagrams, comprising MCC blocks that describe the time sequence of the individual function module. Due to its special means of expression, MCC (Motion Control Chart) is ideally suited to programming sequential processes.

Various MCC blocks are available for controlling the machine, for example, conditions must be fulfilled, I/O signals can be read or set, calculations can be formulated and different control structures such as condition (IF), cases (CASE) and loops (WHILE, REPEAT UNTIL) can be programmed.

All MCC blocks – a selection of the most important SIMOTION functions – are available in toolbars, see figure below.

In SIMOCRANE Basic Technology, MCC is implemented for the sequence control of every function module (e.g. hoist). This results in a clear flow chart for the drive-based control.



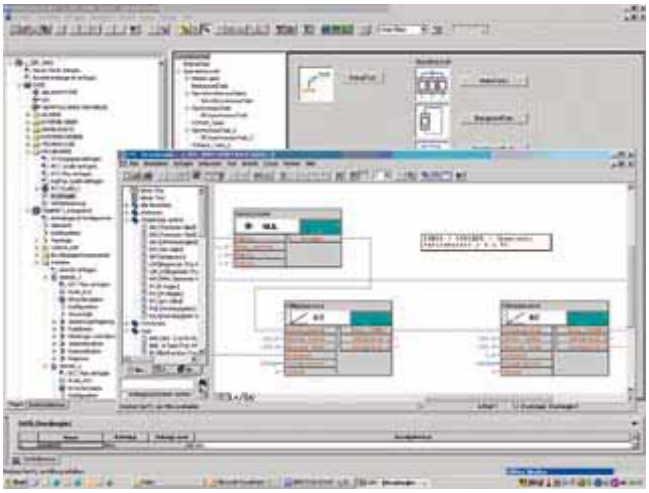
Motion Control Chart

Optional Drive Control Chart (DCC) packages

The Drive Control Chart (DCC) option packages for SIMOTION and SINAMICS extend the possibilities for easy graphical configuration of technology functions using predefined function blocks.

Multi-instance function blocks are selected from a predefined library and graphically interconnected using drag and drop. The standard function block library comprises a large number of control, calculation and logic blocks as well as extensive open and closed-loop control functions.

In the crane DCC library, individual crane-specific technologies (e.g. load-dependent field weakening) can be preconfigured using the SIMOTION standard DCC library and encapsulated in individual macro modules. These Crane DCC blocks are used for setpoint conditioning (velocity, acceleration) of the function module (e.g. hoist) at the time-cycle level. In this manner, clear control loops are presented and previously created blocks can be used again and again.



Drive Control Chart

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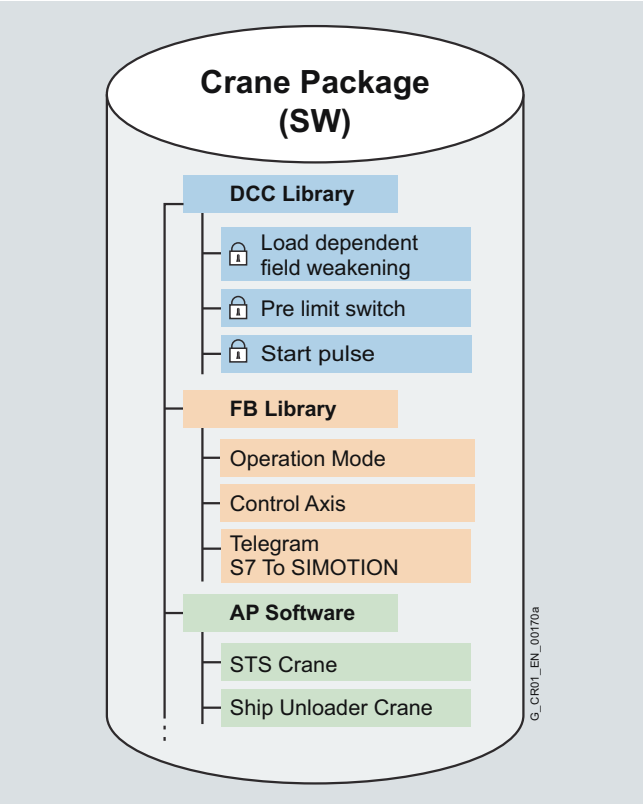
Design

The function library

The "Crane DCC library" comprises a collection of blocks (e.g. load dependent field weakening) which are implemented as "Drive Control Charts" (DCC) blocks. DCC is a representation which supports graphic configuring and interconnecting. The functional scope of the crane library is described in detail in the section "Technology functions".

The "Crane FB library" consists of a collection of blocks (e.g. Operation Mode) which have been programmed in "Structured Text" (ST). These function blocks are called up in the drive-based sequence control at the MCC level.



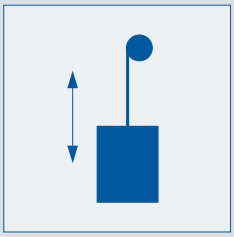
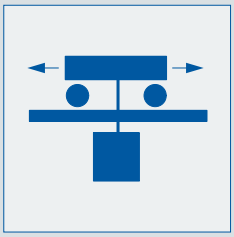
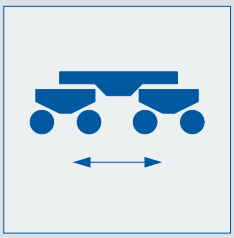
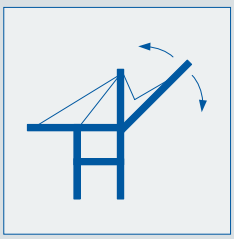
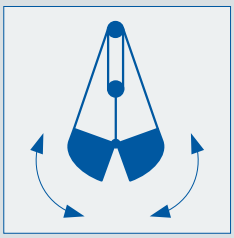
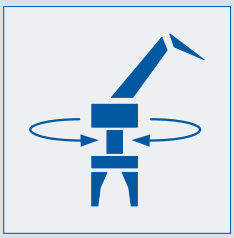
SIMOTION technology package

Standard applications

The standard applications comprise several ready-to-use configured function modules for different crane types, e.g. "Container quay crane" or "Ship unloading crane". These solutions are "ready-to-run" for the user who only needs to set the parameters appropriately. In the case of large-scale adaptation and expansion, these standard applications can be used as a starting point for "Ready-to-apply". Expandability and flexibility have therefore been taken into account.

Design

The application software has a modular structure according to crane type. An overview of the function modules, their operating modes and technology functions used are shown in the following tables.

Function modules	Number of axes	Control modes	Operating modes
Hoist	4 	• Single-axis positioning • Master-slave operation • Synchronous operation	• Automatic • Manual • Speed controlled (jogging) • Sway control
Trolley	2 	• Single-axis positioning • Master-slave operation • Synchronous operation	• Automatic • Manual • Speed controlled (jogging) • Encoderless emergency mode • Sway control
Gantry	2 	• Single-axis positioning • Master-slave operation • Synchronous operation	• Automatic • Manual • Speed controlled (jogging) • Encoderless emergency mode
Boom	1 	• Single-axis positioning • Closed-loop speed controlled with torque limiting	• Manual • Speed controlled (jogging)
Holding and closing gear	2 	• Separate positioning with one axis (holding or closing gear) • Synchronous operation between both axes	• Automatic • Manual • Speed controlled (jogging) • Sway control
Slewing gear	1 	• Single-axis positioning	• Automatic • Manual • Speed controlled (jogging) • Encoderless emergency mode

Overview of the function modules and operating modes

Design (continued)

Technology functions

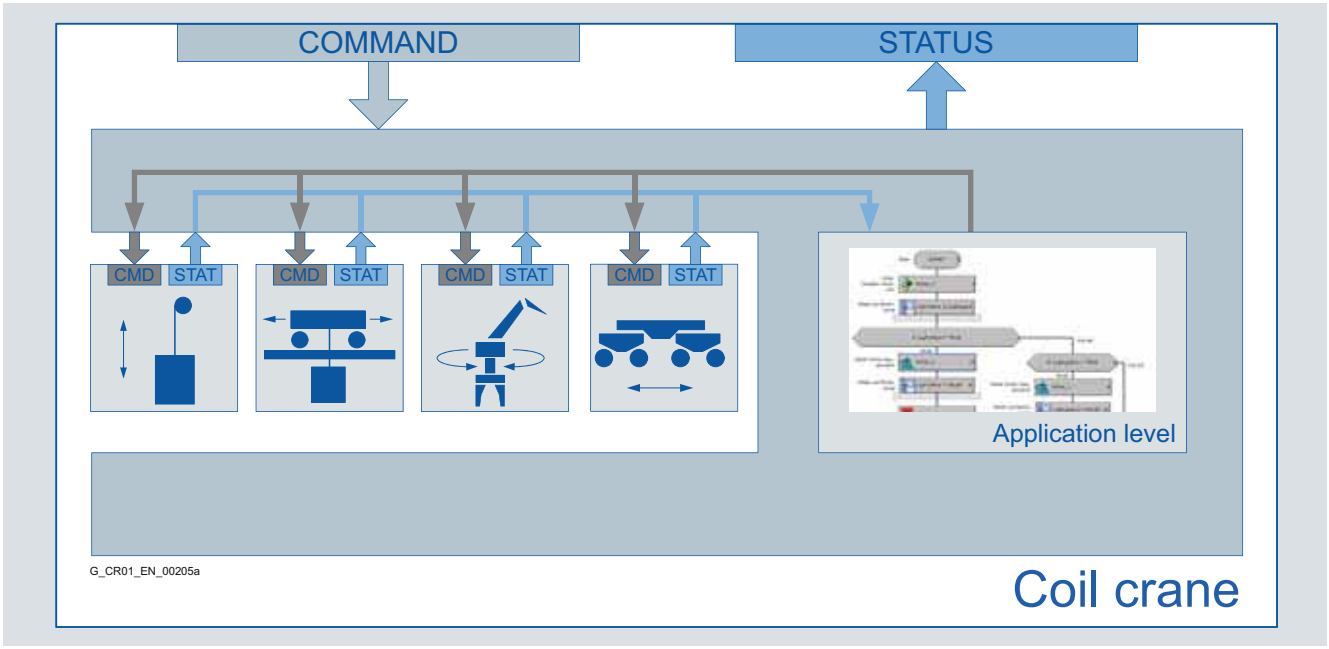
No.	Function	Brief description
1	Load-dependent field weakening	Using the DCC block, a supplementary speed setpoint is calculated dependent on the load. This speed increase for partial loads above the rated speed is required for cranes to increase the handling capacity.
2	Prelimit switch (selectable limiting)	The velocity of the drive can be influenced using the DCC block when a predefined pre-limit switch is reached.
3	Start pulse	Using the DCC block, "load sag" when starting hoisting gear with a suspended load is prevented.
4	Changeover of the ramp-function generator in the field-weakening range and when selecting heavy duty operation	Using the DCC block, the acceleration and deceleration times are modified in heavy duty operation or in field weakening.
5	Current distribution monitoring	Using the DCC block, the current setpoint/actual value from the master and slave are monitored. A message is generated if a specified difference is exceeded.
6	Slack rope controller	This function prevents slack rope developing in the handled goods when the grab is closed. The slack rope controller also ensures that the grab can bury itself into the material to be moved and therefore ensuring the maximum filling level.
7	Current equalization control for orange-peel bucket operation	When raising and lowering the closed grab, the tension levels in the holding and closing ropes should be approximately the same. This means that the hoisting power is optimally distributed across the two motors.
8	Slewing velocity dependent on the length of overhang	The speed of the slewing gear is adapted depending on the length of overhang of the luffing gear in order to keep the circumferential velocity constant.
9	Ramp-up/ramp-down time dependent on length of overhang + influence of the ramp-function generator dependent on the velocity	For cranes with luffing gear, with increasing length of overhang, the load torque for the slewing gear increases while accelerating. In order to avoid that the current limits are reached, the ramp-up and ramp-down times are linearly adapted as a function of the length of overhang.
10	Master switch	Using the DCC block, the drive can be moved with a fine sensitivity using the master switch for manual positioning.
11	Anti-slip control	The velocity between the motor encoder and the external encoder is monitored using the DCC block. If an excessively high velocity deviation occurs, the velocity or the acceleration is adapted in steps.
12	Heavy duty or constant field weakening	Using the DCC block, the drive also allows heavy duty operation (HeavyDuty) by changing the velocity, or operation with constant field weakening (FieldWeak).
13	Monitoring the overspeed	For hoisting gear applications, using the DCC block, an overspeed condition is monitored or a setpoint-actual value deviation is detected (this is not a fail-safe function).
14	Monitoring the setpoints	The DCC block is used to monitor whether the velocity, acceleration or deceleration have been reduced between the command being output from the S7 and implementation in the drive. Further, it is monitored as to whether the drive is in field weakening.
15	Continuous load measurement	This DCC block is used for grab cranes. A continuous load measurement is carried out to guide the crane driver if the grab is not visible. The message "Grab touchdown" is also displayed.
16	Grab monitoring	In the case of closing gear, the block DCC GrabMonitor can be used to detect bulky load material.
17	Time-optimized positioning for a single axis	Using the SIMOTION system function, the drive can be moved to the target position as quickly as possible and precisely with the specified maximum velocity and acceleration/deceleration.
18	Master-slave torque control	Master-slave operation is used if two motors are connected to a common shaft. The master operates either closed-loop position controlled or closed-loop speed controlled depending on the operating mode. The slave only operates closed-loop torque controlled. The master sends the torque as torque setpoint to the slave.
19	Synchronous operation	Synchronous operation control is used if two motors are connected to a common load. Depending on the operating mode, the master and slave operate either closed-loop position controlled or closed-loop speed controlled. The slave receives from the master through a gear (gear ratio 1 : 1) depending on the operating mode, either a speed or position setpoint. The functional scope has been expanded with the implementation of flying homing, offset compensatory control, fixed offset increasement/decreasement, and cornering movement.
20	Tandem mode	The tandem mode is an extension of the synchronous operation control mode. Synchronous operation motion control takes place between two groups. In each group, two drives can be coupled in master-slave closed loop torque control or also in synchronous operation. The function is suited to applications for harbor cranes, such as a double spreader container crane or large ship unloader with 4 drum grabs, as well as industrial cranes with several hoist drives and trolleys.
21	Cornering movement	Using this function, cornering movement for the gantry can be executed in closed-loop speed controlled operation.
22	Brake test	The mechanical brake function (e.g. hoisting gear) should be regularly checked using this function. To do this, the axis moves against the closed brake with a certain torque setpoint in order to check the braking capability of the brake.

Lifting gear specific technology functions

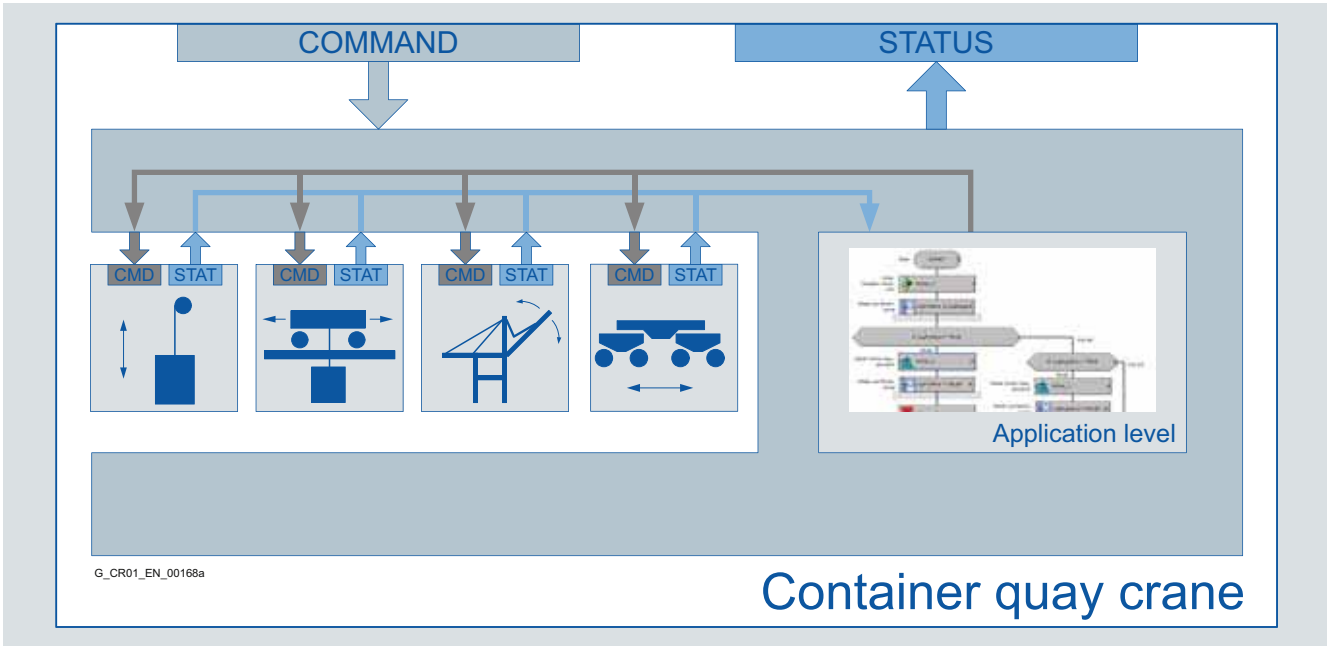
Application example

Software structure

The modular software concept makes it easier to automate different crane types. With the help of the open software, all crane-specific technologies or functions can be supplied to the user in the form of function blocks. The software structure is shown for a coil crane, a container quay crane and a ship unloading crane in the following examples. Each axis of motion is mirrored with a function module in the software. Controlling and meshing of the axes are tracked at the application level.



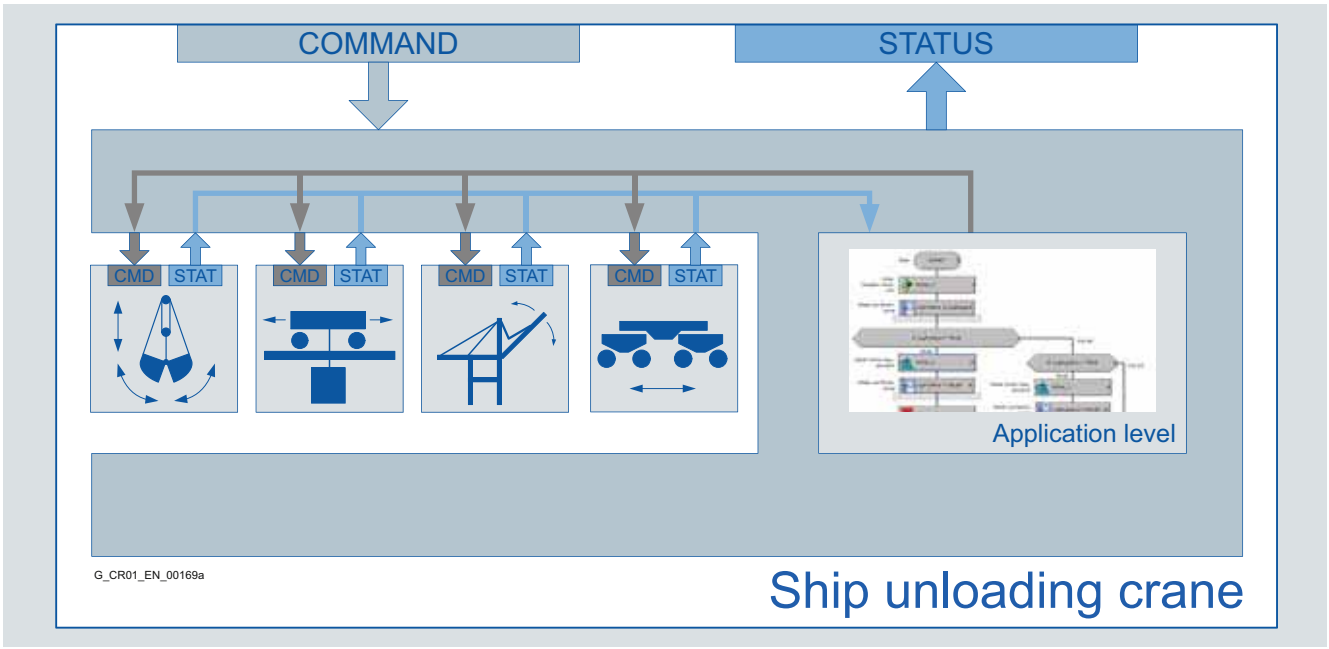
Function blocks for coil crane



Function blocks for container quay crane

2

Application example (continued)



Function blocks for ship unloading crane

Each function module (e.g. hoist) has an MCC unit and a DCC chart. Two application programs created in the MCC call the necessary function blocks from the "Cranes FB library" for execution of the function module (e.g. operating mode management). In a program created by DCC, the setpoint channel for velocity and acceleration/delay takes into account the crane-specific technology (e.g. load-dependent field weakening) cyclically.

The standard application is created according to crane type, e.g. "Container quay crane". For "ready-to-run" users, only parameterization is necessary. For "ready-to-apply" users, this provides the starting point for individual expansions and adaptation to concrete crane applications.

SIMOCRANE
Advanced Technology

3

Sway Control Systems

Overview

During every acceleration or braking process of a crane, swaying is excited in the load.

The electronic SIMOCRANE Sway Control Systems ensure that these load oscillations are eliminated so that crane transport can be performed quickly, without danger, and without any damage to the transported goods.

The SIMOCRANE Sway Control System is available in the SIMOCRANE CeSAR standalone or SIMOCRANE SC integrated system using the SIMOTION D motion controller and the SIMOCRANE Basic Technology.

Depending on the task to be performed and the environmental conditions, the Sway Control Systems can be implemented with or without SIMOCRANE CenSOR camera measuring systems.

Harbor crane system

Benefits

For the handling and transport tasks of cranes, the trend is toward an ever higher productivity and quality. This is achieved with an increasing number of automatic functions of which electronic Sway Control Systems represent a large component.

There are many reasons for using electronic sway control, such as:

- To increase the productivity of the crane system
- To reduce damage
- To prevent accidents
- To simplify the crane structure
- Automatic operation of the crane system
- To extend the service life of crane systems
- Continuous load damping no longer depends on subjective factors

Applications

The Sway Control System is for new crane controllers and it can be used to extend existing crane controllers.

SIMOCRANE Sway Control Systems can also be used in cranes in which drive technology from other suppliers is used.

The requirements for the use of SIMOCRANE Sway Control Systems are a crane controller as well as continuously controllable drives. In some cases, position sensors are necessary. In all cranes, sensors are required for the hoisting gear and for the axes to be positioned if automatic positioning is used.

SIMOCRANE Sway Control Systems are suitable for the following crane types:

- Overhead bridge cranes, gantry cranes (OHBCs)
- Rubber tyred gantry (RTG) cranes
- Rail-mounted gantry (RMG) cranes
- Ship to shore (STS) cranes
- Grab / ship unloader (GSU) cranes
- Slewing cranes (on request)

Various system types with different functions are available for the different application areas.

SIMOCRANE Sway Control Systems	
SIMOCRANE CeSAR standalone	**SIMOCRANE SC integrated**
Overhead bridge cranes (OHBC) e.g. coil / warehouse / handling cranes	Container cranes e.g. STS
Gantry cranes e.g. RMG, RTG	Ship unloaders, e.g. GSU
SIMOCRANE CenSOR camera measuring system	

The SIMOCRANE SC integrated Sway Control System is a software solution that is used on the central SIMOTION D motion controller. The system for sway control is currently available in two axes (trolley direction + direction of rotation) with the functional scope for ship to shore cranes STS and grab cranes GSU.

The SIMOCRANE CeSAR standalone Sway Control System is an autonomous system that can be used in any controller landscape. The system for sway control is currently available in three axes (trolley direction + bridge direction + direction of rotation **or hoist**) with the functional scope for bridge/ gantry cranes.

In future, the SIMOCRANE Sway Control Systems for 2-3-axis applications will be available as a standalone and as an integrated system.

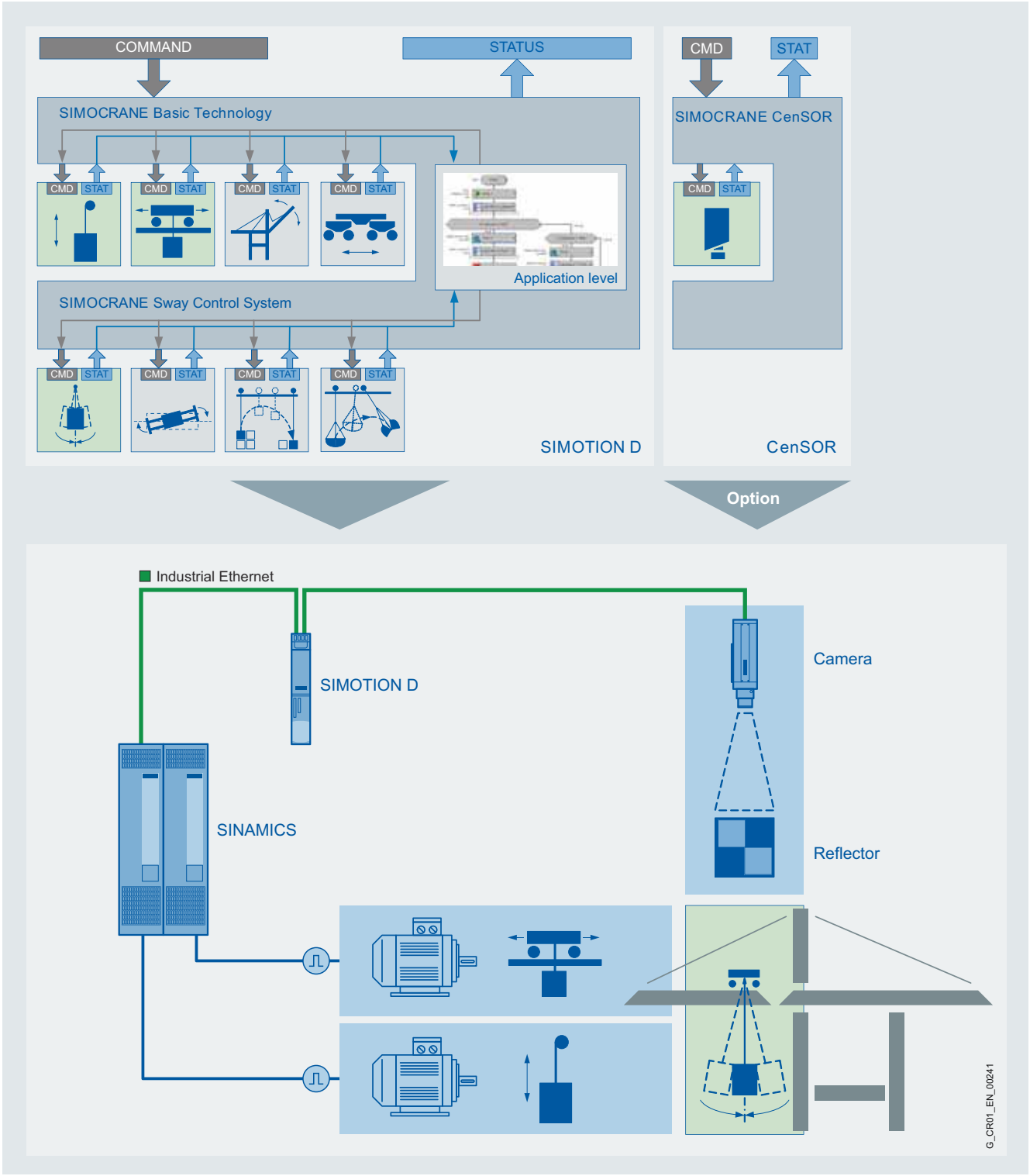
The SIMOCRANE CenSOR camera measuring system can be used with the SIMOCRANE Sway Control Systems, depending on the task to be performed and the environmental conditions.

Design

SIMOCRANE SC integrated Sway Control System

The SIMOCRANE SC integrated system is a software solution based on SIMOCRANE Basic Technology. In this case, special sway control blocks are application linked with the Basic Technology blocks. See the figure "Configuration of SIMOCRANE SC integrated for an STS application".

Commissioning and parameterization of sway control is performed with a supplied commissioning tool. The engineering software comprises the same tools as for Basic Technology, SIMOTION SCOUT and Drive Control Chart DCC. For acquisition of the external disturbance variables, the SIMOCRANE CenSOR camera measuring system can be optionally connected to motion controllers. Commissioning and parameterization is also performed using a supplied commissioning tool.



Configuration of SIMOCRANE SC integrated for an STS application

3

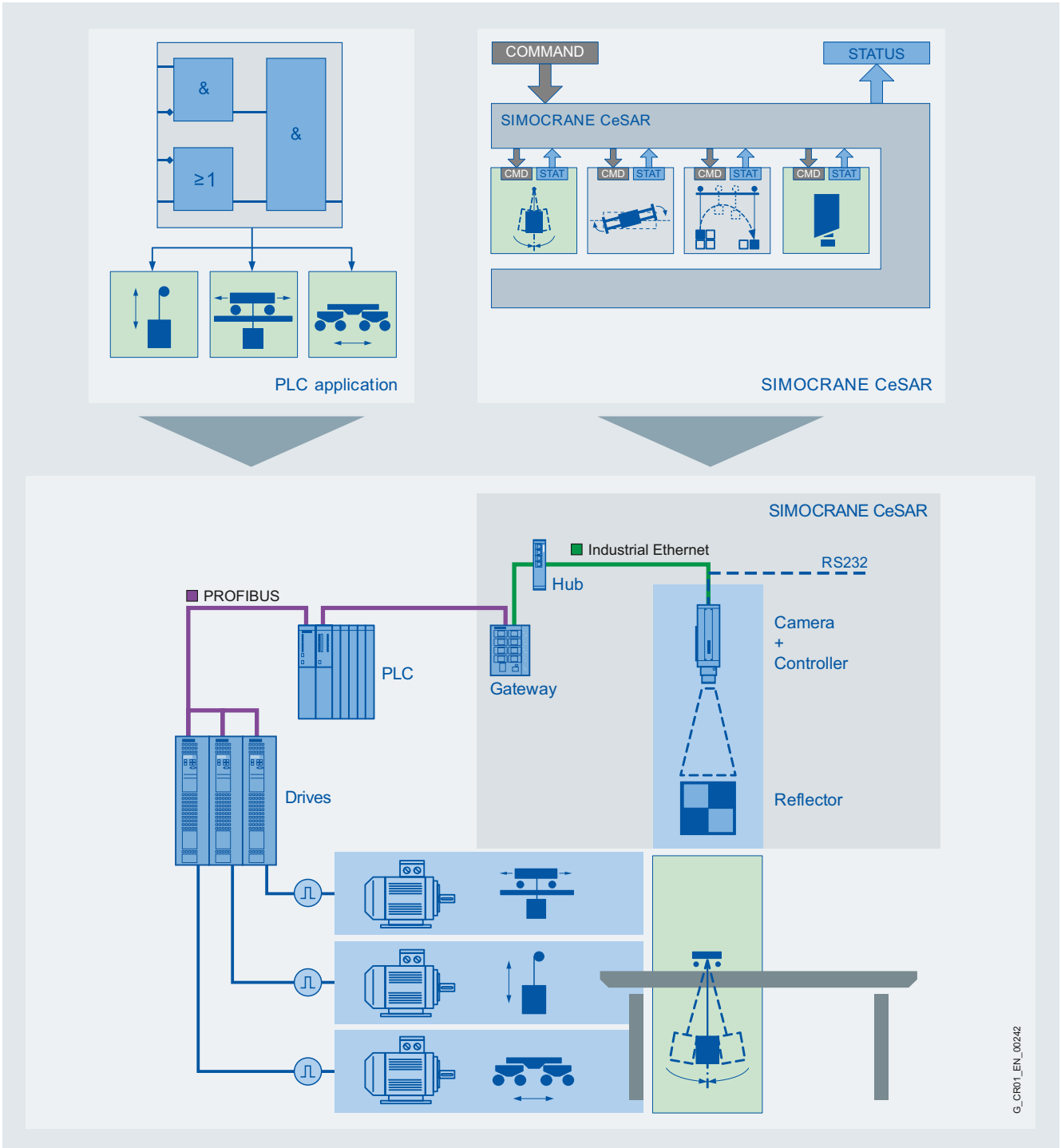
Design (continued)

SIMOCRANE CeSAR standalone Sway Control System

This is a standalone solution that communicates with the crane PLC that is responsible for motion control. SIMOCRANE CeSAR can be connected to PROFIBUS DP for communication purposes. The system consists of a camera with integrated Power PC, an Ethernet-PROFIBUS gateway, a hub, and an RS232 diagnostics module. In systems with "sight", a lens and reflector are also required.

If a camera cannot be used due to insufficient visibility, only a controller and the components required for communication are used.

Communication with the crane controller takes place via the gateway and hub. The sway control and the camera are commissioned and parameterized via the hub or the RS232 module with the supplied commissioning tool.



Configuration of SIMOCRANE CeSAR standalone for an overhead bridge crane application

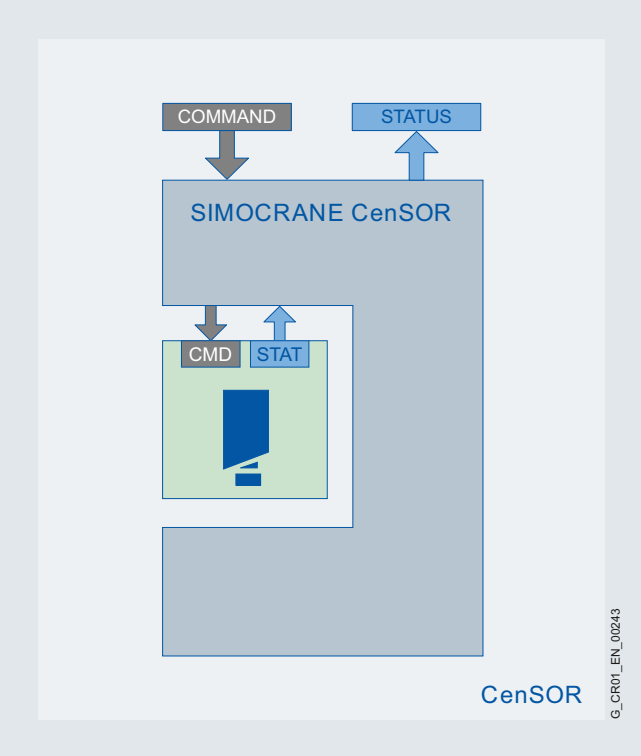
Design (continued)

SIMOCRANE CenSOR camera measuring system

The SIMOCRANE CenSOR camera measuring system comprises a camera with integrated processing unit in various designs and a reflector with a specific optical feature. The system is used in conjunction with SIMOCRANE SC integrated.

Depending on the task to be performed and the environmental conditions, Sway Control Systems can be implemented with or without camera measuring systems. If a camera is used, it has the task of observer for detecting deviations in the ideal sway response for the situation.

It is recommended that a camera is used with ship to shore (STS) cranes. Grab cranes (GSU) are not generally equipped with a camera due to the large dust deposits.



SIMOCRANE CenSOR camera measuring system

When using a camera measuring system a reflector is also required which is attached to the load suspension device. Active reflectors are also equipped with infra-red LEDs. In this way, measuring errors that can be caused by shadows and artificial lighting can be largely avoided. The dimensions of the reflector are dependent on the maximum distance of the camera as measured. The camera measuring system determines the offset of the reflector in a plane perpendicular to the camera axis. The rotation of the reflector is also determined. The reflectors are specially designed to handle vibrations that typically occur on cranes and are attached to the load suspension device. The white areas of the active reflectors have an infra-red LED matrix backing. If necessary, the reflector can be fitted with heating to thaw snow.

Reflectors and Objectives

The objectives and reflectors used depend on the hoisting height of the crane. For higher accuracy requirements, a lens with a larger focal length can be used. This, however, reduces the measuring range because of the smaller aperture angle.

Focal length of the lens	**16 mm (standard)**	**25 mm**
Resolution mm/m (relative to the distance)	0.12	0.08
Image length in the X direction	17°	11°
Image length in the Y direction	13°	8°
Measuring range in the X direction mm/m (relative to the distance)	292	187
Measuring range in the Y direction mm/m (relative to the distance)	216	138
Recommended maximum distance		
Reflector 300 x 300	Up to 15 m	Up to 23 m
Reflector 500 x 500	Up to 23 m	Up to 37 m
Reflector 800 x 800	Up to 35 m	Up to 55 m

SIMOCRANE Sway Control System

Function

SIMOCRANE Sway Control System

The SIMOCRANE Sway Control System is based on calculations of a mathematical oscillation model. When a camera is used, the parameters hoisting height, swing angle and rotation angle are determined by means of optical contact-free measurement, and are incorporated in the calculation model. If the measuring signal of the camera fails, only the states of the model are used.

Damping of the load is performed by influencing the traversing speed for each axis individually. When using the position control the defined positions are automatically approached with anti-sway after release. The axis is controlled in such a way that the load sway is eliminated not only when the maximum speed is reached, but also at the target position. All swaying resulting from the travel motion is largely eliminated. If a camera is also used, swaying resulting from external forces – such as inclined lift or wind – can be almost completely compensated.

General operating modes

The following operating modes are available for the general application areas:

- Manual operation (speed control)
- Position control
- Sway neutralization

The operating mode is selected depending on the functional scope (see sub-item "Functional scope") by setting the appropriate operating mode bit using the PLC.

Speed control

In "speed control" mode, often referred to as manual operation, the speed is specified manually from a higher-level controller. The trolley is accelerated or decelerated to the set speed in such a way that the load sway has been eliminated when the set speed is reached.

Sway control is active in manual mode either throughout the complete traverse, or only during a halt.

Position control

In "automatic position control" mode, the higher-level controller or the internal setpoint encoder can specify a target position for each individual axis. This position is approached automatically after enabling. The axes are controlled in such a way that the load sway is eliminated not only when the maximum speed is reached, but also at the target position.

Sway neutralization

The sway neutralization mode (only for the version with camera) is used to eliminate swaying movements of the load from standstill.

The sway neutralization is linked to a positioning. The target position is either the current trolley position or the load position at the time the sway neutralization is activated.

Sway neutralization results in slight travel movements to both sides of the target position.

Additional functions in the container crane application area

Hoist control

The hoist control allows the system to be set up so that the load is traversed along a "path curve". The path curve is specified to ensure that the spreader or grab does not collide with the crane structure or with containers or other obstacles, and also reaches its target position accurately. This operating mode can be used for ship to shore cranes (STS) and ship unloaders (GSU).

The obstacles are stored in the system as blocked regions and traversing is only permitted outside these areas. Depending on the starting point and the target position, the fastest possible travel path is generated from the data about the blocked regions. Both axes (trolley and hoist) must be operated in the internal operating mode "Hoist control".

The container stack can be specified externally by the crane controller or acquired internally (taught).

If a bay scanner is also used, the signal for the measured vertical hoisting distance is evaluated in addition to the internally learned blocked regions, and it is included in the calculation for the path curve.

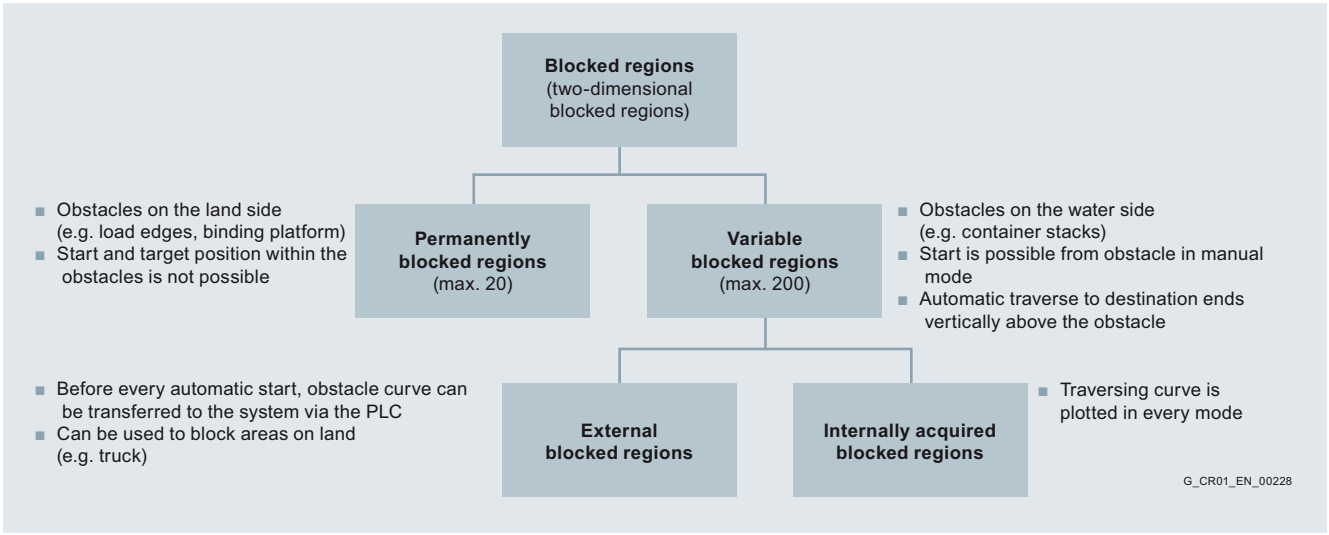
Function (continued)

Blocked regions

The path curve is calculated on the basis of a layout of the working area in which blocked regions are defined. Blocked regions are individual or several combined obstacles or also areas which the crane must not enter for safety reasons to avoid collisions. A distinction is made between fixed and variable blocked regions.

A blocked region is described by two trolley positions and one hoisting position.

The types of blocked regions and their purposes are shown in the following graphic.

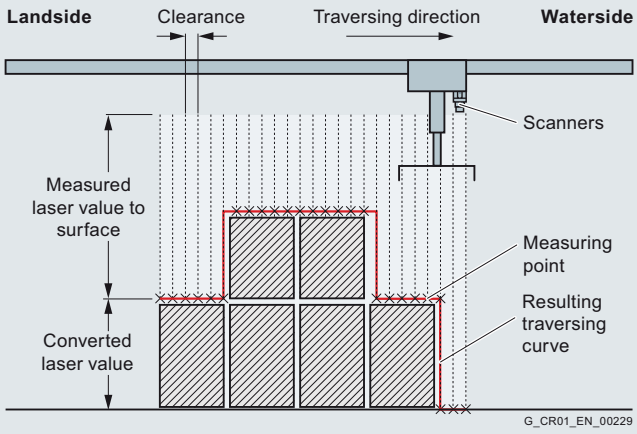


Layout of blocked regions

Bay scanning

If a bay scanner is also used, the signal of the obstacle height is evaluated in addition to the traveled curve.
The distance from the scanner to the surface of the container stack is measured (see graphic below, dashed lines).

This value must be converted to a laser value in the PLC which corresponds to the distance from floor = NULL to the top edge of the container stack at this point (see graphic below; converted laser value). The vertical distance between two valid measuring points is set to the height of the highest measuring point.



Measurement of the height of the container stack with the laser scanner

3

Function (continued)

Trim, list and skew control (TLS) and active skew function

"TLS Control" controls the "trim, list and skew positions" of a spreader.

The TLS Control assumes that

- the length or
- the pivot points

of the four support cables of a spreader can be adjusted by hydraulic cylinders with the aid of the camera.

Through actuation of these hydraulic cylinders in pairs, the spreader can be tilted to the left or right (trim), inclined towards the waterside or landside (list) or rotated in a clockwise or counterclockwise direction (skew). All of these movements can be carried out simultaneously. The current positions of all four cylinders can be saved as zero positions and approached again. The command to approach the zero positions has priority over the trim, list and skew commands.

The active skew function, the electronic anti-sway function, can also be activated. With this function, the skewing motion of the spreader is measured with the camera and eliminated through control of the hydraulic cylinders. After the skewing motion has been eliminated, either the last TLS setting or an external definable rotational position can be approached.

Additional functions in the grab crane application area

Position control with on-the-fly unloading

In the grab crane application (GSU) on-the-fly unloading utilizes the swinging of a grab when unloading bulk goods and saves turnover time in this way. The trolley is stopped before the target position while the grab swings to the target (e.g. funnel). The speed characteristic is calculated so that the grab is above the target position exactly when the trolley stops. The swinging movement is then at its turning point. If the trolley stops now, the grab swings back in the opposite direction.

Additional functions in the industrial application area

Hoist control

The hoist control enables the hoisting gear as well as two traversing directions (trolley/gantry) to be operated in manual mode and with position control and sway control. Each axis moves independently from the other axes.

Support for slewing drives

In addition to a trolley axis and a gantry drive axis, a slewing gear axis is also supported here. The previous hoist axis is replaced for this purpose by the slewing gear axis. With the slewing gear axis, it is possible to damp rotational vibration of the rotary axis (also applies for hook slewing gear). For cranes with hook slewing gear, automatic positioning of the slewing gear is possible, if a shaft encoder is used.

Scope of functions

Licenses are available for the Sway Control Systems depending on the function required. An overview of the modes and functions is shown in the following table.

License	Functionality included
Manual control	Sway-controlled traversing in manual mode (for industrial crane applications only)
Basic control	Manual control
	Positioning
	Sway neutralization
	TLS Control
	Support for slewing drives
Advanced control	Basic control
	Hoist control
	Hoist control with obstacle management (currently only for port application area)
	Active skew control

Grab crane (GSU)

Technical data

SIMOCRANE SC integrated Sway Control System

Order No.	**6GA7200-0AA01-■AA0**
Components of the product	CD • License according to functional scope • Software • Documentation • S7 project example • HMI example

SIMOCRANE CenSOR camera measuring system

Order No.	**6GA7202-1AA■■-■■■0**	
Product designation	Camera	Heater
Input voltage	24 V	230 V
Input current	0.03 A	0.2 A
Starting current	0.03 A	0.2 A
Rated output	5 W	40 W
Permissible ambient temperature • Storage and transport • Operation	 –40 ... +70 °C –25 ... +60 °C	
Permissible relative humidity (without condensation)	5 ... 95 %	
Degree of protection acc. to EN 60529 (IEC 60529)	IP20	
Dimensions (W x H x D)	435 x 144 x 154 mm	
Weight, approx.	4 kg plus 0.5 kg/m for cable	
Integration in the crane controller	See Operating Manual	
Components of the product	Options • Different enclosures • Different temperature ranges • Different cable lengths • Different objectives (16 mm or 25 mm)	

Technical data (continued)

SIMOCRANE CenSOR camera measuring system

Order No.	6GA7201-0AA0■-0AA0			
Product designation	Reflector			
Dimension W (width)	300 mm	300 mm	500 mm	800 mm
Heater	No	Yes	Yes	Yes
Reflector		Reflector		
• Supply voltage	24 V	24 V	230 V	230 V
• Input current	0.5 A	0.5 A	0.7 A	0.6 A
• Starting current	0.5 A	0.5 A	3.5 A	3.5 A
• Rated output	12 W	12 W	145 W	140 W
Permissible ambient temperature				
• Storage and transport	–40 … +70 °C			
• Operation	0 … +55 °C			
Permissible relative humidity (without condensation)	5 ... 95 %			
Degree of protection acc. to EN 60529 (IEC 60529)	IP54	IP54	IP44	IP44
Dimensions (W x H x D)				
Reflector				
• Passive	300 x 300 x 3 mm			
• Active	300 x 300 x 30 mm			
• Active	500 x 500 x 150 mm			
• Active	800 x 800 x 150 mm			
Weight, approx.				
Reflector				
• Passive	3 kg (300 x 300 x 3 mm)			
• Active	5 kg (300 x 300 x 30 mm)			
• Active	22 kg (500 x 500 x 150 mm)			
• Active	48 kg (800 x 800 x 150 mm)			
Integration in the crane controller	See Operating Manual			
Components of the product	Reflector			

Technical data (continued)

SIMOCRANE CeSAR standalone Sway Control System

Order No.	6GA7200-2AA00-■AA0
Components of the product	• Power PC • Adapter • CD - License according to functional scope - Software - Documentation - S7 project example

SIMOCRANE CeSAR standalone camera measuring system

Order No.	6GA7202-2AA■■-■■■0	
Designation	Camera for SIMOCRANE CeSAR	
Product designation	Camera	Heater
Input voltage	24 V	230 V
Input current	0.03 A	0.2 A
Starting current	0.03 A	0.2 A
Rated output	5 W	40 W
Permissible ambient temperature		
• Storage and transport	–40 ... +70 °C	
• Operation	–25 ... +60 °C	
Permissible relative humidity (without condensation)	5 ... 95 %	
Degree of protection acc. to EN 60529 (IEC 60529)	IP20	
Dimensions (W x H x D)	435 x 144 x 154 mm	
Weight, approx.	4 kg plus 0.5 kg/m for cable	
Integration in the crane controller	See Operating Manual	
Components of the product	Options • Different enclosures • Different temperature ranges • Different objectives (16 mm or 25 mm) • Different cable lengths	

Technical data (continued)

SIMOCRANE CeSAR standalone camera measuring system

Order No.	6GA7201-0AA0■-0AA0			
Designation	Reflector			
Dimension W (width)	300 mm	300 mm	500 mm	800 mm
Heater	No	Yes	Yes	Yes
Reflector		Reflector		
• Supply voltage	24 V	24 V	230 V	230 V
• Input current	0.5 A	0.5 A	0.7 A	0.6 A
• Starting current	0.5 A	0.5 A	3.5 A	3.5 A
• Rated output	12 W	12 W	145 W	140 W
Permissible ambient temperature				
• Storage and transport	–40 … +70 °C			
• Operation	0 … +55 °C			
Permissible relative humidity (without condensation)	5 ... 95 %			
Degree of protection acc. to EN 60529 (IEC 60529)	IP54	IP54	IP44	IP44
Dimensions (W x H x D)				
Reflector				
• Passive	300 x 300 x 3 mm			
• Active	300 x 300 x 30 mm			
• Active	500 x 500 x 150 mm			
• Active	800 x 800 x 150 mm			
Weight, approx.				
Reflector				
• Passive	3 kg (300 x 300 x 3 mm)			
• Active	5 kg (300 x 300 x 30 mm)			
• Active	22 kg (500 x 500 x 150 mm)			
• Active	48 kg (800 x 800 x 150 mm)			
Integration in the crane controller	See Operating Manual			
Components of the product	Reflector			

Selection and ordering data

Description	Order No.																
SIMOCRANE SC integrated Container crane, grab crane	**6**	**G**	**A**	**7**	**2**	**0**	**0**	**-**	**0**	**A**	**A**	**0**	**1**	**-**	■	**A**	**A**	**0**
• Basic control															**0**			
• Advanced control															**1**			
SIMOCRANE CeSAR standalone Overhead bridge crane, gantry crane	**6**	**G**	**A**	**7**	**2**	**0**	**0**	**-**	**2**	**A**	**A**	**0**	**1**	**-**	■	**A**	**A**	**0**
• Basic control															**0**			
• Manual control															**2**			

3

Selection and ordering data (continued)

Description	Order No.																			
	6	G	A	7	2	0	2	–	■	A	A	■	■	–	■	■	■	0
Camera system																				
• For SIMOCRANE SC integrated									1											
• For SIMOCRANE CeSAR standalone									2											
Housing type:																				
• Aluminum (standard)												0								
• Stainless steel												1								
Temperature range:																				
• –25 … +60 °C (Standard)													0							
• 0 … +70 °C (stainless steel camera casing)												1	1							
Objective/Lens:																				
• 16 mm (standard)															0					
• 25 mm															1					
Camera supply cable (max. 25 m)																				
Length																				
0 m																A				
10 m																B				
20 m																C				
30 m																D				
40 m																E				
50 m																F				
60 m																G				
70 m																H				
80 m																J				
90 m																K				
0 m																	A			
1 m																	B			
2 m																	C			
3 m																	D			
4 m																	E			
5 m																	F			
6 m																	G			
7 m																	H			
8 m																	J			
9 m																	K			

Description	Order No.																			
	6	G	A	7	2	0	1	–	0	A	A	0	■	–	0	A	A	0
Reflector																				
• Passive - 300 x 300 mm													0							
• Active - 300 x 300 mm													1							
• Active - 500 x 500 mm													2							
• Active - 800 x 800 mm													3							

Overview

Harbor crane system with trucks

Vehicles, e.g. trucks when handling containers, must be loaded and unloaded without problems and without delays. This requires fast and accurate positioning of the truck below the crane.

Many terminal operators resolve this problem with personnel who guide the truck drivers using hand signals. Or they assign the responsibility to the truck drivers, and must rely on their judgment. This method has a detrimental effect on the positioning tasks, especially on personnel safety and on the duration of positioning tasks.

With SIMOCRANE TPS, the positioning tasks can be performed accurately and without any delays. The trucks are scanned and measured on arrival at the terminal. The data for the remaining distance to the target position is transferred to the crane controller and routed from there to a signal unit, e.g. a traffic light system. The truck drivers are safely and accurately guided to the target position by the signal unit.

Benefits

The use of SIMOCRANE TPS provides the following advantages:

- Reduced risk to personnel and machines. Checkers are no longer necessary
- Time is saved when parking the transport vehicles
- The target position is accurately determined depending on the mode of operation, load and target vehicle
- The degree of automation of a crane is increased when SIMOCRANE TPS is combined with other technology functions (e.g. SIMOCRANE Sway Control Systems)
- Two-track mode: The sensor controller can work with two swiveling units simultaneously. Two trucks can be processed simultaneously (tandem mode)
- Flexible implementation: The trucks are detected from both sides regardless of the direction of travel
- Simple operation for crane drivers and truck drivers
- Maximum time for parking available due to optimum installation position of the laser; mounting position under the gantry ensures optimal view of the working area.

Applications

SIMOCRANE TPS is implemented in applications in which terminal trucks and/or ISO containers have to be positioned with a high degree of accuracy below a container quay crane.

Design

Hardware

The sensor controller is a SIMATIC Embedded industrial PC with pre-installed TPS software. The PC is suitable for mounting on DIN rails and is normally installed in the electrical room of a crane.
The PC is ready-to-use and does not require any peripherals, such as keyboard, mouse or monitor, for the commissioning. The system is equipped with interface converters for exchanging data with the laser units.

The data is exchanged over an RS422 connection for every laser scanner and over a CAN Bus connection for the servo motors.

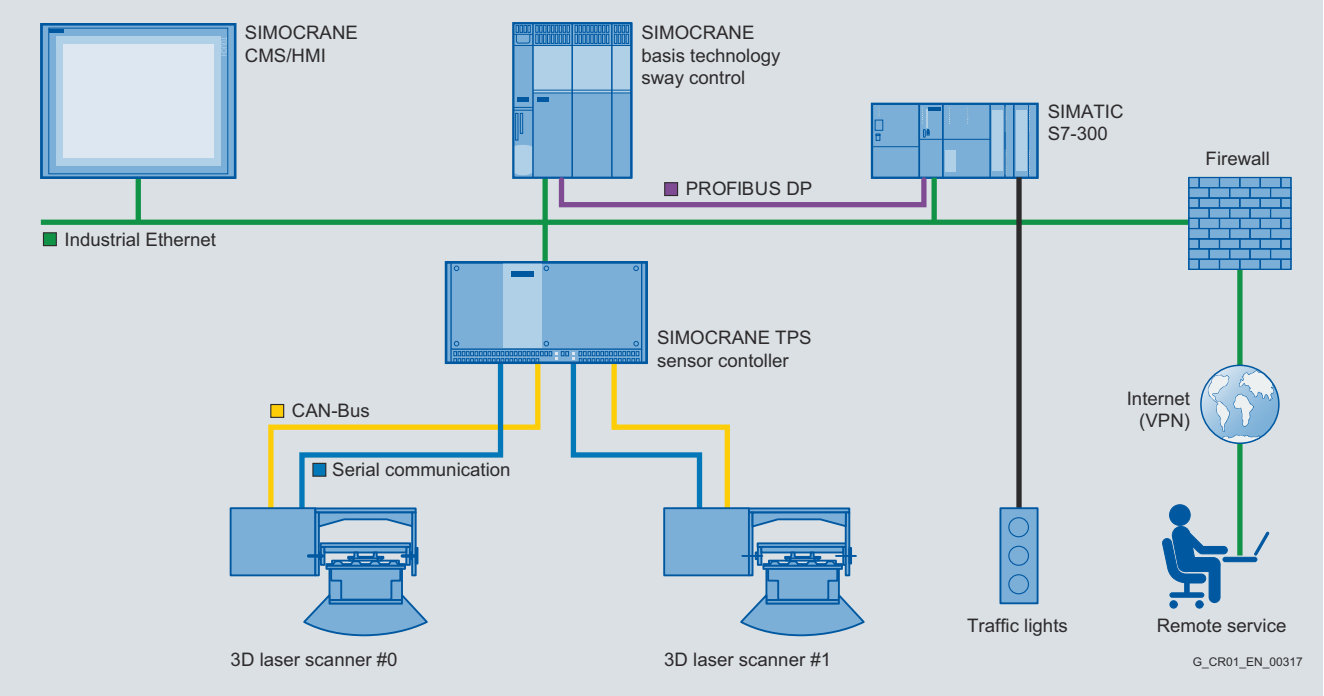
The communication for the data exchange with the crane controller can be performed using either Ethernet or PROFIBUS. Both interfaces are part of the sensor controller.

SIMOCRANE TPS sensor controller

The laser unit comprises a 2D laser scanner and a mechanical swiveling platform. The swiveling platform is moved by a high-precision servo motor.

3D laser swiveling unit

Design (continued)



SIMOCRANE TPS topology – crane system

Software

SIMOCRANE TPS uses the Windows operating system. The sensor controller is preconfigured so that it starts automatically and access via the Windows Remote Desktop Connection is enabled. This means the PC can be put into operation using the second onboard Ethernet interface from a separate computer, for example, a notebook.

The SIMATIC Net OPC Server is installed and preconfigured to permit data exchange with the crane controller. The preinstalled project has already been parameterized for operation on a SIMATIC S7 controller.

SIMOCRANE sensor controller activates the laser scanner, evaluates the scan data and calculates the target positions for the parameterized trucks. The resulting data is supplied via the OPC interface of the crane controller. In addition to this data, the interface also supplies error and diagnostic information.

Note:
SIMOCRANE TPS does not intervene actively in the process of the crane, but only provides information. The system must therefore be regarded as an intelligent sensor.
The crane controller remains responsible for controlling the crane, and in particular, the control of the signal unit (e.g. traffic light, display). Signal units are not a component part of SIMOCRANE TPS.

Function

Container handling

Laser units are mounted on the crane. They are controlled and evaluated by the TPS runtime software. These laser units are designed as 3D laser swiveling units and can be precisely aimed at the target area.

The core of SIMOCRANE TPS is the sensor controller. This controller performs the following tasks:

- Controlling the 3D laser swiveling units
- Collecting the raw data from the scanner and detecting the scanned objects
- Detecting the known vehicle types
- Processing logic for the operating sequences (parking procedure)
- Providing a command and data interface to the crane controller and for operation

TPS sequence

Approaching vehicles are detected at a distance of about 20 m from the laser units as soon as the spreader is located above the viewing range of the laser (normally over the portal beam). From this moment, identification of the truck starts in terms of the loaded container size(s) or the characteristics of the trailer on which the container should be placed.

When this task has been completed, the target position is calculated. This depends on various factors:

- Container size and spreader setting
- Characteristics of the trailer
- Crane operation mode

The sensor controller calculates the target position using this data. The determined values are transferred to the crane controller as a setpoint input.

Preparations for use

The TPS has a very simple operator interface. The crane driver switches the system on and makes the following settings:

- In which lane does he/she want to work
- From which direction will the traffic appear (left/right)

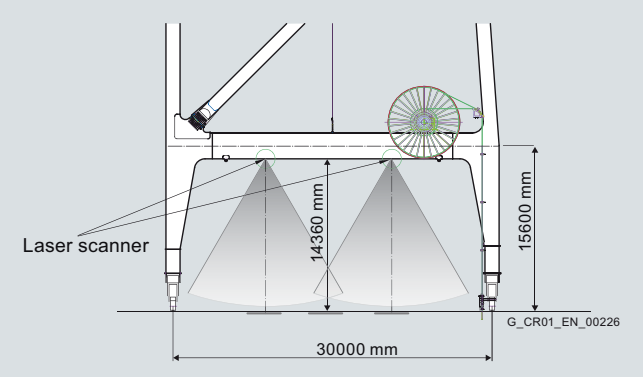
The type of vehicle and the position of the container (front, center or rear) are determined by TPS itself.

Several factors must be considered for the use of SIMOCRANE TPS:

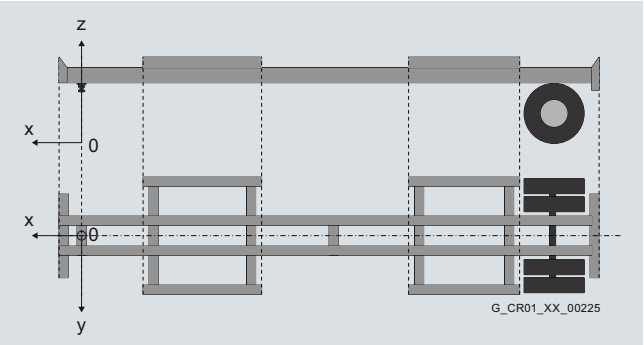
- Dimensions of the crane, in particular, the mounting height of the laser units and the required range

  For a normal installation height of 14 m above the load point, the corresponding range of the truck approach distance is 20 m on each side. The range of the crane trolley is 12.5 m in both directions.
- Characteristics and dimensions of the vehicles that should be acquired by the terminal

  These values must be entered in the SIMOCRANE TPS software. The system uses the parameters to generate an object database.



Cross-section of the crane system



Trailer positioning

- Number of different vehicle types

  The maximum number of vehicle types that can be recognized varies in accordance with the geometric dimensions. The less the dimensions between the vehicle types vary, the fewer types (categories) can be distinguished. Most applications detect up to eight different trailer types and four different driver cabin types.
- Operational process under the crane

  The process influences the number of required laser units and the speed of response of the system.
- Operational area with regard to contamination effects, weather effects and mechanical shocks
- Accessibility of laser units for maintenance and service purposes.

Note:
The system is based on optical sensors and is primarily affected by all effects that influence/impair the visibility of the target objects.

The system can only function with known vehicles. It can only handle vehicles that have been parameterized in the software. The system will not detect automatically any trucks from the street (e.g. unknown trucks).

Technical data

Sensor controller	
SIMATIC Embedded industrial PC	
General technical data	
Installation	on DIN rail
Supply voltage	24 V; 20.4 ... 28.8 V, electrically isolated
Operating system	Windows XP
Hard disk	> 80 GB, 2.5"
Interface	• PROFIBUS/MPI interface, electrically isolated • USB 4 x USB 2.0 high speed/ high current • Ethernet interface 2 x (RJ45) Intel 10/100/1000 Mbit/s, electrically isolated, timing-capable • DVI-I
Degree of protection according to DIN EN 60529	IP20
Protection class	1 in accordance with VDE 0106 Part 1 (IEC 536)
Ambient temperature	
• Operation	5 ... 40°
• Storage	-20 ... 60°
Dimensions (W x H x D)	262 x 134 x 47 mm
Weight	2 kg

3D laser swiveling unit	
General technical data	
Supply voltage	
• Servo motor	48 ± 3 % V DC / 30 A
• Servo motor electronics	24 ± 3 % V DC / 2 A
Laser scanner	
• Laser electronics	24 ± 3 % V DC / 2 A
• Heating for laser scanner and control cabinet	24 ± 6 V DC / 6 A
• RS422 interface	12 ... 24 V AC/DC / 150 mA
LMS221 laser scanner	
• Typical range (at 10 % remission)	30 m
• Usable scanning angle	180°
• Angle resolution (scanner)	0.25°, 0.5°, 1°
• Measuring resolution (scanner)	10 mm
• Wavelength of laser diode	Infrared light (λ = 905 nm)
• Laser/class	Class 1 (safe for eyes), according to EN/IEC 60825-1 and 21CFR1040.10
• Beam divergence	13 mrad
• Weight	9 kg
Communication	
LMS221 laser scanner	RS422 (via USB) (9.6/19.2/38.4/500 kbaud)
Servo motor	CAN (via USB) (250 kbit/s)

3D laser swiveling unit (continued)	
Swiveling platform	
• Max. swivel angle	180° (± 90°)
• Swivel angle resolution	0.008°
• Swiveling velocity	100°/s (for positioning)
• Weight	35 kg
Degree of protection according to DIN EN 60529	
• Laser scanner	IP67
• Servo motor	IP66 (built into a RITTAL cabinet)
Shock and vibration resistance	IEC 68
Dimensions (W x H x D)	838 x 300 x 340 mm
Ambient temperature	
• Operation	– 25 ... +50° C
• Storage	– 25 ... +70° C

SIMOCRANE TPS	
Communication	
OPC	SIMATIC NET OPC
General technical data	
Interface	Ethernet/PROFIBUS DP
Area of application	Harbor area
• Installation altitude	14 m above loading point [1]
• Transmission range	20 m (along the truck travel paths) [1] 12.5 m (along the crane travel paths) [1]
• Truck types	Max. 8
• Container types	ISO 20 ft (6.096 m) ISO 30 ft (9.144 m) ISO 40 ft (12.192 m) ISO 45 ft (13.716 m) 2 x 20 ft (2 x 6.096 m)
No. of monitoring devices	
• Sensor controller	1
• 3D laser swiveling unit	2
Accuracy	± 5 cm (for the typical installation height of 14 m)

[1] For the usual installation height of 14 m. Please enquire about other distances.

Application example

TPS for STS cranes

This application example describes a common solution for positioning terminal trucks under a container quay crane.

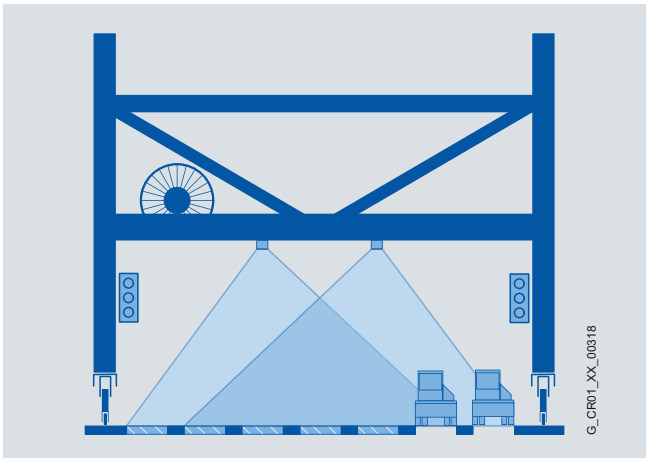
The system supports the truck driver during parking with the aid of a simple control signal. A signal unit visible to the truck driver should be mounted at each corner of the crane. The crane driver operates the system and specifies the lanes in which loading takes place and from which direction the trucks arrive. The system must be able to operate two independent lanes at the same time (tandem mode). The working area between the tracks is a total of 32 m wide and has seven lanes. On the basis of the presets for lane and direction of travel, the system must be able to position different trucks and trailers independently.

Crane with TPS

In order to fulfill this function, the following SIMOCRANE products are required:

- SIMOCRANE Truck Positioning Sensor Controller **6GA7220-1AA00-0AA0**
- 2 x SIMOCRANE Truck Positioning 3D laser swiveling units **6GA7221-1AA21-0AA0**.

The required working area between the crane uprights of up to 32 m can be operated, because the laser for this application is mounted at the bottom of the portal beam. A typical value for this height is 13 to 15 m above the quay. The mounting positions of the laser were selected so that both have an optimum view of the respective lanes. The figure above shows the positions of the swiveling units and the assigned lanes.



Laser arrangement

In addition to the SIMOCRANE products, additional components are required for operating the system and for displaying positioning signals. Siemens products that are ideal for this task are listed below:

- Panel PC 477 as the operator panel for the crane driver, e.g. **6AV7853-0AH34-4BA0**
- SIMATIC PLC as crane controller, e.g. **6ES7317-2AJ10-0AB0**
- 4 x traffic light, e.g. **L24757-C2323-A101**
- 8 x support for fixing signal encoders, 119 mm, e.g. **C24121-A35-C93**.

The product SIMOCRANE TPS has a standardized interface to SIMOCRANE CMS. SIMOCRANE CMS contains preconfigured WinCC sample images for operating and monitoring TPS. TPS is operated in the cabin on the Panel PC 477 that has a Client-Server connection with the main CMS computer.

For cranes without SIMOCRANE CMS, an application example with WinCC flexible RT is available on the Siemens Cranes website. A standard interface to TPS is integrated.
This can be download free of charge.

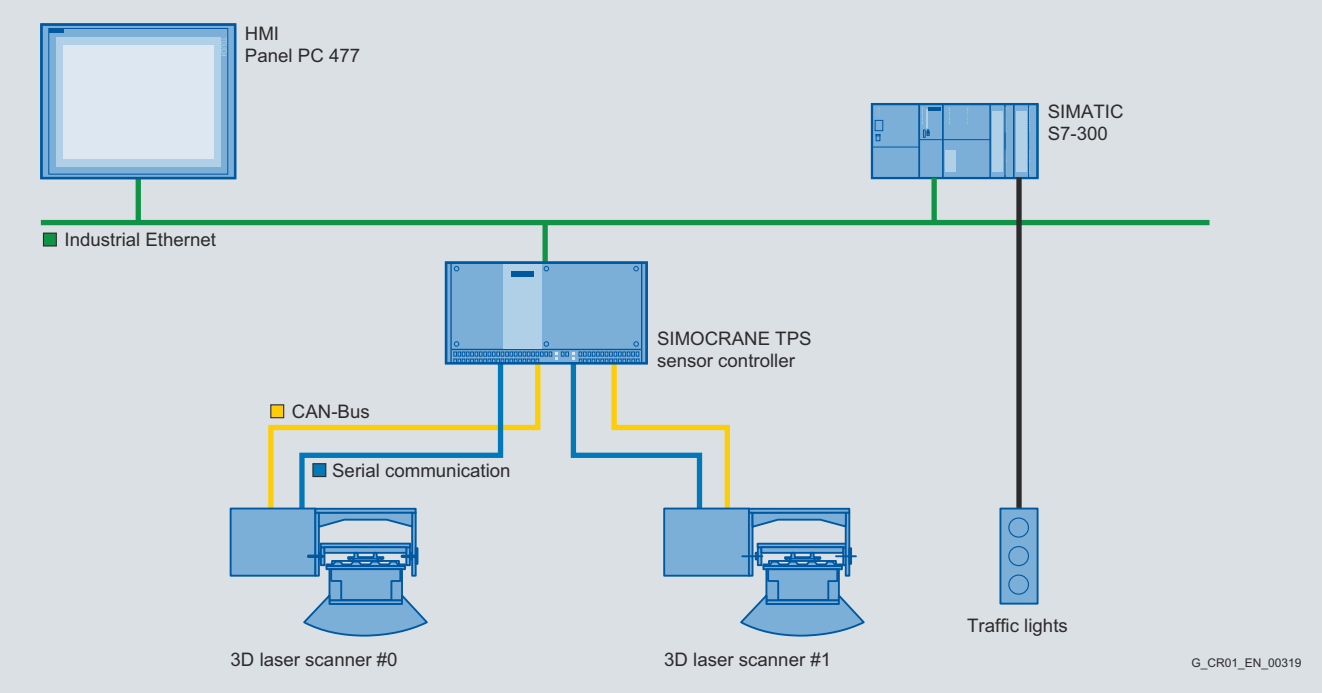
www.siemens.com/cranes

Application example
TPS for STS cranes

Application example (continued)

The figure below shows a common topology of the described application. Communication to the HMI and crane controller is implemented via an Ethernet interface.

Signal control is integrated into the crane controller (PLC). The signals are generated here on the basis of TPS position values.



TPS topology for STS crane

Selection and ordering data

SIMOCRANE TPS is supplied preconfigured and ready to use. One sensor controller and two 3D laser swiveling units are required for the current version.

Description	Order No.
SIMOCRANE TPS sensor controller V1.0-SP1 based on SIMATIC Embedded industrial PC Consists of 1 item each • Microbox PC for standard rail mounting, installed and preconfigured ready to use (e.g. in the electrical room of a crane) • SIMATIC NET OPC server for data exchange with the crane controller	**6GA7220-1AA00-0AA0**
SIMOCRANE TPS 3D laser swiveling unit Consists of 1 item each • Laser scanner (SICK AG, LMS 221) • Swiveling platform (manufactured by Lase GmbH) servo platform, including control cabinet and servo motor (completely pre-assembled) • Weather protection hood for LMS221 laser scanner • HARTING plugs for the connection of power supply cables and data leads • CAN-USB interface converter for activating the swiveling motor of the laser unit • RS422-USB interface converter for activating the laser sensors	**6GA7221-1AA21-0AA0**

Further information

You will find information about the SIMATIC Embedded industrial PC in Catalog ST PC and in the Industry Mall under "Products/Automation technology/Industrial PC SIMATIC PC/SIMATIC Box PC".

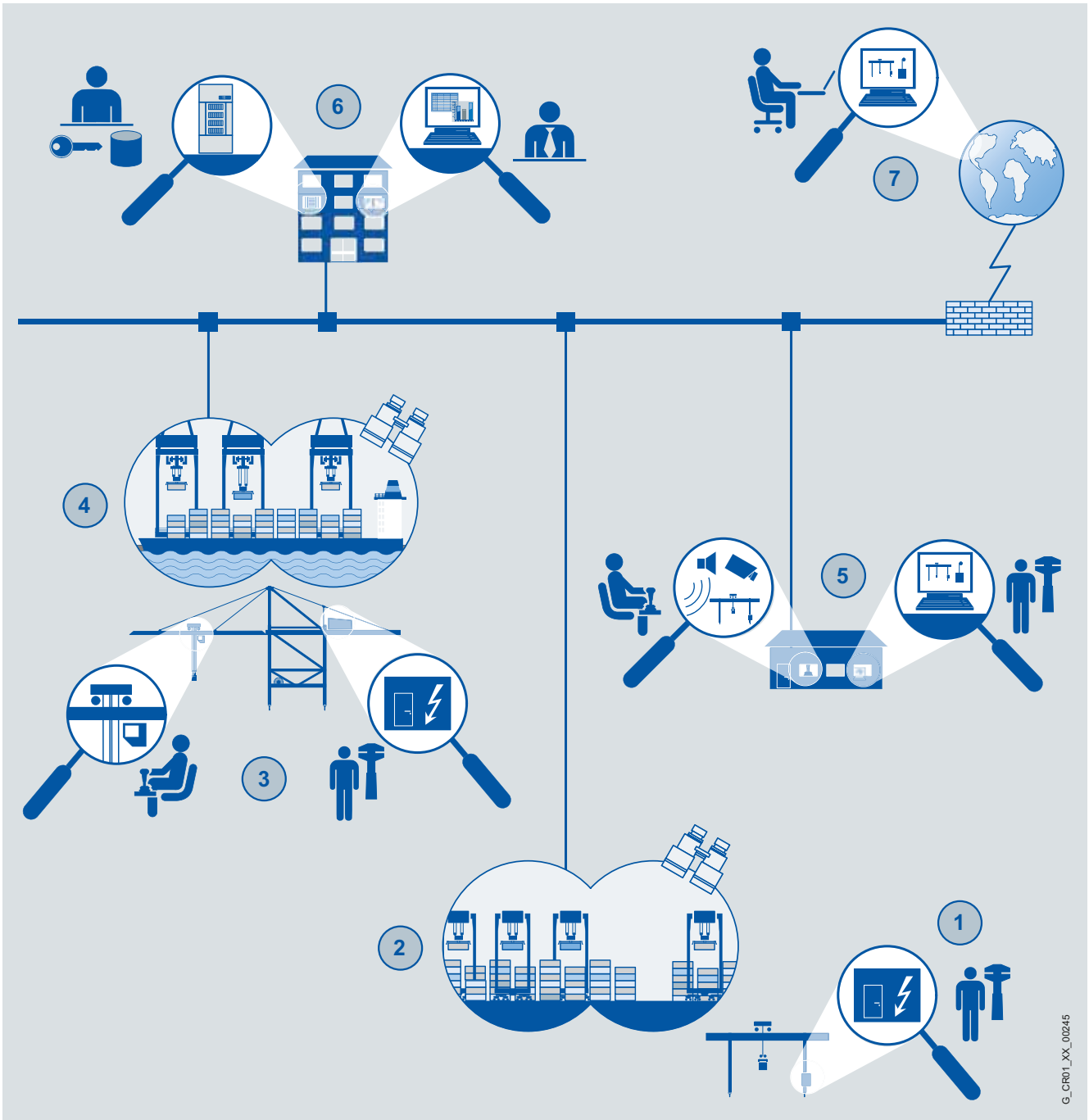
Notes

SIMOCRANE
Crane Management System

4

Example: harbor crane system

Overview



Product overview for CMS harbor crane system

The product overview describes the implementation of SIMOCRANE CMS (Crane Management System) and its scalability based on the example of a harbor crane system. The application fields range from the control center/control room (Ethernet/WLAN) through loading and unloading in the harbor area right up to the maintenance station with remote access options.

1. CMS station in the electrical room of a stacking crane for maintenance technicians
2. Remote access or remote control of stacking cranes in the stacking area of a container terminal
3. CMS station in the electrical room of a ship-to-shore crane for maintenance technicians and in the cabin for the crane driver
4. Remote access to ship-to-shore cranes in the plant area (quay) of a container terminal
5. Remote access and remote control from the maintenance building for maintenance technicians and crane drivers
6. Central administration building with system administration, data archiving and evaluation
7. Possibility of remote access via the Internet by specialists

Overview (continued)

The SIMOCRANE CMS Crane Management System is a PC-based visualization application (SCADA) for crane drivers, maintenance personnel, and plant operators.

It provides the following functions:

- Graphical visualization of the crane system
- Alarm/event reporting system and support for diagnostics
- Recording measured values for various operating parameters
- Recording and analysis of cargo handling data
- Recording and analysis of operating hours and counters

SIMOCRANE CMS is a graphics-based, user-oriented system that supports users in a simple manner during operation as well as with troubleshooting and rectification of faults. The use of SIMOCRANE CMS enables the downtime for a crane to be shortened. SIMOCRANE CMS provides the crane operator with important data for analysis. Critical states are signaled to the crane driver preemptively to prevent damage. The system architecture is based on market standards and thus offers the facility for integrating into existing IT and automation landscapes. WinCC has a number of available communication channels for connecting to automation systems of different manufacturers. The connection to higher-level logistics systems is also possible thanks to the openness of the system.

Benefits

- **Clear, graphical display of a crane and its components**
  The most important parameters can be read at all times, and critical states are detected immediately.
- **Language-neutral thanks to symbolic representation**
  Users of different nationalities and with different training can utilize the information equally well.
- **Clear navigation**
  Simple navigation structure and user interface that leads the user to the destination in just a few steps. The design also supports touch screens.
- **Numerous interfaces**
  Apart from Siemens controllers, automation systems from other manufacturers are also supported. For integrating into existing IT landscapes, the system offers standard interfaces, for example, for connection to a Terminal Operating System (**TOS**).
- **Data acquisition and archiving**
  Fault messages, position data, and cargo handling data are acquired, archived and can be evaluated at any time.
- **Scalability**
  The system is equally suited to small crane systems in a minimal configuration and complex plant structures with numerous cranes which would normally be implemented in client/server structures.
- **Flexibility and expandability**
  The supplied tools allow the crane application to be adapted and expanded at any time. The system can also be expanded at any time with add-on functions in the form of optional modules.
- **Support and access to expertise**
  Worldwide use of this product ensures extensive support and fast response times.

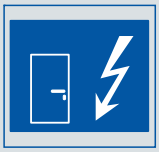
Installation sites and environment

Applications

The SIMOCRANE CMS Crane Management System is designed for use in cranes, for both **harbor** and **industrial environments**. The SCADA product implemented can be used to adapt the system to different application cases such as the configuration of CMS single-user systems and networked CMS infrastructures.

Installation sites and environment

Electrical room



The drive and control technology and the **CMS station** are located in the electrical room.
An industry-standard rack PC is recommended.

The user group mainly consists of service and maintenance technicians. It is possible to call up detailed diagnostic information here, by accessing documentation, circuit diagrams etc.

Maintenance building

The maintenance and system technicians are based here on standby. They require **remote access** to the **CMS systems** of the cranes. This requires a standard PC which, as web client, can call up diagnostics information from the crane.

Remote control of cranes can also be performed from the maintenance building.

Crane driver cabin

The CMS operator panel in the crane driver cabin is preferably a **Touch PC** and primarily supports the crane driver in his work.

The crane driver receives information on the operating states and operating data, as well as readily understandable diagnostic information. It is only possible to set the operating mode for the crane from the crane driver cabin; and this also applies to activation and deactivation of the technological functions, such as Sway Control or Truck Positioning.

Control center/control room

In the case of a network of several cranes and a central data server for long-term archiving and consolidated evaluation, the RCMS server is located here and any further RCMS operator stations with remote access to the cranes.

Administrators, the plant operator, as well as maintenance and service technicians or crane drivers with remote control desks work here.

From an RCMS operator station, the terminal operator has a complete overview of the plant and can quickly access an individual crane without the need to be physically on the crane.

Applications (continued)

User groups and functions

Crane driver

The straightforward arrangement provides this user group with the most important information about the operating state of the crane. It is important in a fault situation that the crane drivers can detect the cause as fast as possible. They must be able to decide quickly whether they are capable of correcting the fault themselves or whether they require support from a technician.

Apart from presenting information, they can also make operational adjustments, i.e. by activating and deactivating options such as SIMOCRANE Sway Control, SIMOCRANE Truck Positioning, etc.

Maintenance technician

This user group has specific knowledge of the system and can therefore call up more extensive diagnostic information for fast rectification of faults. Maintenance technicians must be able to access the main sources of information quickly that they require for fault rectification purposes. In the error messages context, maintenance technicians can access specific circuit diagrams and manuals.

Operator

The terminal operator is interested in statistical information and operating data. This user group is provided with this information content in the form of reports and statistics.

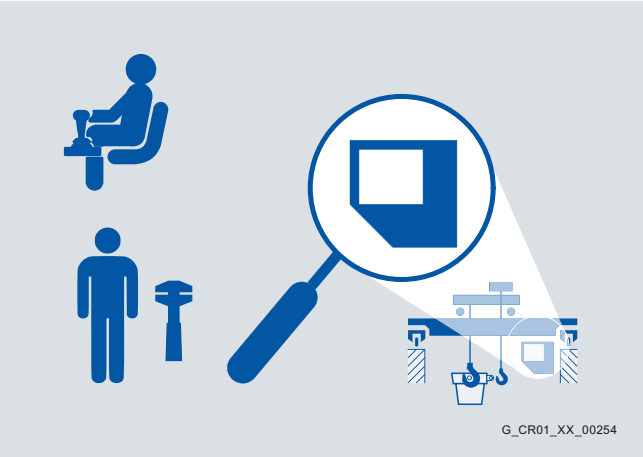
Administrator

The administrator has access to all authorizations and can set up and manage users. This usually comprises the personnel of the IT department of the plant operator.

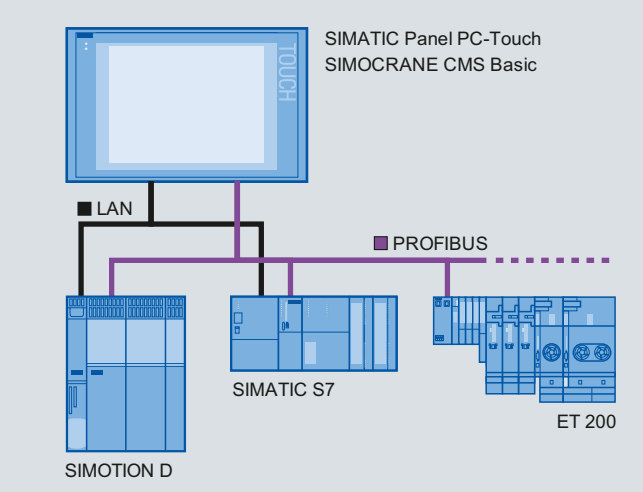
CMS Basic single-user system

Design

CMS Basic single-user system



The local CMS station is directly located on the crane. Depending on the size of the crane, it comprises a single operator station (CMS Basic) or a server for additional operator panels (CMS DataMonitor/CMS Webnavigator). The CMS station is directly connected to the crane controller and acquires all the relevant operating data.



CMS single-user system (SIMOCRANE Basic)

Typical applications

Non-networked single-crane applications in which the focus is on the local application and less on remote access and data evaluation possibilities. Visualization of crane components and the alarm/event system are the most important components here.

Examples:

- Ladle crane
- Goliath crane
- Slewing luffing crane

Requirements:

- Acquisition of productivity data and archiving
- Alarm/event reporting system with archiving
- Error logs and productivity data logs
- Visualization of the crane and individual components
- CMS display should be installed in the crane driver cabin

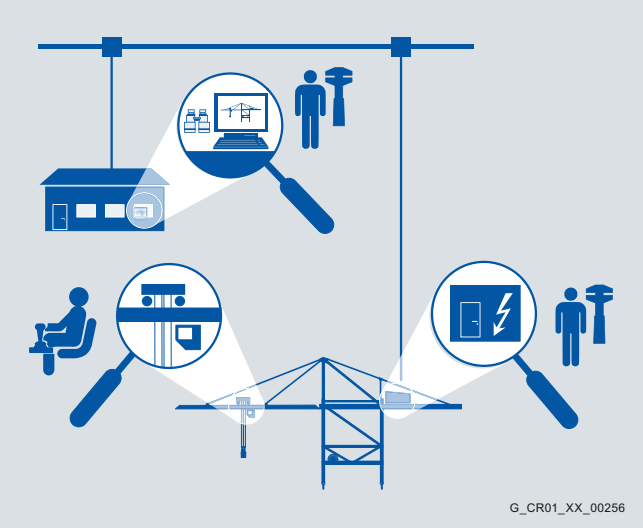
Solution:

- CMS Basic Order No. **6GA7210-1AA13-0AA0**
- Panel PC 677 as the operator panel and CMS PC, e.g.: Order No. **6AV7874-0BE52-1AC0**

Further information:
See "Technical data", "Selection and ordering data" and Catalog ST 80.

Design (continued)

CMS Webnavigator – multi-user system with remote access



This version has all the basic CMS functions and the option of operating additional operator stations as so-called web clients. It is mainly used in large cranes where several persons operate the system at the same time.

Remote access to the local CMS stations is also possible, this is also referred to as "Remote CMS" (RCMS) in the cranes sector. In the case of large crane systems, this is usually performed in a central maintenance building. In case of a fault, diagnostic information can be called up beforehand. In the best case scenario, a fault can be rectified in this way.

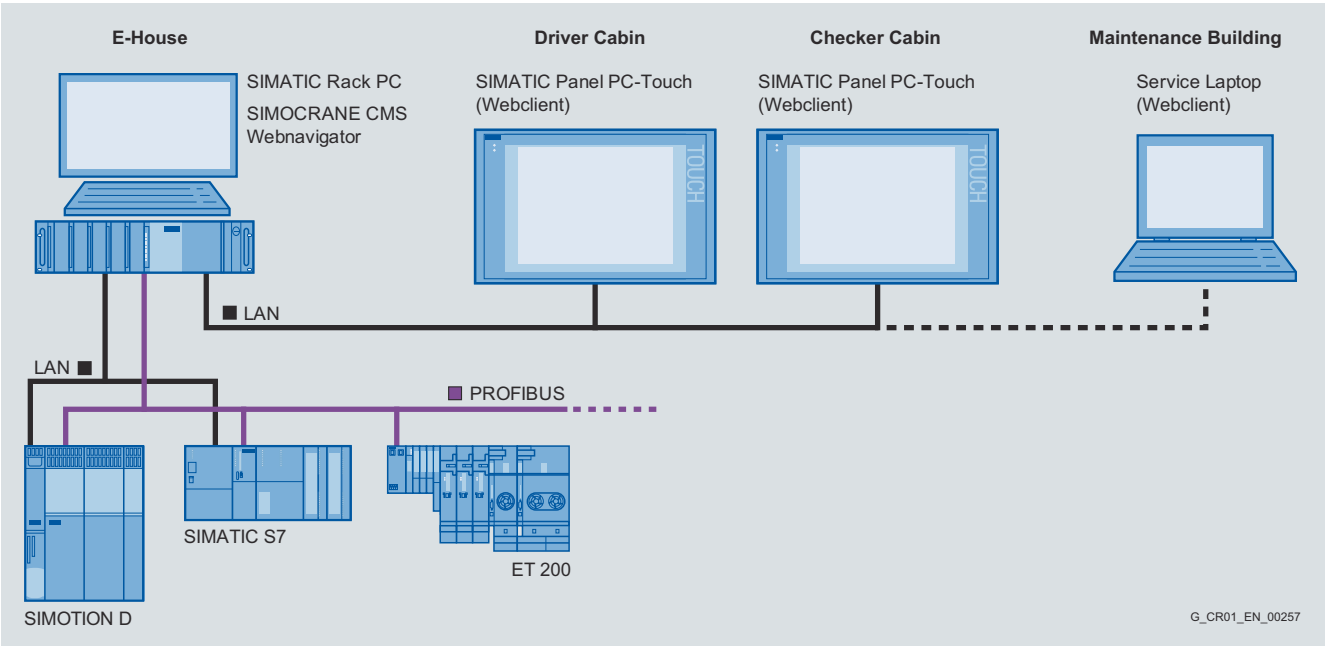
Requirements:

- Acquisition of productivity data and archiving
- Alarm/event reporting system with archiving
- Error logs and productivity data logs
- Visualization of the crane and individual components
- CMS computer is installed in the electrical room
- Crane driver must have an operator panel in the cabin
- Remote access must be possible from a maintenance building

Solution:

- CMS Webnavigator Order No. **6GA7210-3AA13-0AA0**
- Panel PC 477 as operator panel for the crane driver and in the checker cabin, e.g.:
  Order No. **6AV7853-0AH34-4BA0**
- Rack PC 847B as the CMS PC in the electrical room, e.g.:
  Order No. **6ES7643-8KP41-0BA0**
- Standard PC in the maintenance building with remote access via Internet Explorer (web)

Further information:
See "Technical data", "Selection and ordering data" and Catalog ST 80.



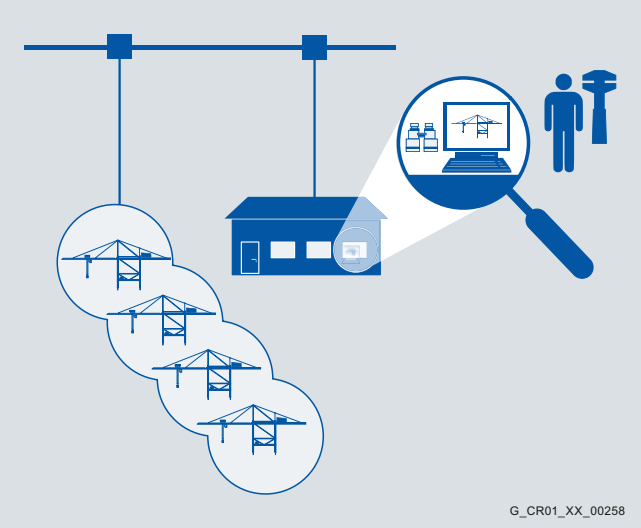
Topology of CMS multi-user system (SIMOCRANE Webnavigator)

CMS Webnavigator multi-user system with remote access

Design (continued)

Note:

This configuration can also be selected when more than one crane is used. Every crane can be connected to the PC in the maintenance building, if necessary.



Use of several cranes with remote access

Typical applications

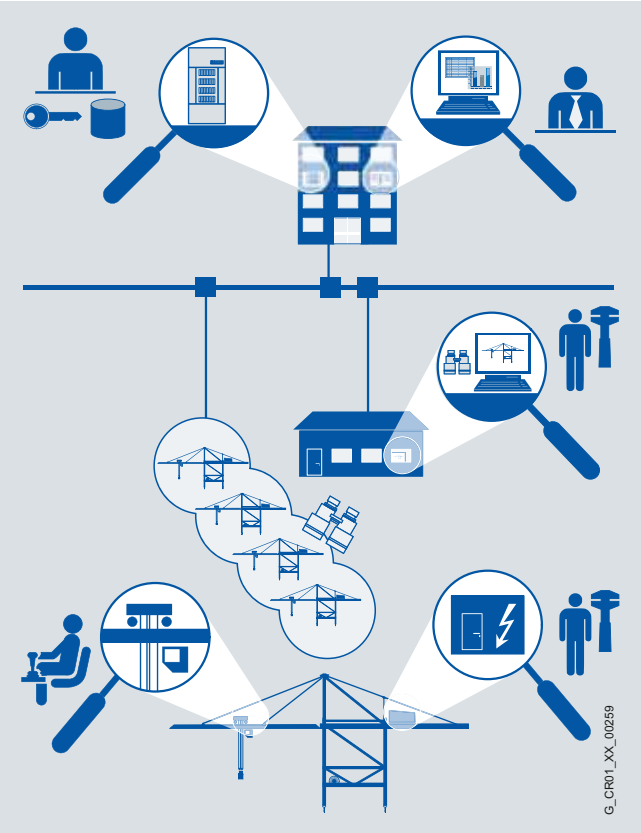
Often, where several networked cranes of a similar or identical type are used. It is important to be able to access each crane from a central location, e.g. a maintenance building or workshop because of long distances. Maintenance technicians want to be able to call up as much detailed information as possible in the event of a fault to ensure that the correct tool or spare part can be prepared for on-site use.

Examples:

- Ship to shore cranes and grab cranes (bulk goods) in the harbor area

Design (continued)

RCMS server – central or remote CMS



Larger plants usually have a control room with one or more operator stations, used to monitor the entire plant. The data from all subordinate local CMS stations is collected and evaluated in the control room.

In combination with a multi-user system on the crane, remote access to the local CMS stations is also possible here.

Depending on the number of lower-level CMS stations and the volume of data which is to be recorded and archived for the entire plant, one or more servers will be required. In this case, the server records the data for the local CMS stations of the crane and then makes it available to the central CMS operator stations. The CMS server is used as an application server for central software components such as for maintenance planning or downtime monitoring, etc.

Requirements:

- Acquisition of productivity data and archiving for each crane
- Alarm/event system with archiving for each crane
- Error logs and productivity data logs
- Visualization of the crane and individual components
- CMS computer is installed in the electrical room
- Crane driver must have an operator panel in the cabin
- Remote access must be possible from a maintenance building
- A central server must record and archive the data from all cranes
- Graphical evaluations must be possible in the control center with regard to productivity, error statistics and availability

Solution:

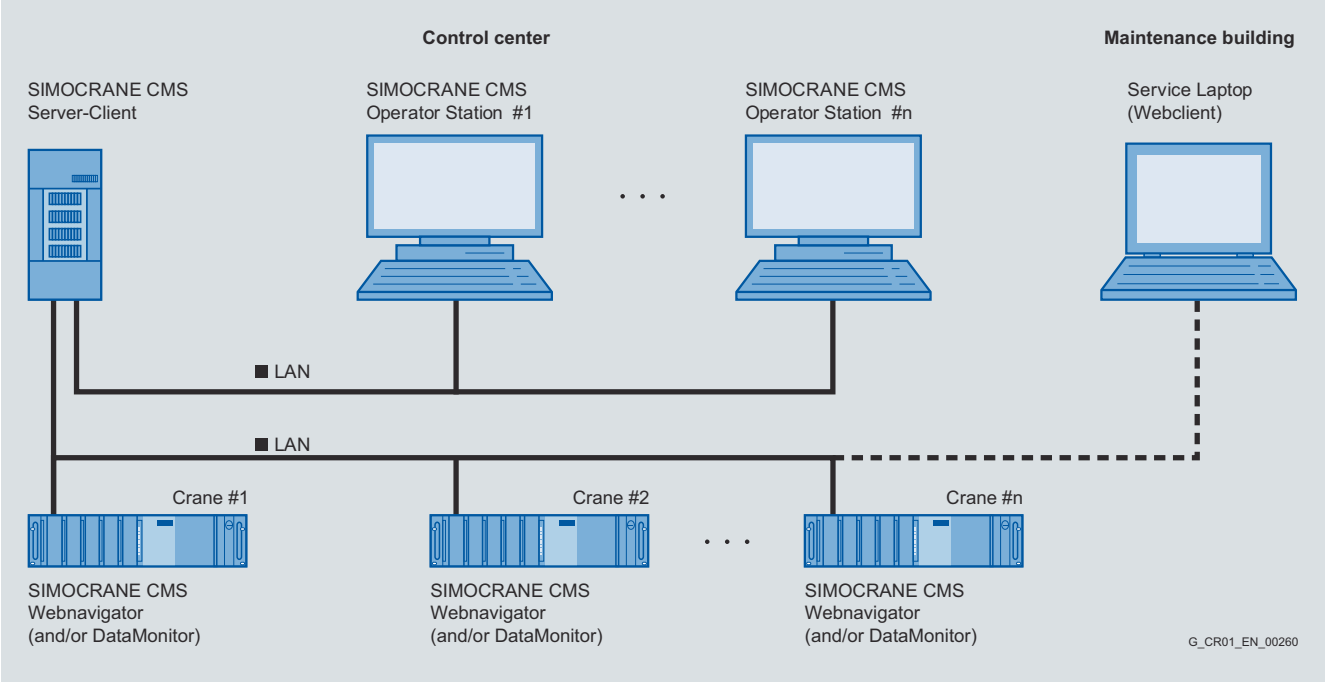
- CMS Webnavigator Order No. **6GA7210-3AA13-0AA0** on each crane
- RCMS server Order No. **6GA7212-0AA13-0AA0** (up to 5 cranes)
- Panel PC 477 as the operator panel in the cabin, e.g. Order No. **6AV7853-0AH34-4BA0** for each crane
- Rack PC 847B as the CMS PC in the electrical room, e.g. : Order No. **6ES7643-8KP41-0BA0** for each crane
- Rack PC 847B as RCMS server, e.g.: Order No. **6ES7643-8KP41-0BA0**
- Rack PC 847B as RCMS operator station, e.g. : Order No. **6ES7643-8KG30-5BX0** or standard PC with equivalent hardware

Further information:
See "Technical data", "Selection and ordering data" and Catalog ST 80.

RCMS server-client with central operator stations

Design (continued)

RCMS server-client



Topology of RCMS server and operator stations (server-client)

Remarks:

- If there are more than 5 cranes, it is only necessary to select the appropriate RCMS package (Order No. 6GA7212-..A13-**1**AA0)
- On the crane, one extra operator panel (e.g. checker cabin) is possible
- In the control center, additional operator stations are possible as clients

Typical applications

Large harbor crane systems, such as container terminals. In addition to the diagnostic possibilities on the individual crane, productivity data acquisition and reporting play a decisive role. The availability of acquired cargo handling data, downtimes as well as performance data are important aspects of plants of this type.

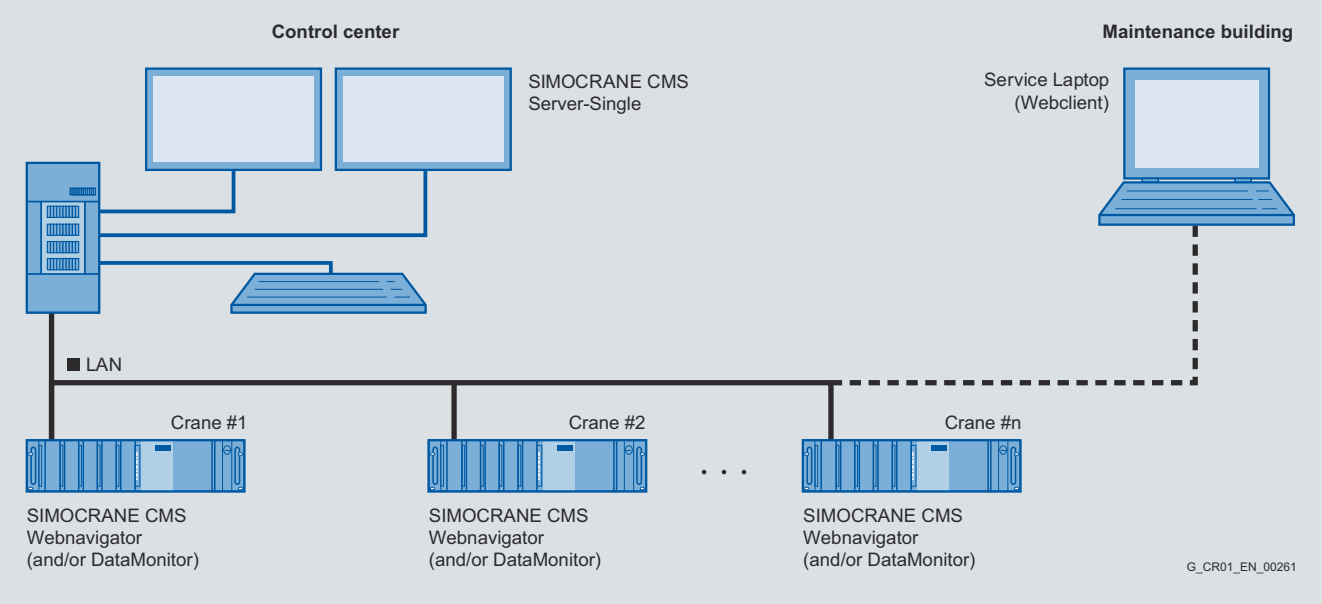
Examples:

- Ship to shore cranes and grab cranes (bulk goods) in the harbor area

Design (continued)

RCMS server-single

With this configuration, the server is also the central operator station with access to the lower-level CMS systems.



Topology of RCMS single-user system (server – single)

Status display
Error diagnostics

Function

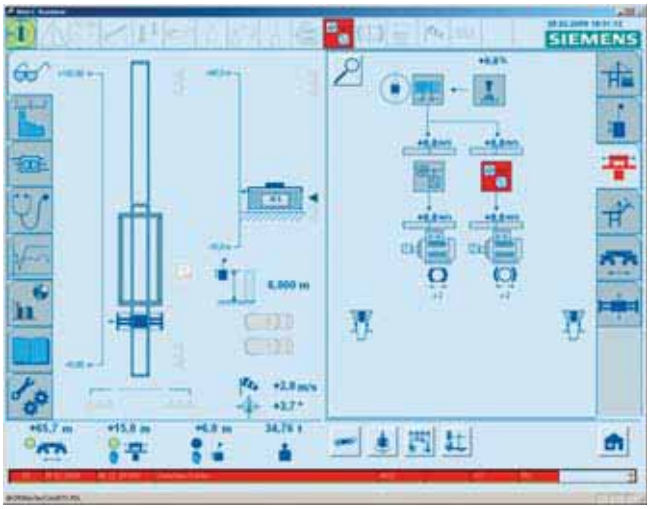
CMS basic functions

Graphical visualization

The system provides a symbol-oriented, graphical display of the crane and crane components complete with the current operating values and statuses. It is a tool for the crane driver. Important displays are always in view, and detailed views can be called up in just a few steps.

The screen contents provide supplementary information which will help the crane driver in his work. He is then capable of recognizing the cause of simple faults, such as interlocking for certain movements.

A status bar at the top of the screen displays fault states symbolically, and this is supplemented by text messages at the bottom of the screen.



Graphical condition monitoring – fault status

Fault messages and diagnostics

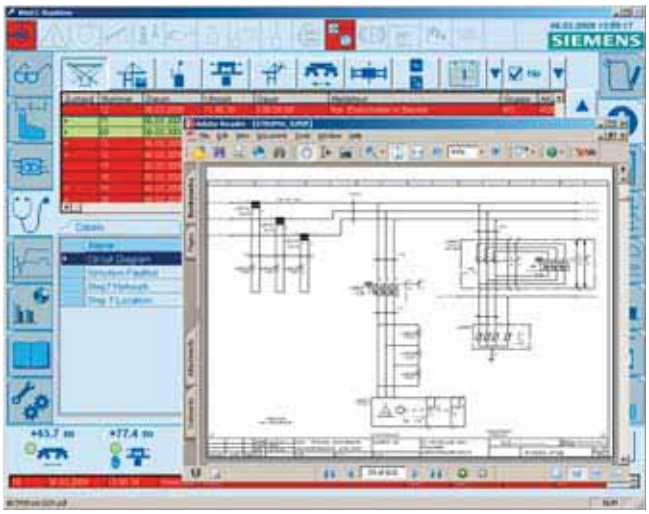
In the event of a fault, the alarm/event system helps with trouble-shooting and fault rectification. These complex functions support maintenance technicians with their work and help to reduce downtime.

Detailed fault lists present the course of the fault chronologically. Many filtering and sorting functions increase clarity.

Chronological message list

With a fault message selected, further sources of information can be accessed, such as:

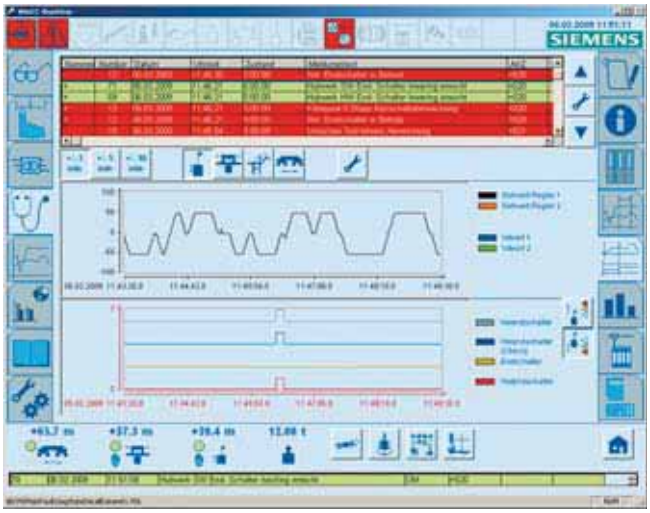
- Maintenance instructions and notes
- Circuit diagrams
- Manuals, operating manuals, data sheets
- Screens, drawings
- Direct navigation to the PLC program



Circuit diagram

Function (continued)

CMS also allows the position data, setpoints, etc. that were applicable at the time of the selected message to be called up and displayed in the form of a trend curve. This is a trace function with a sampling rate of at least 500 ms.



Example of setpoint progression at the time of the fault

Apart from the chronological message list, there are also statistical views that provide information on the frequency and duration of faults (hit list).

These make it easy to identify weak points and to obtain information about downtimes.

Measured-value acquisition:

CMS continuously acquires and archives important parameters, such as

- Position values
- Setpoint inputs and actual values
- Speed, velocity, etc.

These values can be displayed in the form of trend curves at any time, and easily configured.

Cargo handling

The cargo handling data of a crane is acquired and archived in order of occurrence. The composition of the data fields (cargo handling data set) is freely configurable and can therefore be adapted for every crane type.

An overview can be called up in the form of a list at any time at the press of a button.

Container handling list

The archived data can be made available to higher-level systems for further evaluation.

MMBF – Mean Moves Between Failures

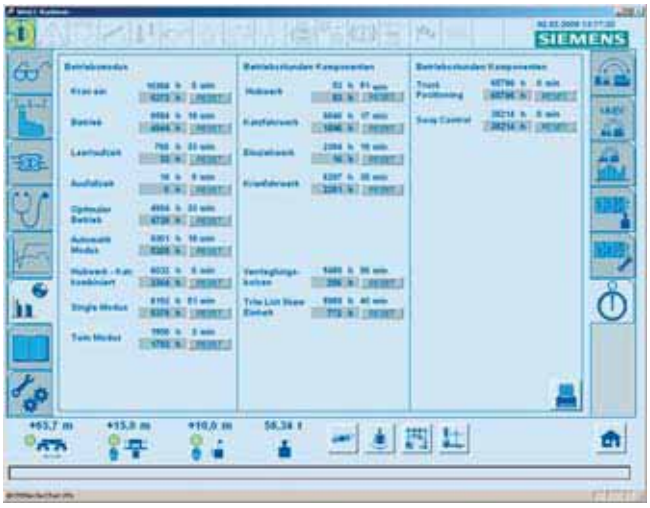
MMBF (cargo handling moves between failures) is one of the most important key performance indicators in crane technology. It provides information on the availability of the crane.

Runtime meter
Reporting

Function (continued)

Operating hour counters

Maintenance planning systems require counts from operating hours and counters for the components with relevance to maintenance. These values are originally acquired by the crane controller. The CMS acquires these values from the controller and makes them available to higher-level systems.



Operating hour counter

It is possible to acquire

- Operating hours and
- Counter values

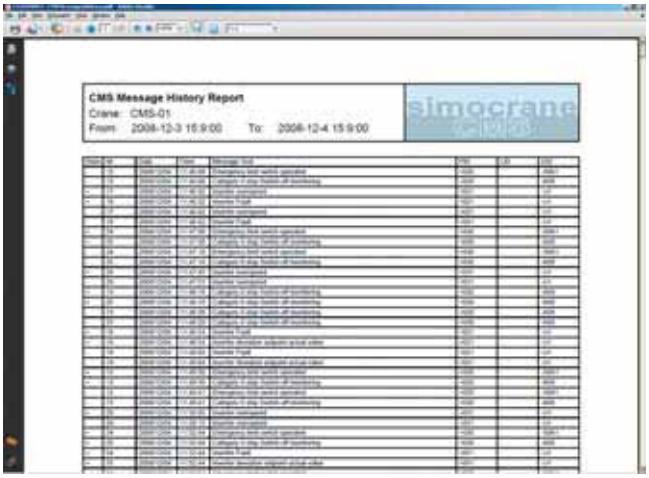
and process them. These values can be initialized or backed up in the controller via the CMS user interface. This function is extremely helpful if the CPU in the PLC has to be replaced.

Reporting

A simple form of report output is integrated into the system. The following reports can be output on the standard Windows printer:

- Current or archived fault reports
- Report of cargo handling data
- MMBF report

The tools that are available with WinCC allow the reports included as standard to be adapted or expanded at any time, and you can create and design your own reports.



Report for archived message list

This report in PDF format can easily be output on a PDF printer.

Function (continued)

CMS options

The extended functions are not included in the basic packages. They are optional and must be ordered accordingly.

CMS Webnavigator – Multi-user system

With WinCC Webnavigator, the CMS station can be expanded with additional operator stations. A typical application is an operator panel in the crane driver cabin or at another location at the crane.

Access is, however, also possible from other locations as long as the CMS station on the crane is accessible over the network or the Internet.

The access rights can be individually configured for each operator station and each user.

WinCC Webnavigator is included in the packages "CMS Webnavigator" and "CMS Webnavigator + DataMonitor".

CMS DataMonitor

The optional package DataMonitor offers user-friendly functions for the graphical presentation of cargo handling data, number of faults, and other operating data of the crane. You can use a web-based user interface to create your own reports or adapt existing ones at any time.

These reports are possible directly on the CMS station or from a generally available office PC, which, however, must be connected to the crane management system over the network.

Graphic DataMonitor

In addition to data reporting the DataMonitor can also be used for remote access to the CMS user interface. In this case, however, it is purely a monitoring mode. In most applications, this is sufficient for remote maintenance purposes. The optional package CMS Webnavigator is not necessary in this case for remote maintenance purposes.

WinCC DataMonitor is included in the packages "CMS DataMonitor" and "CMS Webnavigator + DataMonitor".

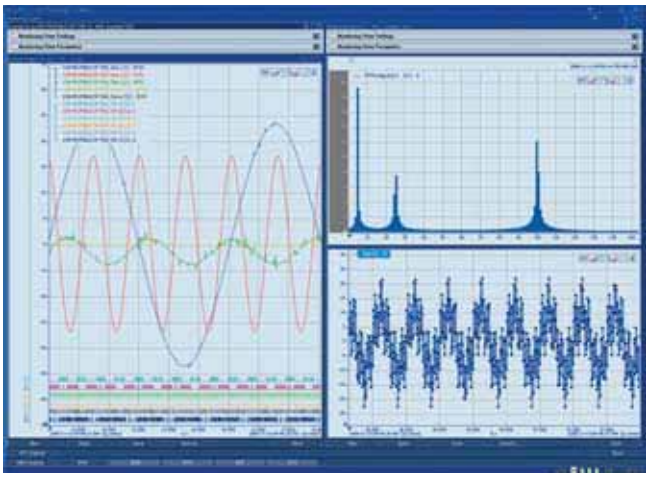
Trace with SIPLUS CMS

An important source of information in the event of a fault is the signal profile of:

- Speed
- Torque
- Current
- Voltage

in combination with a selection of important digital signals such as:

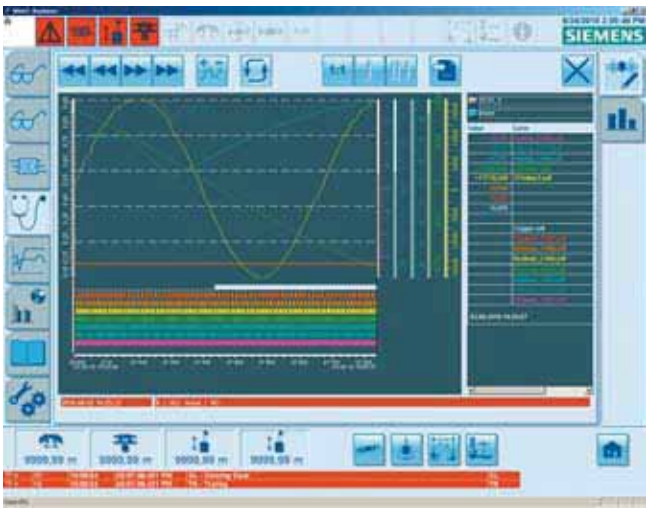
- Limit switches
- Commands, etc.



X-Tools

Most of these are dynamic variables. If an error occurs, the system plots the signal profile for a predefined number of signals and saves them for a period before and after the fault event.

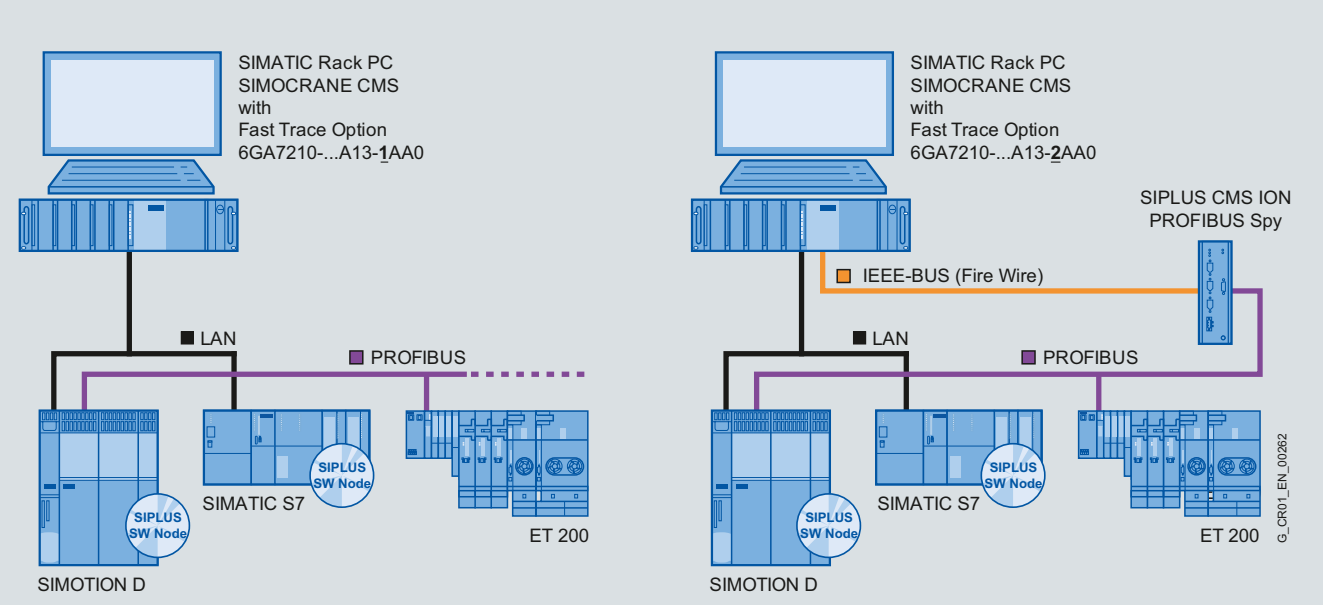
SIPLUS CMS used here is a high-performance product that is well-proven in other sectors. As well as recording trace data, the "X-Tools" program included in the scope of delivery offers high-performance tools for data analysis and continuous monitoring of operating parameters (Condition Monitoring). This component is integrated into the SIMOCRANE CMS user interface in such a manner that values stored in the context of an error message can be retrieved as easily as possible. The maintenance technician requires no special training for this tool.



Trace status in WinCC

System configuration, condition monitoring

Function (continued)



SIPLUS CMS configuration

IONs – Input-Output Nodes

SIPLUS CMS offers "IONs" for acquiring measured values. These are hardware or software modules that acquire the measured values.

With the numerous hardware IONs in the SIPLUS product range, measured values can be acquired directly where they arise. This avoids incorrect interpretations which may result due to the time taken to transmit via a controller. Sampling rates of up to 40 kHz (analog) or 50 kHz (binary) are possible using hardware IONs.

Software IONs

SIPLUS CMS records the data directly from the SIMATIC S7 and SIMOTION controllers using appropriate software IONs (Input-Output Nodes). The sampling rate using software IONs depends on the controller platform used. A "cycle-synchronized" trace can thus be achieved.

PROFIBUS ION

The PROFIBUS ION, also known as "Spy", is particularly versatile. This module can be used to record any values which pass via the PROFIBUS. The spy is a totally passive node and affects neither the bus nor the cycle time of controllers. The sampling rate that can be achieved is the PROFIBUS cycle.

Selection criteria

Software ION characteristics:

- For an integrated SIMATIC S7 or SIMOTION complete solution
- Up to 172 channels (signals or values) per controller
- Sampling rate up to the minimum cycle time of the controller (depending on the quantity structure)
- No additional hardware components required
- Communication via existing Ethernet interfaces.

PROFIBUS ION (PROFIBUS spy) characteristics:

- Independent of the controller used
- Expansion capability regarding the number of signals
- Sampling rate in the PROFIBUS cycle
- No resources required on the controller side (cycle time, memory)
- Communication over IEEE (interface required in the PC).

Function (continued)

RCMS central server or remote CMS functions

The central CMS functions concern the operation of CMS operator stations in central control rooms. In the context of harbor cranes, the term "RCMS" (Remote CMS) has become established.

As well as offering remote access to the CMS stations of the cranes, the central RCMS offers additional functions such as:

- Plant-wide crane overview
- Remote access to individual cranes
- Central data acquisition and evaluation
- Availability overview
- Performance evaluation

The central RCMS focuses on the entire plant, not the single crane. Cranes of the same type can be compared and weak points therefore detected. The determination of KPIs (Key Performance Indicators) and overviews of operation modes, downtimes etc. plays a key role at this point.

Given the volume of information that has to be displayed, we would recommend using large screens or even multi-screen mode. The system also supports the use of the large screens, commonly used in the control rooms of large industrial plants or control centers.

Plant-wide crane overview

The plant-wide crane overview is a project-oriented plant display based on a layout plan. The project engineer stores this plan as background in a format that is suitable for WinCC. Individual cranes are depicted using symbols. This display is not included in the scope of the product, but the data interface is provided.

Cartographic view

An alternative display is the hierarchic view as a topology tree. The different types of crane are displayed here in groups. The status of the individual cranes is visualized using different colors.

Tree view

Remote access to individual cranes

In the crane overview, a crane can be selected and the CMS interface of this crane can be displayed via remote access.

Central data acquisition and evaluation

Function (continued)

Central data acquisition and evaluation

The cargo handling data, error messages, and counter values acquired for each crane are synchronized with the RCMS server. This server makes the consolidated data for all assigned cranes available for further evaluations.

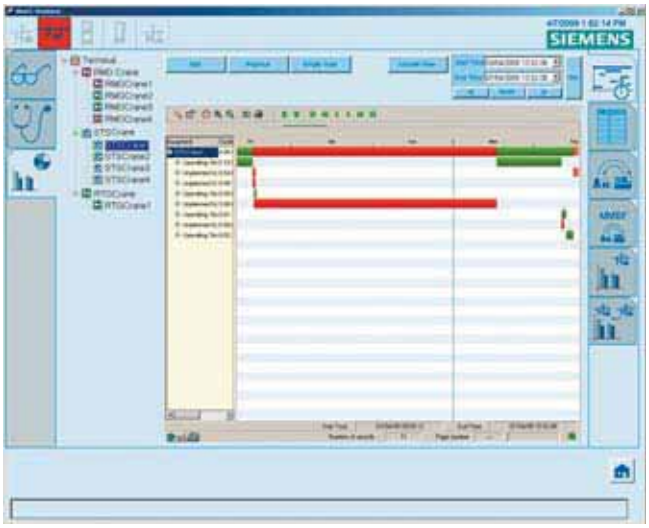
Report Designer, message list

This is a WinCC server that supplies the central (RCMS) stations with the data. To display the data, the WinCC functions are available here. The WinCC DataMonitor can be used for a more complex graphical evaluation.

DataMonitor evaluation

Availability overview

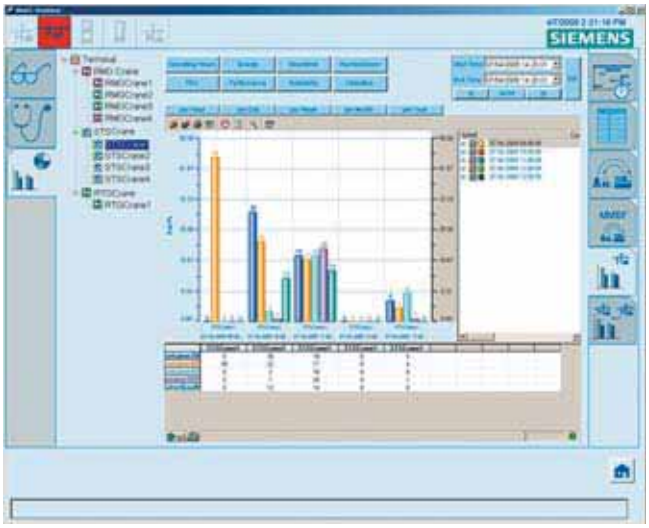
The WinCC option "DowntimeMonitor" continuously acquires the operating states of all assigned cranes. This enables the operator to determine the availability of the cranes at any time and to detect weak points.



Gantt chart

Performance evaluations

In addition to the operating states, the system also acquires counter values. This allows the KPIs (Key Performance Indicators) to be determined, which provide information regarding the reliability and performance of a crane.



Bar diagram counter

In addition to a number of predefined calculation algorithms, plant-specific calculation formulas can be stored.

Integration

SIMOCRANE CMS is a combination of product components and application components. The scope of supply comprises the CMS product components and a CMS standard application.

CMS product components

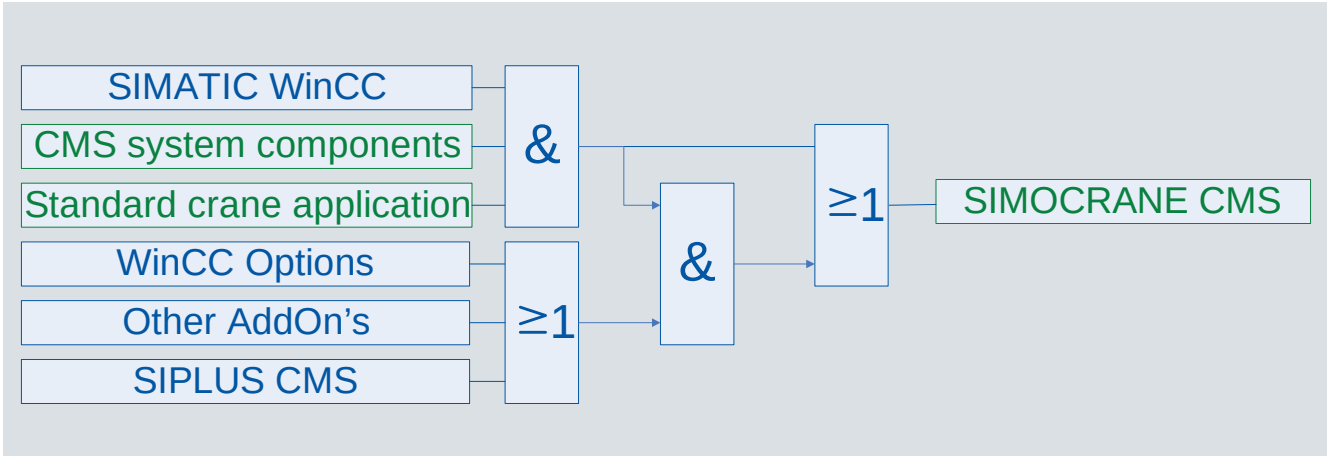
- **SIMATIC WinCC**
  SIMATIC WinCC is the SCADA system platform. It contains the basic functions for condition monitoring, the error message system, and process value archiving.
- **WinCC options**
  The packages DowntimeMonitor, DataMonitor, and Webnavigator are required for evaluating and conditioning data and for accessing a CMS station remotely.
- **SIMOCRANE CMS system software**
  Based on the open interfaces of WinCC, this software package expands the basic system with the sector-specific crane technology functions. This covers the acquisition and processing of cargo handling data as well as expanded diagnostic functions.
- **SIPLUS CMS**
  Using this "Condition Monitoring" tool, trace functions are implemented, high-speed events are acquired, and limits are monitored.

Standard CMS application

The product components named here form the tool kit for implementing the functionality of a crane management system. The scope of supply also includes a standard application that demonstrates concrete implementation. The standard application comprises a large number of variants for crane applications and therefore makes starting a CMS project much easier. In the simplest case, it is sufficient to parameterize the interface at the controller end to obtain a fully functional crane management system.

Experience has shown that a number of functions always remain that must be regarded as project-specific. The system is sufficiently open to allow you to fulfill these requirements with your own project engineering work.

The standard applications supplied cover the most commonly used harbor cranes (STS, RMG, RTG) and one industrial crane (ladle crane).
The application is intended as an example, and can be expanded or modified during configuration with additional crane types at any time.



SIMOCRANE CMS product range

Recommended computer configurations

Configuration

Recommended computer configurations

Computer configurations from the SIMATIC range are recommended below. In accordance with the recommendations, alternative computer hardware can also be used.

Recommended computer configuration:

SIMOCRANE CMS station on the crane (single-user station)

Touch PC version
e.g. SIMATIC Panel PC 677B
- Used as operator panel in the crane driver cabin
- Suitable for 5 g shock load

Front panel	Touch 15" or greater
Processor	Core 2 Duo 2 GHz
Memory configuration	4 GB
Hard drive	RAID1, 2 x 80 GB
Optical drives	DVD±R
Communications interfaces	Ethernet
Other interfaces	USB
Operating system	Windows XP Prof.

SIMOCRANE CMS station on the crane (single-user or multi-user station)

Rack PC version
e.g. SIMATIC Rack PC 647
- Suitable for 5 g shock load
- Additionally, monitor min. 1280 X 1024 dpi or widescreen format

Processor	Core 2 Duo 2 GHz
Memory configuration	4 GB
Hard drive	RAID1, 2 x 160 GB
Optical drives	DVD±R
Communications interfaces	2 x Ethernet (PROFIBUS)
Other interfaces	USB
Operating system	Windows XP Prof.

SIMOCRANE CMS operator panel on the crane

- Web client for the CMS computer
- Touch PC version
  e.g. SIMATIC Panel PC 477B
- Used as operator panel in the crane driver cabin or checker cabin
- Suitable for 5 g shock load
- Preferably diskless

Front panel	Touch 15" or greater
Processor	Pentium M 1.4 GHz
Memory configuration	2 GB
Mass storage	CF Card 4 GB
Communications interfaces	Ethernet (PROFIBUS)
Other interfaces	USB
Operating system	Windows XP embedded

SIMOCRANE RCMS server

- Server PC version
- 1 - 2 displays if necessary, preferably widescreen format

Processor	Quad-Core 2.8 GHz
Memory configuration	4 GB
Hard drive	RAID1, 2 x 160 GB
Optical drives	DVD±R
Graphics card	2 x DVI or 2 x VGA
Communications interfaces	2 x Ethernet
Other interfaces	USB
Operating system	Windows Server 2003 Standard SP2

SIMOCRANE RCMS operator station

- Office PC version
- 1 - 2 displays if necessary, preferably widescreen format

Processor	Core 2 Duo 2 GHz
Memory configuration	2 GB
Hard drive	80 GB
Optical drives	DVD±R
Graphics card	2 x DVI or 2 x VGA
Communications interfaces	Ethernet
Other interfaces	USB
Operating system	Windows XP Prof.

Further information

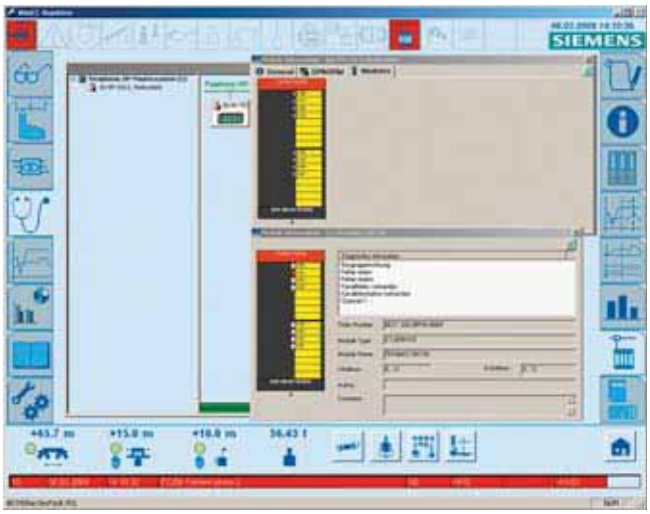
Optional components

Products are listed below that are not components of SIMOCRANE CMS, but which are recommended to perform the tasks described briefly here. Please read the detailed technical data and ordering information at the specified Internet address.

System diagnostics

As a WinCC-certified AddOn, this software module offers an integral SIMOCRANE CMS overview of the configured PROFIBUS topology and the status of all connected PROFIBUS stations, without the need for a SIMATIC Manager on the computer.

The product comprises an Active-X control, which can be easily integrated in WinCC, and function blocks for SIMATIC S7. PROFIBUS diagnostics can be integrated in an existing system in just a few steps. The overview of the PROFIBUS topology is generated dynamically on the basis of the S7 hardware configuration.



PROFIBUS diagnostics

WinCC AddOn – PROFIBUS/PROFINET diagnostics

This WinCC AddOn enables a diagnostics display to be integrated for the PROFIBUS or PROFINET plant topology and diagnostic information to be called up for the field devices used.

PROFIBUS DP/PA slave diagnostics	2XV9450-1SD12
PROFINET IO Device diagnostics	2XV9450-1SD10

www.siemens.com/systemdiagnostics

WinCC AddOn – PM-Maint

This is a complete maintenance planning system that can be centrally implemented for the entire plant, or even be locally implemented on the crane.

PM-Maint 100 maintenance tasks without web client	9AE7104-2SS10-1AA0-Z
PM-Maint 100 maintenance tasks with web client	9AE7104-2SS10-1BA0-Z
PM-Maint 300 maintenance tasks without web client	9AE7104-2SS20-1AA0-Z
PM-Maint 300 maintenance tasks with web client	9AE7104-2SS20-1BA0-Z
PM-Maint > 300 maintenance tasks without web client	9AE7104-2SS30-1AA0-Z
PM-Maint > 300 maintenance tasks with web client	9AE7104-2SS30-1BA0-Z

www.siemens.com/process-management

Note:
The operating hour counters of CMS remain available independently of this AddOn and can also be provided for previously installed maintenance systems.

Function matrix

SIMOCRANE CMS

Technical data

	Type	6GA7210-**1**..13-.AA0	6GA7210-**2**..13-.AA0	6GA7210-**3**..13-.AA0	6GA7210-**4**..13-.AA0
	Ordering packages	**SIMOCRANE CMS Basic**	**DataMonitor**	**Webnavigator**	**Webnavigator + DataMonitor**
Configurable presentation					
• Crane types [1]		✓	✓	✓	✓
- STS		✓	✓	✓	✓
- RMG/RTG		✓	✓	✓	✓
- Industrial crane (ladle crane)		✓	✓	✓	✓
• Drives		✓	✓	✓	✓
- Hoisting gear		✓	✓	✓	✓
- Gantry		✓	✓	✓	✓
- Trolley		✓	✓	✓	✓
- Slewing gear		✓	✓	✓	✓
• Load suspension device		✓	✓	✓	✓
- Grab		✓	✓	✓	✓
- Hook		✓	✓	✓	✓
- Single, twin, tandem spreader		✓	✓	✓	✓
- Gripping tongs		✓	✓	✓	✓
• Add-on modules		✓	✓	✓	✓
- Sway Control settings		✓	✓	✓	✓
- Truck Positioning settings		✓	✓	✓	✓
Condition monitoring					
• Crane components		✓	✓	✓	✓
- Crane overview		✓	✓	✓	✓
- Boom		✓	✓	✓	✓
- Gantry drives		✓	✓	✓	✓
- Spreader		✓	✓	✓	✓
• Positions		✓	✓	✓	✓
• Limit switches		✓	✓	✓	✓
• Weight		✓	✓	✓	✓
• Drives		✓	✓	✓	✓
- Setpoint/actual value		✓	✓	✓	✓
- Brakes		✓	✓	✓	✓
• Rope drums		✓	✓	✓	✓
- Safety brakes		✓	✓	✓	✓
• Wind		✓	✓	✓	✓
- Rail clamps		✓	✓	✓	✓
- Interlock bolt		✓	✓	✓	✓
• Interlocks		✓	✓	✓	✓
- Operation-specific		✓	✓	✓	✓
- EMERGENCY OFF		✓	✓	✓	✓
- Access (doors)		✓	✓	✓	✓
• Main power supply		✓	✓	✓	✓
Operator functions					
• Counter handling		✓	✓	✓	✓
• Sway Control modes		✓	✓	✓	✓
• Truck Positioning modes		✓	✓	✓	✓
Error diagnostics					
• Approx. 100 typical, preconfigured crane error messages		✓	✓	✓	✓
• Display of pending and historical messages		✓	✓	✓	✓
• Statistical message overview ("hit list")		✓	✓	✓	✓
• Symbolic error status display		✓	✓	✓	✓
• Graphical assignment in the status display		✓	✓	✓	✓
• Call up of supplementary information		✓	✓	✓	✓
- Documents (examples only)		✓	✓	✓	✓
- Screens (examples only)		✓	✓	✓	✓
- Circuit diagrams (examples only)		✓	✓	✓	✓

[1] Adaptable for other crane types by adjusting the configuration.

Technical data (continued)

	Type	6GA7210-**1**..13-.AA0	6GA7210-**2**..13-.AA0	6GA7210-**3**..13-.AA0	6GA7210-**4**..13-.AA0
	Ordering packages	**SIMOCRANE CMS Basic**	**DataMonitor**	**Webnavigator**	**Webnavigator + DataMonitor**
Error diagnostics (continued)					
• STEP 7 network entry point (symbolic or absolute)		✓	✓	✓	✓
• Process values to accompany messages (e.g. positions)		✓	✓	✓	✓
• SIMATIC S7 CPU diagnostics (CPU-dependent)		✓	✓	✓	✓
• SIMOTION IT-Diag integration (under license)		✓	✓	✓	✓
Operating data acquisition					
• Acquisition of cargo handling data ("Moves")		✓	✓	✓	✓
• Acquisition of operating hours counts		✓	✓	✓	✓
• Acquisition of load and maintenance counts		✓	✓	✓	✓
• Acquisition of MMBF		✓	✓	✓	✓
• Acquisition of setpoint/actual values for position data		✓	✓	✓	✓
Logging functions					
• Report for pending messages		✓	✓	✓	✓
• Report for historical messages		✓	✓	✓	✓
• Cargo handling data record (moves)		✓	✓	✓	✓
• Operating hour counters report		✓	✓	✓	✓
• Counter report		✓	✓	✓	✓
• Graphical data evaluation			✓		✓
• Export in other file formats			✓		✓
- PDF			✓		✓
- MS Office			✓		✓
System features					
• 1024 or 2048 process tags		✓	✓	✓	✓
• 512 archive tags		✓	✓	✓	✓
• Communication channels		✓	✓	✓	✓
- SIMATIC S5/S7 (PROFIBUS, Ethernet)		✓	✓	✓	✓
- SIMOTION (Ethernet)		✓	✓	✓	✓
- OPC		✓	✓	✓	✓
• Remote access (CMS only)			✓	✓	✓
• Multi-user capability (up to 3 including remote access)			✓	✓	✓
- Display only			✓	✓	✓
- Also with operation				✓	✓

Options for SIMOCRANE CMS

	Type	6GA7210-.....-1AA0	6GA7210-.....-2AA0
	Ordering packages	**Option Trace SW**	**Option Trace SW + HW**
Trace – Status analysis			
• SIPLUS CMS software package – X-Tools		✓	✓
• SIMATIC S7 block for data acquisition		✓	✓
• SIMOTION block for data acquisition		✓	✓
• PROFIBUS Spy (hardware)			✓

Function matrix

SIMOCRANE RCMS server

Technical data (continued)

	Type	6GA7212-**0**..13-**0**AA0	6GA7212-**0**..13-**1**AA0	6GA7212-**1**..13-**0**AA0	6GA7212-**1**..13-**1**AA0	6GA721**3**-...11-**0**AA0
	Ordering packages	**SIMOCRANE RCMS**				
		Server-Single-5	**Server-Single-25**	**Server-Client-5**	**Server-Client-25**	**Operator station**
Crane overview		✓	✓	✓	✓	✓
• Cartographic plant overview (example only)		✓	✓	✓	✓	✓
- Zooming and scrolling possible		✓	✓	✓	✓	✓
- Dynamic position display		✓	✓	✓	✓	✓
- Status display (operation, fault, maintenance, etc.)		✓	✓	✓	✓	✓
- Call-up of detailed information per crane		✓	✓	✓	✓	✓
• Hierarchic tree structure for cranes and types		✓	✓	✓	✓	✓
- Status display (operation, fault, maintenance, etc.)		✓	✓	✓	✓	✓
- Call-up of detailed information per crane		✓	✓	✓	✓	✓
Remote access						
• Remote access to the CMS of the selected crane		✓	✓	✓	✓	✓
• Calling up the trace data for a crane		✓	✓	✓	✓	✓
Performance evaluations		✓	✓	✓	✓	✓
• Operating status overview as Gantt chart		✓	✓	✓	✓	✓
- Downtimes		✓	✓	✓	✓	✓
- Operating times		✓	✓	✓	✓	✓
- Maintenance		✓	✓	✓	✓	✓
• Performance evaluation for cargo handling data		✓	✓	✓	✓	✓
- Cargo handling per hour		✓	✓	✓	✓	✓
- Evaluation based on handled cargo (e.g. container sizes)		✓	✓	✓	✓	✓
- Evaluation based on weights moved		✓	✓	✓	✓	✓
• KPI per crane		✓	✓	✓	✓	✓
- MMBF values (Mean Moves Between Failures)		✓	✓	✓	✓	✓
- Customer-specific KPIs (configurable)		✓	✓	✓	✓	✓
Graphic evaluations		✓	✓	✓	✓	✓
• Message statistics		✓	✓	✓	✓	✓
• Counter and operating hours values		✓	✓	✓	✓	✓
• Cargo handling data as tables or graphics		✓	✓	✓	✓	✓
Long-term archiving		✓	✓	✓	✓	
• Messages for the assigned cranes		✓	✓	✓	✓	
• Operating hours values		✓	✓	✓	✓	
• Counter and operating hours values		✓	✓	✓	✓	
• Customer-specific values (configurable)		✓	✓	✓	✓	
System features						
• 1024 process tags		✓	✓	✓	✓	
• Up to 32 RCMS operator stations can be used				✓	✓	
• Archive tags						
- 512 archive tags		✓		✓		
- 5000 archive tags			✓		✓	
• Data evaluation/reporting (DataMonitor)						
- 3 clients		✓		✓		
- 10 clients			✓		✓	
• Performance monitoring (DowntimeMonitor) [1]						
- 5 cranes		✓		✓		
- 25 cranes			✓		✓	

[1] For more than 25 cranes, please enquire.

Selection and ordering data

Description	Order No.																
SIMOCRANE CMS	**6**	**G**	**A**	**7**	**2**	**1**	**0**	**–**	■	■	**A**	**1**	**3**	**–**	■	**A**	**A**	**0**
WinCC RT system software CMS system software CMS standard application (WinCC project)																		
Scope of functions • Crane condition monitoring • Error messages and diagnostics • Recording of cargo handling data • Acquisition of operating hours/counter values • Reporting • Document references • Maintenance instructions/notes • STEP 7 block reference																		
Single-user/multi-user system																		
• Single-user system – CMS Basic									**1**									
• Multi-user system: 3 read-only clients – CMS DataMonitor									**2**									
• Multi-user system: 3 clients – CMS Webnavigator									**3**									
• Multi-user system: 3 clients – CMS Webnavigator + DataMonitor									**4**									
Language versions																		
• Standard (Ger., Eng., It., Fr., Sp.)										**A**								
• ASIA (Eng., Chs., Cht., Kor., Jpn.)										**B**								
Sampling rate																		
• Trace with acquisition cycle of at least 500 ms															**0**			
• Trace < 500 ms – SIPLUS CMS with SW IONs S7/SIMOTION															**1**			
• Trace < 500 ms – SIPLUS CMS with SW IONs S7/SIMOTION + HW ION PROFIBUS Spy															**2**			

4

SIMOCRANE RCMS

Selection and ordering data (continued)

Description	Order No.																		
SIMOCRANE RCMS server	**6**	**G**	**A**	**7**	**2**	**1**	**2**	**–**	■	■	**A**	**1**	**3**	**–**	■	**A**	**A**	**0**
WinCC RT system software																		
WinCC DataMonitor																		
WinCC DowntimeMonitor																		
WinCC Server (only for 6GA7212-1...)																		
RCMS system software																		
RCMS standard application (WinCC project)																		
Scope of functions																		
• Plant overview																		
• Error messages and diagnostics																		
• Remote access to crane CMS																		
• Evaluation of operating data and reporting																		
• Calculation of operating characteristics																		
• Archiving of messages and operating data																		
• Single-user station without client connection									**0**									
• Connection to up to 32 RCMS operator stations (clients) is possible									**1**									
Language versions																		
• Standard (Ger., Eng., It., Fr., Sp.)										**A**								
• ASIA (Eng., Chs., Cht., Kor., Jpn.)										**B**								
Quantity structure																		
• Up to 5 cranes															**0**			
• Up to 25 cranes															**1**			

Description	Order No.																		
SIMOCRANE RCMS operator station (client)	**6**	**G**	**A**	**7**	**2**	**1**	**3**	**–**	**0**	■	**A**	**1**	**1**	**–**	**0**	**A**	**A**	**0**
WinCC RT 128 tags																		
WinCC WebNavigator client																		
WinCC DataMonitor client																		
WinCC DowntimeMonitor client																		
RCMS system software																		
RCMS standard application (WinCC client)																		
Scope of functions																		
• Plant overview																		
• Error messages and diagnostics																		
• Remote access to crane CMS																		
• Evaluation of operating data and reporting																		
Language versions																		
• Standard (Ger., Eng., It., Fr., Sp.)										**A**								
• ASIA (Eng., Chs., Cht., Kor., Jpn.)										**B**								

SIMOCRANE
Application examples

5

5

Overview

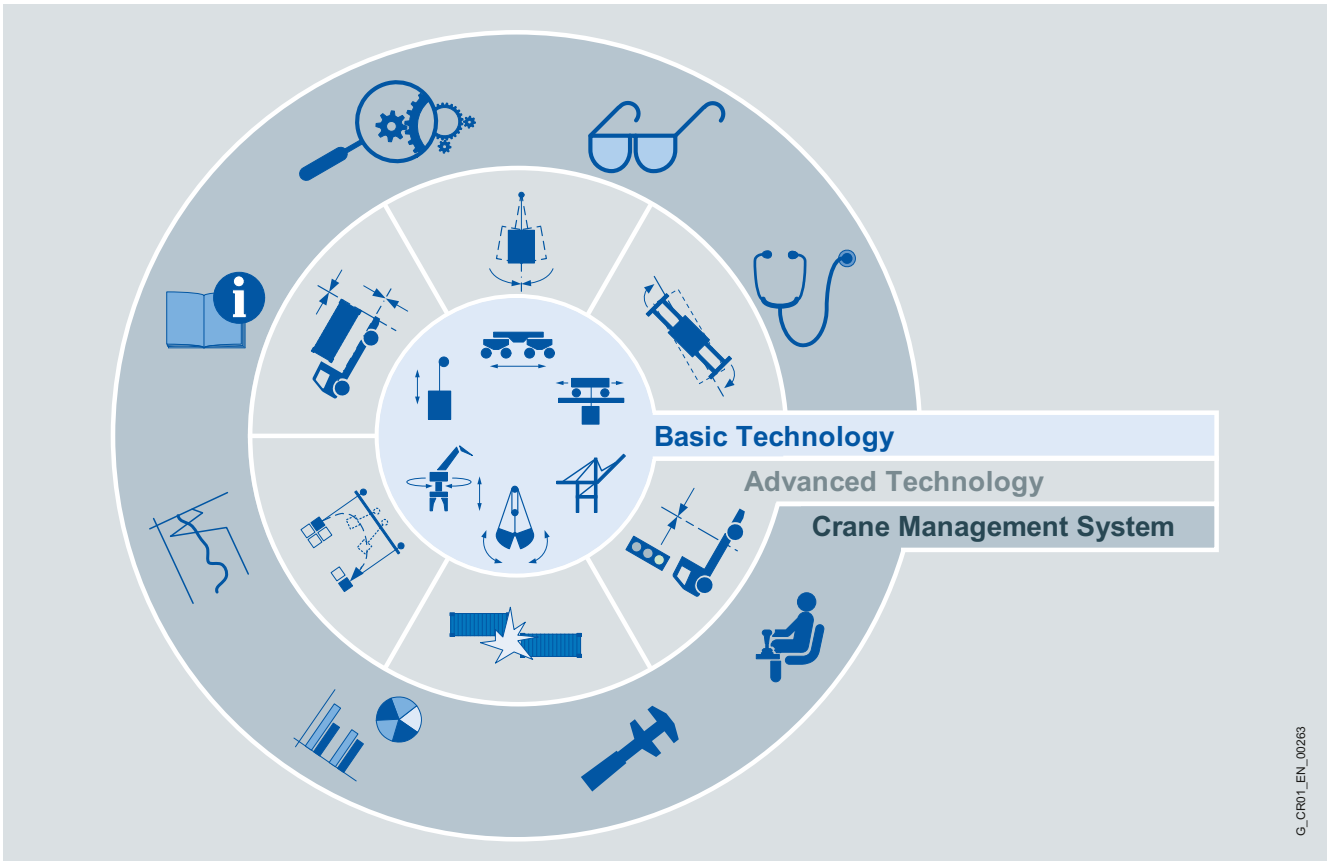
SIMOCRANE offers a range of coordinated products that, in different combinations, fulfill a wide range of different requirements.

The SIMOCRANE product family is based on standard SIEMENS products. Our customers therefore enjoy all the usual advantages regarding service and innovation.

The high degree of scalability is a decisive advantage in the implementation of simple manual crane applications through to semi or fully automated crane applications.

The diversity and combination possibilities of SIMOCRANE products for implementing the different requirements will be illustrated here.

The detailed functional scope of the individual products is described in the corresponding chapters. In the following application example, only those functions required for the solution are listed.



SIMOCRANE product range

Applications

This application example describes a solution for automatic loading and unloading a load on and off a terminal vehicle using the SIMOCRANE technology.

Application example

The positioning system must assist the truck driver when parking with the aid of a simple "traffic light" control. A traffic light visible to the truck driver is mounted at each corner of the crane. The crane driver operates the system and specifies the lanes for loading and the direction of travel of the truck. The working area between the lanes is 32 m in total and has seven lanes. On the basis of the presets for lane and direction of travel, the system must be able to position different trucks and trailers independently.

A positioning system must assist the crane driver when setting down and picking up the containers. The journey from the ship to the selected working lane and vice versa must be completed automatically and in the shortest possible time. For safety reasons, the spreader must always stop at a safe height. Automatic travel should be possible without a teach-in journey. The crane driver is responsible for lowering the load from the safe height and making the correct system settings, for example, for stacking type or working lane. The crane driver must be able at any time to interrupt automatic travel of the trolley and hoisting gear. The transitions from automatic to manual travel and vice versa should be performed smoothly.

Solution

The application example formulated above can be implemented using SIMOCRANE products in combination with a crane application. For this application example, the products and their functions described below are put to use.

Basic function:

- **Basic functions for STS crane**

  SIMOCRANE Basic Technology forms the basis for this application and controls the standard motion control functions of hoist and trolley.
- **SIMOCRANE CMS Crane Management System**

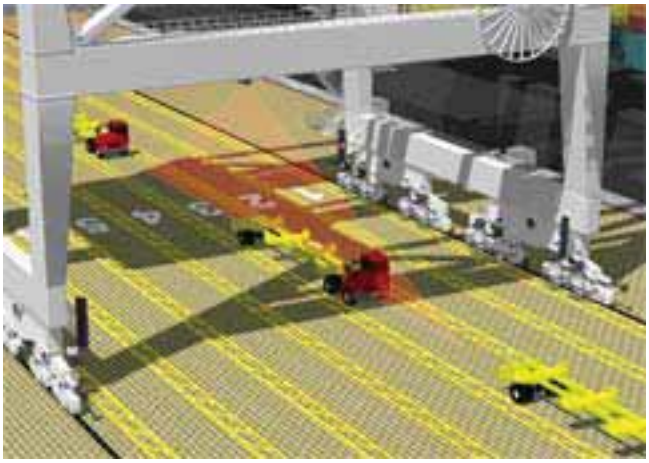
  SIMOCRANE CMS records fault and operating data and enables settings to be made for crane operation.

  A touch panel PC is installed in the crane driver cabin that allows the crane driver to perform operations and display operating data and operating states.

Procedure

1. Controlled parking of a truck

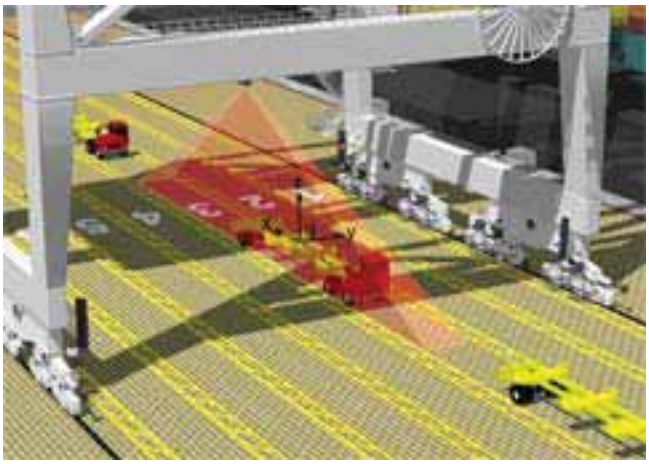
SIMOCRANE TPS is used to detect an approaching truck and to determine the exact target position. The driver is guided to the target position using a signaling system (e.g. traffic light).



Truck Positioning System – Parking

2. Precise target position measurement for the parking truck

Parking is still performed manually by means of the parking attendant. For this reason, after parking, precise measurement of the truck is necessary. This is also performed by SIMOCRANE TPS. The precise target coordinates determined (X, Y, Z and angle of rotation) are transferred to the crane controller.



Truck Positioning System – Position acquisition/target position measurement

Note:
The determined coordinates must be converted to a crane coordinate system in an application in the crane controller!

Procedure

Applications (continued)

3. Load or discharge a container on the ship

This procedure can be performed in parallel with steps 1 and 2.

The SIMOCRANE Sway Control System covers the following functions here:

- Time-optimized, reliable and automatic motion control of the trolley and hoisting gear.
- Closed-loop control of load swaying.
- Closed-loop control of the angle of rotation of the load (skew control). The skew controller sends the setpoints for the trim, list and skew cylinders to the crane controller.

Note:
The control solution for the individual cylinders must be implemented in an application in accordance with the type of mechanical system installed.

When this is combined with acquisition of the height and hindrance profiles by means of an appropriate distance sensor system, performance and collision avoidance can also be improved.

4. Putting a container down on the truck

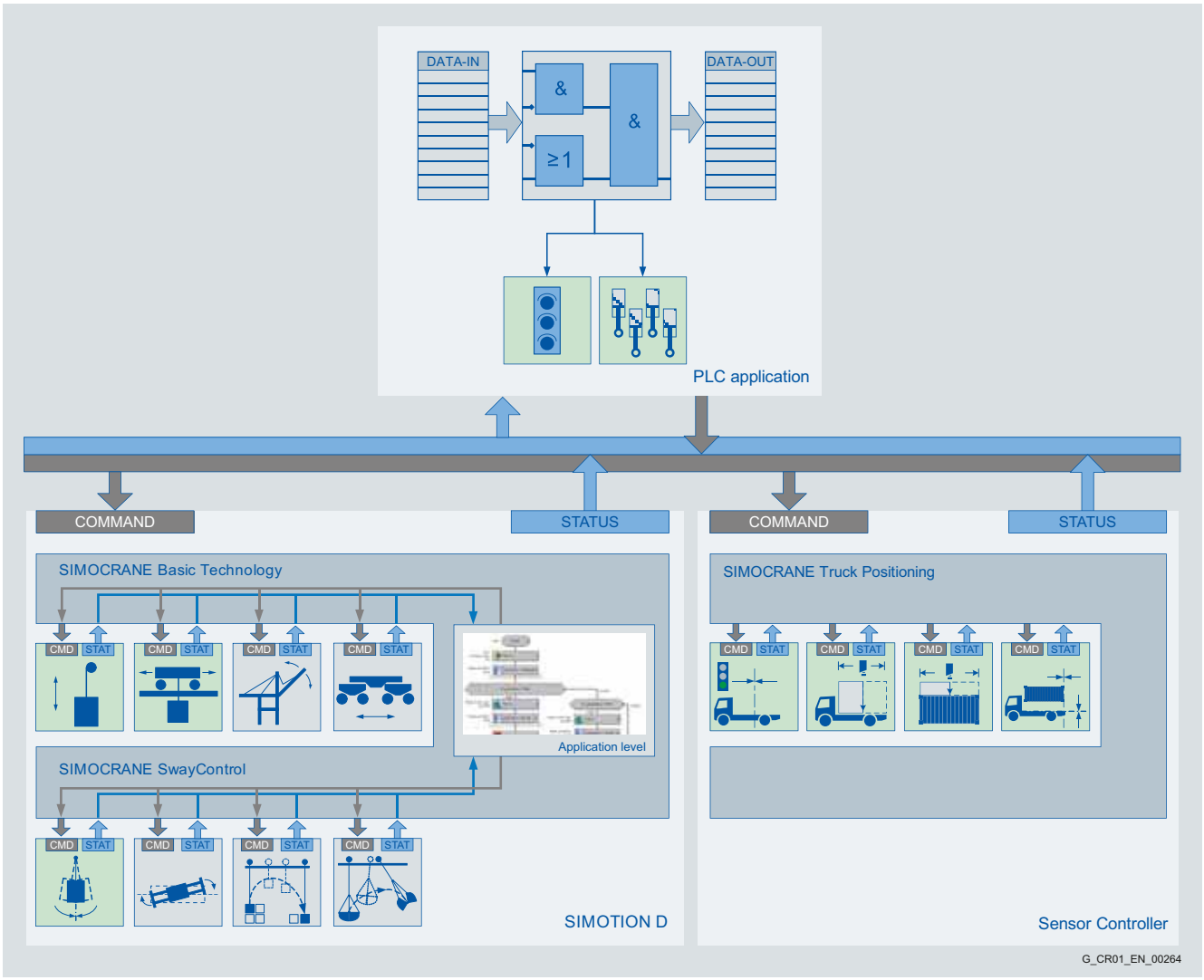
The decisive factor in this step is the accurate interplay of the SIMOCRANE components used.

- The load position is determined by the SIMOCRANE Sway Control System and it is output at the interface for the crane controller.
- The target position is determined by SIMOCRANE TPS and it is output at the interface for the crane controller.
- The crane application can determine the setpoints for the final positioning operation from this. With this information, SIMOCRANE Basic Technology controls the relevant axes to complete the positioning operation.
- If skew control is implemented, this is also controlled by the crane application. The corresponding setpoints are determined here on the basis of the load and target position data.

TPS – Scenario on-board ship

TPS – Setting down a container

Applications (continued)



Function blocks of the application example for a semi-automatic STS crane

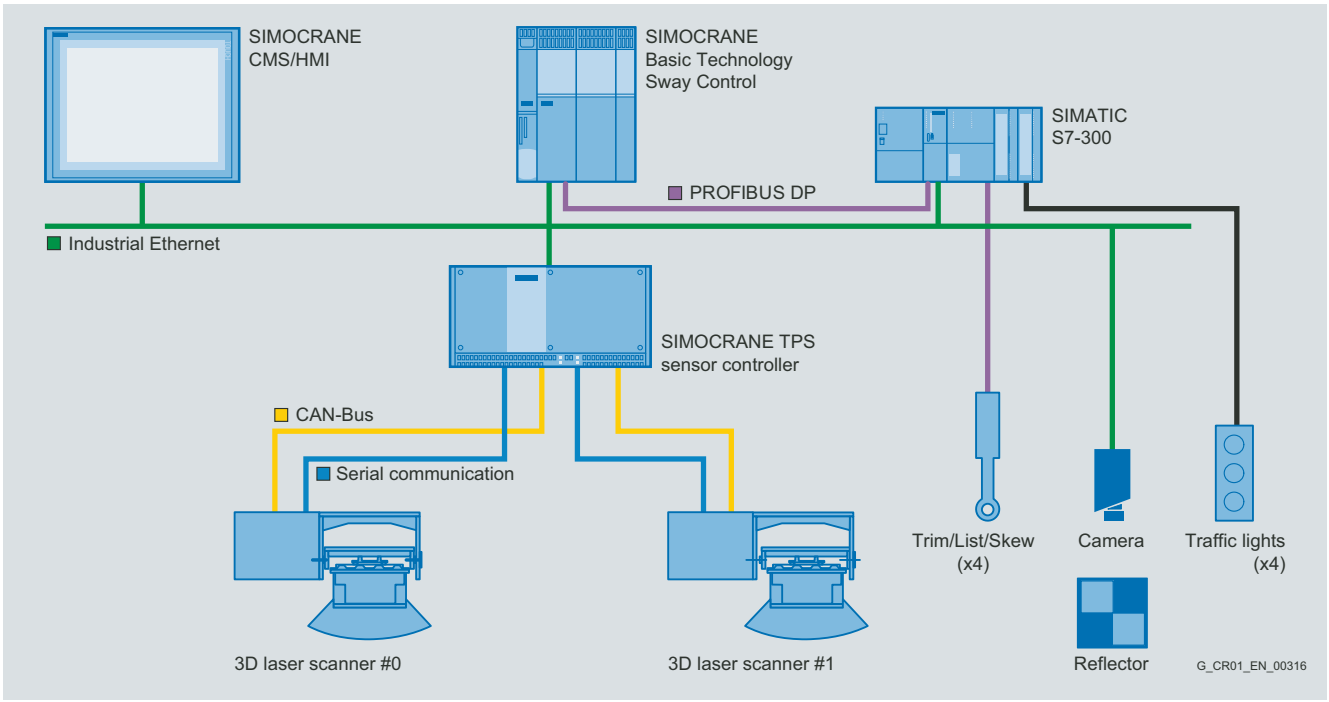
The figure shows where which software modules execute or are implemented. The symbols with a green background indicate those function modules that are required especially for the application described here.

The "Sensor Controller" includes all function modules for determining the positions of the containers or vehicles. The **Sway Control functions** of SIMOCRANE SC execute on SIMOTION D as well as the motion control of SIMOCRANE Basic Technology. The application-specific parts, such as traffic light and cylinder controllers are implemented on the crane controller (PLC).

Data is exchanged between the 3 units Sensor Controller, SIMOTION D and PLC over defined interfaces which is symbolized in the figure by "COMMAND" and "STATUS".

System configuration and ordering data

Applications (continued)



Topology of semi-automatic STS crane

The following components are required for this application:

Description	Order No.
SIMOCRANE Basic Technology	
1 x SIMOCRANE Basic Technology, incl. SIMOTION D435	**6AU1660-4AA10-0AA0**
SIMOCRANE Truck Positioning	
1 x SIMOCRANE Truck Positioning Sensor Controller	**6GA7220-1AA00-0AA0**
2 x SIMOCRANE Truck Positioning 3D laser swiveling unit	**6GA7221-1AA21-0AA0**
4 x traffic light, e.g.	**L24757-C2323-A101**
8 x support for fixing signal encoders 119 mm, e.g.	**C24121-A35-C93**
SIMOCRANE Sway Control System	
1 x SIMOCRANE SC Integrated for SIMOTION D	**6GA7200-0AA01-0AA0**
1 x camera for sway measurement, stainless steel, -25 °C to +60 °C, 16 mm lens	**6GA7202-1AA10-0CA0**
1 x reflector, active, 800 x 800 mm, measuring range up to 40 m	**6GA7201-0AA03-0AA0**
SIMOCRANE CMS (HMI)	
1 x SIMOCRANE CMS Basic	**6GA7210-1AA13-0AA0**
1 x Panel PC 677B	**6AV7874-0BE52-1AC0**

Application part

The individual products process input parameters and output results or setpoints. The technological procedure, interlocks, and crane-specific conversions etc. must be performed and taken into consideration in the crane application.

- Coordinate transformation
- Setpoint calculation for motion control
- Crane controller signaling system
- Control of TLS closed-loop control (skew control)
- Evaluation of the laser for height profile acquisition (bay scanner)
- Structure of procedure and control of axes
- Safety functions.

Details of the individual SIMOCRANE products as well as further configuration options can be found in:

- Chapter 2 – SIMOCRANE Basic Technology
- Chapter 3 – SIMOCRANE Advanced Technology (Sway Control Systems, truck positioning)
- Chapter 4 – SIMOCRANE CMS Crane Management System.

Drive systems

6

System overview

Overview

Drive components

The modular drive system SINAMICS S120 from the SINAMICS product range is ideally suited for use in crane applications. It allows power modules and control performance to be freely combined. Due to their modularity, the power modules for units such as hoist, trolley and gantry can be connected via a common DC link, which enables energy to be transferred. Depending on the performance, the power components are available in three formats: booksize, chassis and Cabinet Module.

The power modules can be subdivided into line-side and motor-side power components. The SIMOTION D Motion Control System is the ideal solution for the increasingly complex motion control tasks in the crane environment. SIMOTION D controls the motor-side power modules through a direct connection via DRIVE-CLiQ. The line-side power modules are controlled by the CU320 Control Unit.

Booksize format

Booksize format units are optimized for multi-axis applications and are mounted adjacent to one another. The connection for the common intermediate DC circuit is an integral feature.

Chassis format

Higher-output units (approximately 100 kW and above) are constructed as built-in units in chassis format. Chassis format units are cooled by an internal air cooling circuit as standard.

Cabinet Module format

Apart from the built-in units, SINAMICS S120 Cabinet Modules represent a cabinet-mounted system that is specially designed for use in crane construction, and which can be used to build up a row of drive cabinets with a total output of up to 4500 kW.

The building block system with a central incoming supply and common DC busbar is ideally suited to multi-motor operation in cranes. The modular concept allows all components to be combined to meet requirements in a closed cabinet system.

Overview (continued)

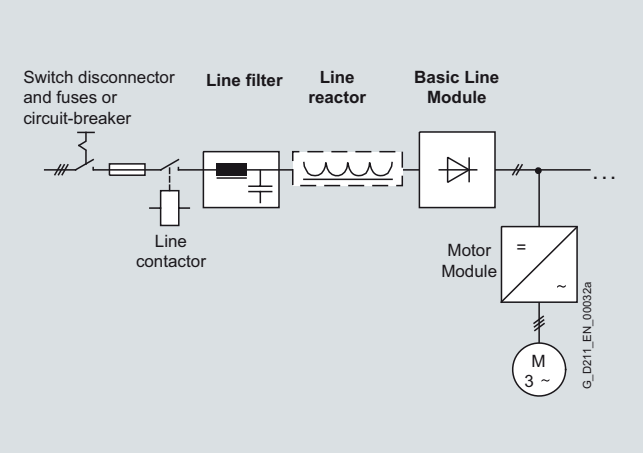
Line-side power components

Line Modules generate a DC voltage from the line voltage and supply Motor Modules with energy via the intermediate DC circuit. There are three possibilities for the infeed for the SINAMICS drive system:

- Basic Line Modules
- Smart Line Modules
- Active Line Modules

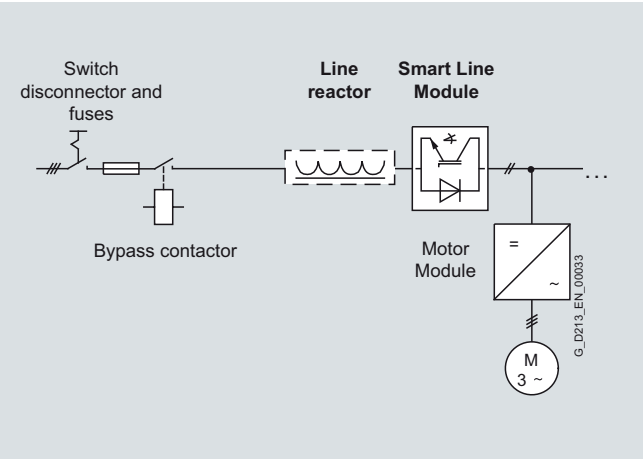
Basic Line Modules

For applications such as rubber tyred gantry cranes (RTG), for which no regenerative feedback is possible due to a diesel-fueled generator infeed, Basic Line Modules are available. Basic Line Modules are designed only for infeed operation, i.e. they are not capable of recovering energy to the mains supply. If regenerative energy is produced, e.g. when drives brake, it must be converted to heat by means of a Braking Module and a braking resistor. When a Basic Line Module is used as the infeed, the matching line reactor must be installed. A line filter can be optionally installed in order to maintain the limit values according to EN 61800-3, Class C2.



Smart Line Modules

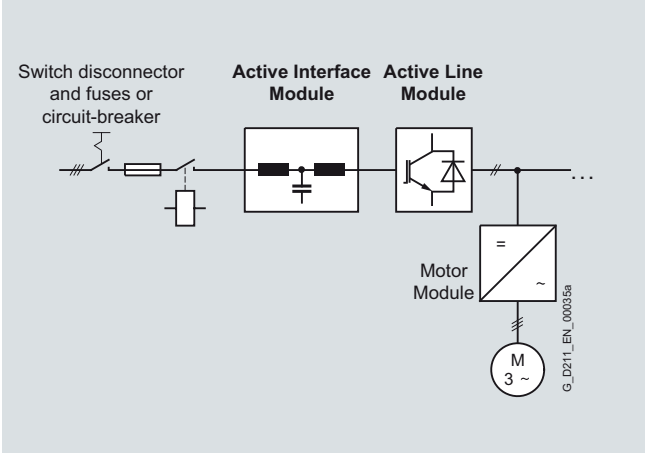
Smart Line Modules can supply energy and recover energy to the mains supply. Braking Modules and braking resistors are required only if the drives need to be decelerated in a controlled manner even after a power failure (i.e. when energy cannot be recovered to the supply). When a Smart Line Module is used as the infeed, the matching line reactor must be installed.



Active Line Modules

Active Line Modules can supply energy and return regenerative energy to the supply system. Braking Modules and braking resistors are required only if the drives need to be decelerated in a controlled manner after a power failure (i.e. when energy cannot be recovered to the supply). In contrast to Basic Line Modules and Smart Line Modules, however, Active Line Modules generate a regulated DC voltage which remains constant despite fluctuations in the line voltage. In this case, the line voltage must remain within the permissible tolerance range. Active Line Modules draw a virtually sinusoidal current from the supply which limits any harmful harmonics.

In order to operate an Active Line Module, it is absolutely essential to use the Active Interface Module for the appropriate rating.



6

Overview (continued)

Motor-side power components

Motor Modules generate a DC voltage from the intermediate DC circuit to supply AC motors.

Motor Modules

A voltage-source DC link and an inverter for supplying a motor are integrated in the Motor Modules. Motor Modules are also designed for multi-axis drives and are controlled by the SIMOTION D435 Control Unit in crane applications. Motor Modules are interconnected through a common DC bus. Since the Motor Modules share the same intermediate DC circuit, they can exchange energy with one another, i.e. if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode. The intermediate DC circuit is supplied with line supply voltage by a Line Module.

Overview of the performance ranges

Overview of the infeed performance ranges of the line-side power components for crane applications

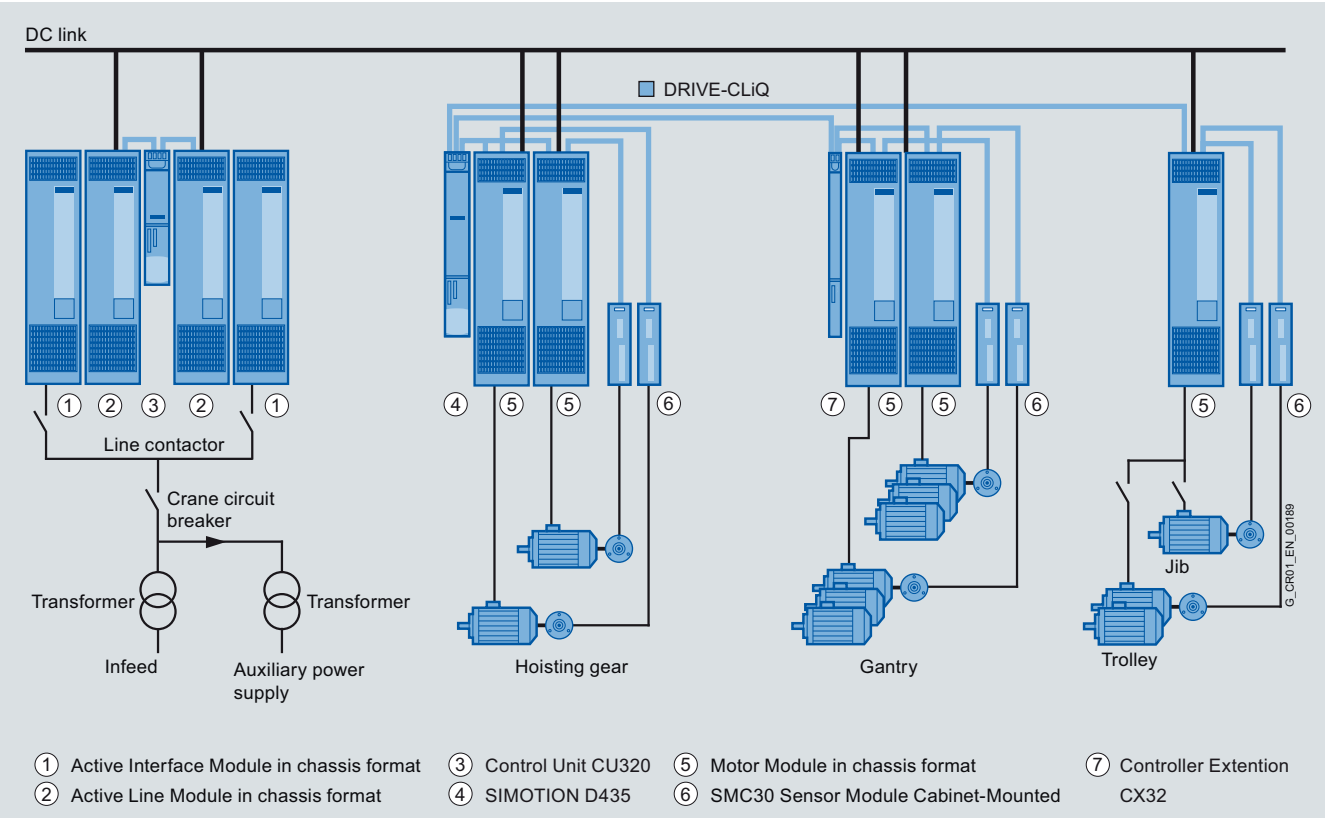
Line voltage	Booksize	Chassis	Cabinet
Basic Line Modules			
380 ... 480 V 3 AC	20 ... 100 kW	200 ... 710 kW	–
500 ... 690 V 3 AC	–	250 ... 1100 kW	–
Smart Line Modules			
380 ... 480 V 3 AC	5 ... 36 kW	250 ... 800 kW	–*
500 ... 690 V 3 AC	–	450 ... 1400 kW	–*
Active Line Modules			
380 ... 480 V 3 AC	16 ... 120 kW	132 ... 900 kW	600 ... 3600 kW
500 ... 690 V 3 AC	–	560 ... 1400 kW	–*

Overview of the type rating and the rated output current of the motor-side power components for crane applications

	Booksize	Chassis	Cabinet
Motor Modules			
DC link voltage 510 ... 720 V			
Type rating	1.6 ... 107 kW	110 ... 800 kW	110 ... 800 kW
Rated output current	3 ... 200 A	210 ... 1405 A	210 ... 1405 A
DC link voltage 675 ... 1035 V			
Type rating	–	75 ... 1200 kW	– *)
Rated output current	–	85 ... 1270 A	–

*) Available soon

Component overview based on the example of a container crane with power components in chassis format



① Active Interface Module in chassis format
② Active Line Module in chassis format
③ Control Unit CU320
④ SIMOTION D435
⑤ Motor Module in chassis format
⑥ SMC30 Sensor Module Cabinet-Mounted
⑦ Controller Extention CX32

The SIMOTION D Motion Control System with the Controller Extension CX32 is described in Section 2 "SIMOCRANE Standard Technology" of the catalog. The SMC30 Sensor Module Cabinet-Mounted is required to evaluate the encoders with TTL/HTL signals.

Overview

SINAMICS S120 Cabinet Modules are components forming part of a modular cabinet system for multi-motor drives with a central line infeed and a common DC link busbar of the type typically used in, for example, cranes. As standard, they are installed side by side in a row. They comprise built-in units of the SINAMICS S120 series in chassis format.

All drive components, from the infeed to the motor-side inverters, are configured in a clear, compact layout in the individual Cabinet Modules. They can be combined with great flexibility and can be optimally adapted to customer-specific requirements thanks to a comprehensive array of options.

The main components of the system in crane applications are as follows:

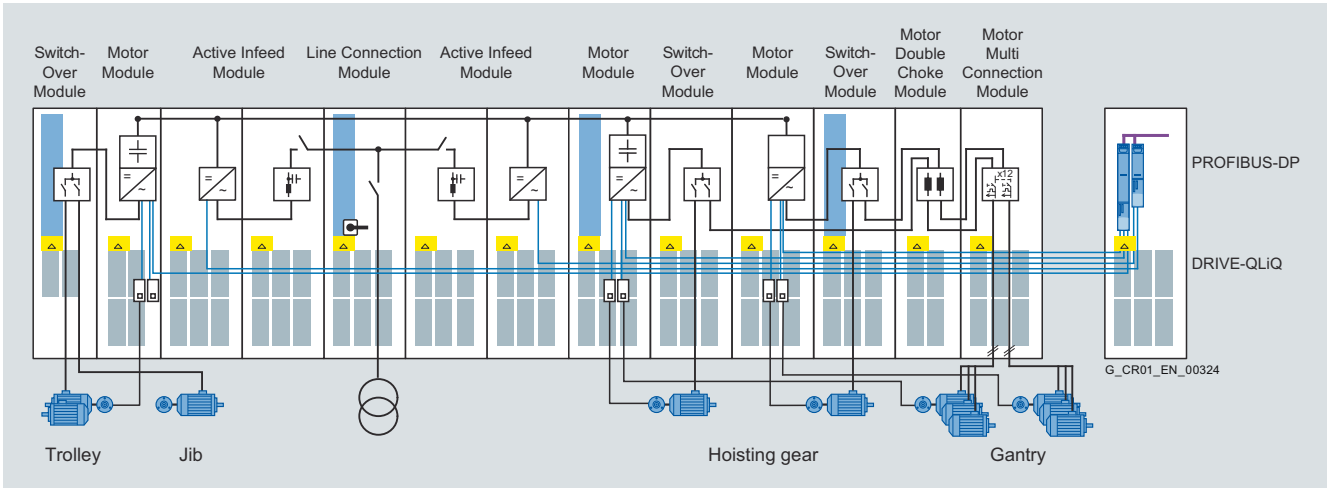
- Line Connection Modules with line-side components as well as the crane switch
- Line Modules for infeed in the Active Line Module version for four-quadrant mode with negligible line harmonic distortion and integrated line contactor
- Motor Modules in chassis format for controlling motors
- Switch-Over Modules for interconnecting motors and Motor Modules
- Motor Multi Connection Modules for connecting motors in parallel
- Motor Double Choke Module for connecting a reactor between Motor Modules and motors when long cables are used.

The sector-specific version Cranes option **B70** is based on the requirements of the EN 60204-32 standard and implements the measures required for the cabinets.

Specification in contrast to the available standard cabinet design:

- All auxiliary power supplies are routed to terminals for wiring in star topology
- Vibratory load during operation
  Excursion 1.0 mm at 2 to 13.2 Hz
  Acceleration 6.8 m/s^2 at 13.2 to 100 Hz
- The colors of the cores are in accordance with DIN EN 60204-32 except in the case of built-in modules in chassis format.
- The complete documentation is supplied for the cabinets for the ordered configuration
- Internal wiring of the Cabinet Modules which can be combined to create transport units
- Prepared wiring for easy assembly

Component overview based on the example of a container crane with Cabinet Modules



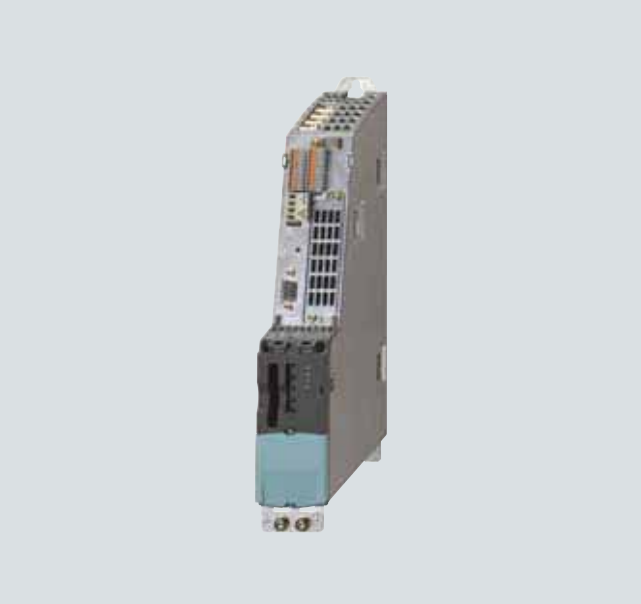
Control Units
CU320 Control Unit

Overview

CU320 Control Unit, with guard cover

In crane applications, the communication, open-loop and closed-loop control functions for the Line Modules execute in the CU320 Control Unit. The CU320 Control Unit is generally designed for multi-axis mode and for operation on Motor Modules.

Design



CU320 Control Unit, without guard cover

The CU320 Control Unit features the following connections and interfaces as standard:

- 4 DRIVE-CLiQ sockets for communication with other DRIVE-CLiQ devices, e.g. Motor Modules, Active Line Modules, Sensor Modules, Terminal Modules
- 1 PROFIBUS interface with PROFIdrive V4 profile
- 8 parameterizable digital inputs (floating)
- 8 parameterizable bidirectional digital inputs/digital outputs (non-floating), of which 6 are high-speed digital inputs
- 1 serial RS232 interface (e.g. to connect the AOP30 Advanced Operator Panel)
- 1 interface for the BOP20 Basic Operator Panel
- 1 slot for the CompactFlash card on which firmware and parameters are stored
- 1 slot for mounting an option module (e.g. TB30 Terminal Board)
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronic power supply via the 24 V DC supply connector
- 1 PE/protective conductor connection
- 1 ground connection

A shield connection for the signal cable shield on the option module is located on the CU320 Control Unit.

The available option slot is used to expand the connections and interfaces, for example, to include additional terminals or for communication purposes.

The status of the CU320 Control Unit is indicated via multi-color LEDs.

A BOP20 Basic Operator Panel can also be snapped directly onto the CU320 Control Unit for diagnostic purposes.

As the firmware and parameter settings are stored on a plug-in CompactFlash card, the Control Unit can be changed without the need for software tools.

The CU320 Control Unit can be mounted on the side of the book-size format Line Module via brackets integrated in a Line Module. The CU320 Control Unit can also be fixed to the wall of the control cabinet using the integrated fixing lugs. As the CU320 Control Unit is not as deep as the Line Modules, suitable spacers are available to increase the depth of the CU320 Control Unit to 270 mm.

Integration

DRIVE-CLiQ components such as Motor Modules and Active Line Modules can be connected to a CU320 Control Unit. The number of modules depends on the performance required, including duty type and additional functions.

In crane applications, the Line Modules are controlled by the C320 Control Unit. In simple crane applications, the Motor Modules are also controlled by the C320 Control Unit.

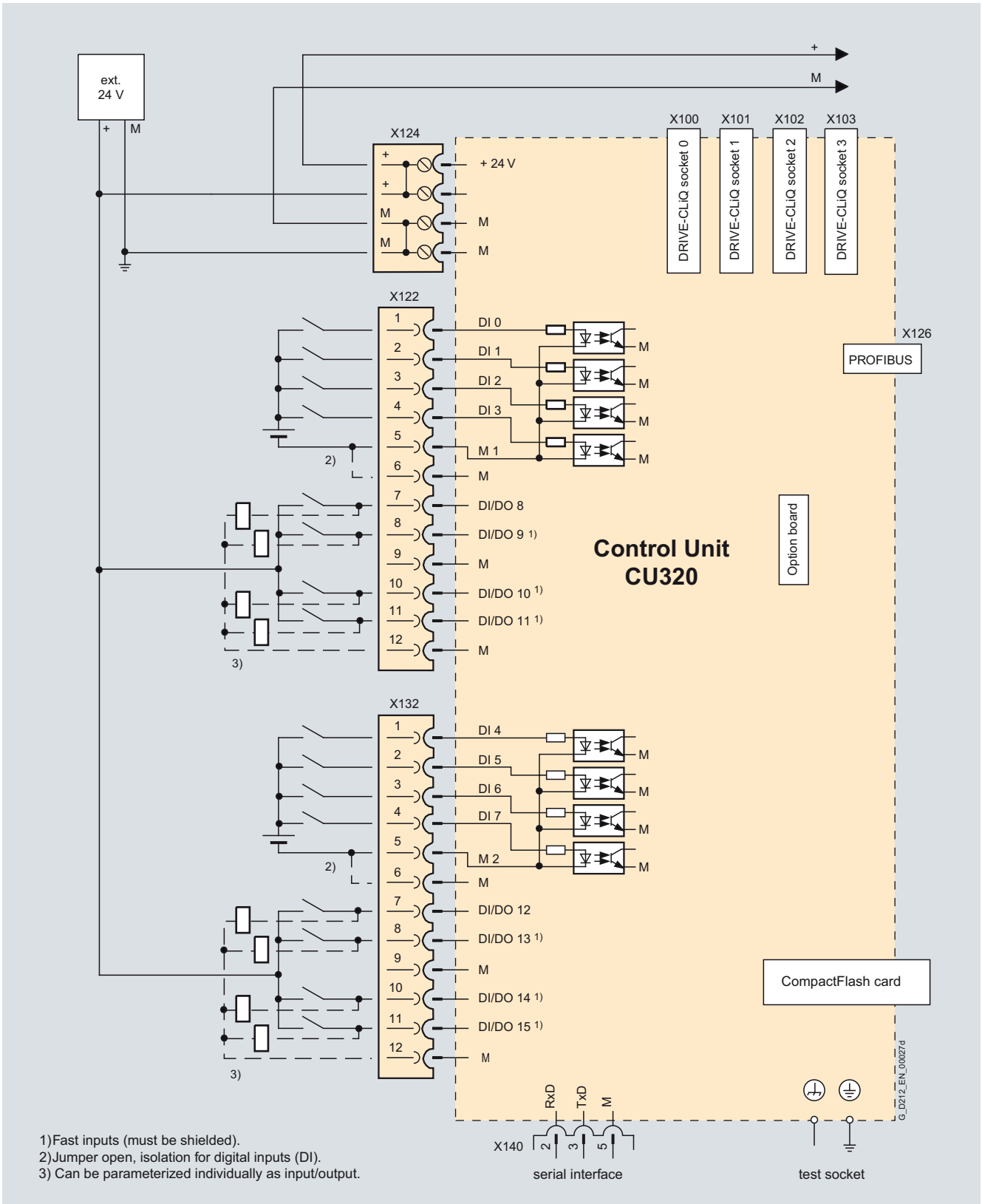
The BOP20 Basic Operator Panel can also be snapped onto the CU320 Control Unit during operation to perform troubleshooting procedures.

The CU320 Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool.

Communication between a CU320 Control Unit and the connected components takes place via DRIVE-CLiQ.

If an application requires more than one Control Unit, the number can be increased accordingly. The Control Units are then interconnected on a higher-level controller via PROFIBUS according to the PROFIdrive V4 profile.

Integration (continued)



1)Fast inputs (must be shielded).
2)Jumper open, isolation for digital inputs (DI).
3) Can be parameterized individually as input/output.

Connection example of CU320 Control Unit

Technical data

CU320 Control Unit	
Power requirement At 24 V DC, max. without taking account of digital outputs, expansion option slot and DRIVE-CLiQ supply	0.8 A
Conductor cross-section, max.	2.5 mm^2
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1 8 floating digital inputs 8 bidirectional non-floating digital inputs/digital outputs
• Voltage	–3 … +30 V
• Low level (an open digital input is interpreted as "low")	–3 … +5 V
• High level	15 … 30 V
• Current consumption at 24 V DC, typ.	10 mA
• Delay time of digital inputs [1], approx.	
- L → H	50 µs
- H → L	100 µs
• Delay time of high-speed digital inputs [1], approx. (high-speed digital inputs can be used for position detection)	
- L → H	5 µs
- H → L	50 µs
• Conductor cross-section, max.	0.5 mm^2
Digital outputs (sustained short-circuit-proof)	8 bidirectional non-floating digital inputs/digital outputs
• Voltage	24 V DC
• Load current per digital output, max.	500 mA
• Delay time, approx. [1]	150 µs
• Conductor cross-section, max.	0.5 mm^2
Power loss	< 20 W
PE connection	M5 screw
Ground connection	M5 screw
Dimensions	
• Width	50 mm
• Height	270 mm
• Depth	226 mm
Weight, approx.	1.5 kg
Conformity	CE
Approvals	cULus (File No.: E164110)

Selection and ordering data

Description	Order No.
CU320 Control Unit (without CompactFlash card)	**6SL3040-0MA00-0AA1**

Accessories

Description	Order No.
PROFIBUS connector	
• Without programming device/PC connection	**6ES7972-0BA41-0XA0**
• With programming device/PC connection	**6ES7972-0BB41-0XA0**
Spacers (2 units) For increasing the depth of the CU320 Control Unit to 270 mm if the brackets on the side are not to be used, but the depth still has to be 270 mm.	**6SL3064-1BB00-0AA0**
STARTER commissioning tool	**6SL3072-0AA00-0AG0**

[1] The specified delay times refer to the hardware. The actual reaction time depends on the time slice in which the digital input or output is processed.

Overview

The CompactFlash card contains the firmware and parameter settings. The CompactFlash card is plugged into the correct slot on the CU320 Control Unit.

Design

A CU320 Control Unit can perform the communication, open-loop and closed-loop control functions for several Line Modules.

In addition to the firmware, the CompactFlash card also contains licensing codes which are required to enable firmware options (performance expansion 1 in the current version).

The computing capacity requirement and utilization of the CU320 Control Unit can be calculated with the SIZER engineering tool.

The firmware options can also be enabled on-site, for example, if the performance expansions required are not known at the time of placing the order. You will need the serial number of the CompactFlash card and the order number of the firmware option to be enabled. With this information, the relevant license code can be purchased from a license database and the firmware option enabled. The license code is only valid for the CompactFlash card declared and cannot be transferred to other CompactFlash cards.

Selection and ordering data

Description	Order No.
CompactFlash card for CU320 Control Units with firmware version 2.6 including Certificate of License	
• without performance expansion	**6SL3054-0CG00-1AA0**
• with firmware option performance expansion 1	**6SL3054-0CG01-1AA0**
Firmware license	
• Performance expansion 1 including Certificate of License for upgrading the license of a CompactFlash card	**6SL3074-0AA01-0AA0**

Further information

Firmware version

The firmware version is encoded in the order number of the CompactFlash card supplied.

The firmware version is encoded as follows in the order number printed on the CompactFlash card:

Order No.:	**6SL3054-**	**0■■0■-1AA0**
Firmware version		↑
	1	**B**
	2	**C**
Version		↑
	.1	**B**
	.2	**C**
	.3	**D**
	.4	**E**
	.5	**F**
	.6	**G**
		↑
Without performance expansion		**0**
With performance expansion 1		**1**

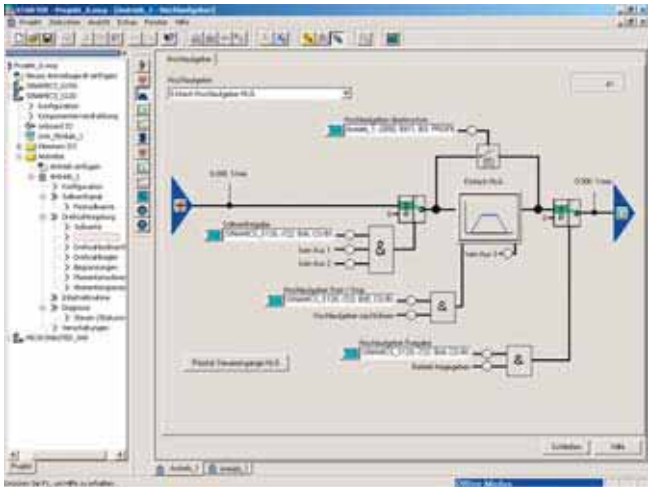
At the time of printing this catalog, the current firmware version for CU320 is Version 2.6.

Example:

Order No. **6SL3054-0CG00-1AA0** is for firmware version 2.6. A specific firmware version can be ordered to fulfill a requirement for spare parts, e.g. Order No. **6SL3054-0CD00-1AA0** for firmware version 2.3.

STARTER commissioning tool

Overview



The user-friendly STARTER commissioning tool can be used for:

- Commissioning
- Optimizing
- Diagnostics

This software can be operated either as a standalone PC application, integrated in SIMATIC STEP 7 with TIA compatibility via Drive ES Basic, or it can be integrated into the SCOUT engineering system (for SIMOTION). The basic functions and handling are the same in both cases.

In STARTER, in addition to the SINAMICS drives, MICROMASTER 4 devices and the SIMATIC ET 200S FC and SIMATIC ET 200pro FC frequency converters are also supported.

The project wizard sets up the drives within the structure of the project tree.

Beginners are supported by solution-based dialog guidance, which offers a standardized graphics-based display to maximize clarity when setting the drive parameters.

First commissioning is guided by a wizard which makes all the basic settings in the drive. Therefore, getting a motor up and running is merely a question of setting a few parameters as part of the drive configuration process.

Any individual settings required are made using graphics-based parameterization screens, which also visualize the operating principle of the drive extremely accurately.

Examples of individual settings that can be made include:

- Use of terminals
- Bus interface
- Setpoint channel (e.g. fixed setpoints)
- Closed-loop speed control (e.g. ramp-function generator, limits)
- BICO interconnections
- Diagnostics

Specialists can access individual parameters quickly at any time via the expert list. Frequently used parameters can be stored in customized user lists.

In addition, the following functions are available for optimization purposes:

- Self-optimization of closed-loop control settings (depending on drive)
- Trace (for SINAMICS S120 only)

Diagnostics functions provide information about:

- Control/status words
- Parameter status
- Operating conditions
- Communication states

Performance features

- User-friendly: Only a small number of settings need to be made for successful first commissioning: the motor is turning
- Solution-based user navigation simplifies commissioning.
- Self-optimization functions reduce manual optimization work

Minimum hardware and software requirements

PG or PC with Pentium III 1 GHz

512 MB RAM (1 GB RAM recommended)

Screen resolution 1024 × 768 pixels, 16 bit color depth

Free hard disk memory: 2 GB

Microsoft Windows 2000 SP4

Microsoft Windows 2003 Server SP1, SP2

Microsoft Windows XP Professional SP2, SP3

Microsoft Windows Vista Business SP1

Microsoft Windows Vista Ultimate SP1

Microsoft Internet Explorer V6.0 or higher

Selection and ordering data

Description	Order No.
STARTER commissioning tool for SINAMICS and MICROMASTER English, German, French, Italian, Spanish	**6SL3072-0AA00-0AG0**

Accessories

Connection

Depending on the version of the Control Unit, the Control Unit (CU) of the drive unit can communicate with the programming device (PG) or PC via a serial interface, PROFIBUS, or Ethernet/PROFINET. Accessories can be ordered for the relevant drive system as shown in the table below.

Selection and ordering data

Description	Order No.
RS232 SIMATIC S7 connecting cable RS232 null-modem cable, 6 m	**6ES7901-1BF00-0XA0**
PROFIBUS communication module CP 5512 PCMCIA type 2 card + adapter with 9-pin SUB-D socket, for Windows 2000/ XP Professional and PCMCIA 32	**6GK1551-2AA00**
SIMATIC DP plug-in cable 12 MBaud, for PG connector, pre-assembled with 2 × 9-pin SUB-D connector, 3 m	**6ES7901-4BD00-0XA0**
PROFINET/Ethernet Standard CAT5 Ethernet cable or PROFINET cable is required.	**–**
PROFINET Standard CAT5 Ethernet cable or PROFINET cable is required. In the CU320, the CBE20 Communication Board is required for Ethernet communication.	**–**

Further information

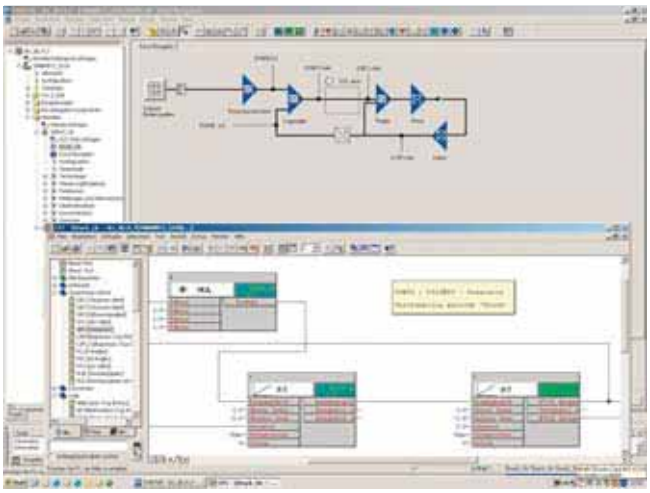
For the purpose of updating, the STARTER commissioning tool is also available on the Internet at

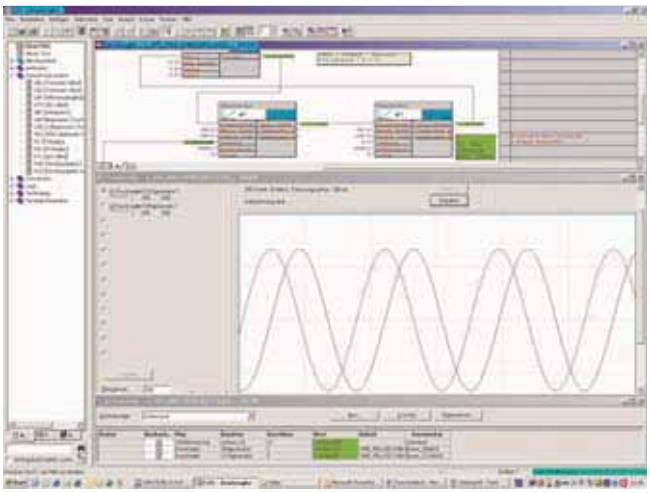
www.support.automation.siemens.com/WW/view/en/10804985/133100

DRIVE CONTROL CHART (DCC)

Overview

Drive Control Chart (DCC) expands the scope of device functions by means of freely available closed-loop control, calculation and logic modules and offers a means by which technological functions can be graphically configured in the SINAMICS S120 drive system. DCC is installed as a supplementary application to the STARTER commissioning tool.





Drive Control Chart expands the facility for the simplest possible configuring of technological functions both for the SIMOTION Motion Control System as well as for the SINAMICS S120 drive system. This opens up for users a new dimension in adapting the specified systems to the specific functions of their machines. DCC has no restriction with regard to the number of usable functions; this is only limited by the performance capability of the target platform.

The user-friendly DCC editor enables easy graphical configuration and a clear representation of control loop structures as well as a high degree of reusability of existing diagrams.

The open-loop and closed-loop control functionality is defined by using multi-instance-enabled blocks (Drive Control Blocks - DCBs) from a predefined library (DCB library) that are selected and graphically linked by dragging and dropping. Test and diagnostic functions allow verification of program behavior or the identification of causes in the event of faults.

The block library encompasses a large selection of closed-loop, arithmetic and logic function blocks, as well as comprehensive open-loop and closed-loop control functions.

For combining, analyzing and acquiring binary signals, all commonly used logic functions are available for selection (AND, XOR, on/off delay, RS flipflop, counter, etc.). Diverse arithmetic functions such as absolute-value generation, dividers and minimum/maximum analysis are available for monitoring and evaluating numeric variables. In addition to the automatic speed control, axial winder functions, closed-loop PI controller, ramp-function generator or wobble generator can be configured simply and without problems.

Almost unlimited programming of control structures is possible in conjunction with the SIMOTION Motion Control System. These can then be combined with other program sections to form an overall program.

Drive Control Chart for SINAMICS S120 also provides a convenient basis for resolving drive-level open-loop and closed-loop control tasks directly in the converter. This results in further adaptability of SINAMICS to the tasks set. On-site processing in the drive supports modular machine concepts and results in increased overall machine performance.

Minimum hardware and software requirements

See the SCOUT or STARTER engineering software, since DCC is installed in addition to this.

Selection and ordering data

DCC comprises the graphical configuring tool (DCC Editor) and the block library (DCB Library).

DCC is installed in addition to the SCOUT or STARTER engineering software.

The engineering license for DCC that is required for each PC (floating) is automatically purchased with the order. No additional run-time license is required.

DCC can be supplied in two versions: The version for SIMOTION and SINAMICS applications, or the version for SINAMICS applications only.

	Order No.
DCC-SIMOTION/-SINAMICS V2.0 SP5 for SCOUT/STARTER V4.1 SP5 (Single engineering license, with DCC data carrier) DCC editor + DCB libraries for use on SIMOTION V4.1 SP5 and SINAMICS S120 V2.6 SP2 / V4.3 SP1 German, English, French, Italian (SIMOTION) German, English, French, Italian, Spanish (SINAMICS)	**6AU1810-1JA20-5XA0**
DCC-SINAMICS V2.0 SP5 for STARTER V4.1 SP5 (Single engineering license, with DCC data carrier) DCC editor + DCB library for use on SINAMICS S120 V2.6 SP2 / V4.3 SP1 English, German, French, Italian, Spanish	**6AU1810-1HA20-5XA0**

Overview

Basic Line Modules are available for applications in which no energy is returned to the supply or where the energy exchange between motor and generator axes takes place in the DC link. Basic Line Modules can only feed energy from the supply system into the DC link, energy cannot be fed back into the supply system. Basic Line Modules are designed for connection to grounded (TN, TT) and non-grounded (IT) supply systems. The connected Motor Modules are pre-charged over the integrated pre-charging resistors (20 kW and 40 kW) or through activation of the thyristors (100 kW).

Basic Line Modules 20 kW and 40 kW are designed with an integrated brake chopper and can be used directly for applications in generator mode after an external brake resistor has been connected.

A Braking Module is only necessary in combination with the Basic Line Module 100 kW in generator mode.

Design

The Basic Line Modules in booksize format feature the following connections and interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronic power supply
- 1 DC link connection
- 3 DRIVE-CLiQ sockets
- 1 connection for braking resistor (20 kW and 40 kW Basic Line Modules only)
- 1 temperature sensor input (KTY84-130 or PTC/PT100)

The status of the Basic Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Basic Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control, length 0.11 m
- DRIVE-CLiQ cable (length depends on module width) to connect Basic Line Module to adjacent Motor Module, length = width of Basic Line Module + 0.11 m
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
- 1 set of warning signs in 16 languages
- 1 heat conducting foil (for Basic Line Modules with cold plate cooling only)

Accessories

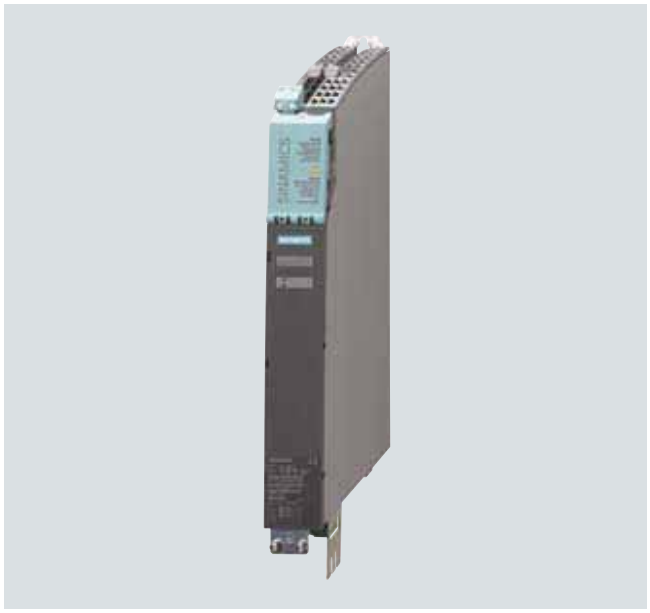
For technical data, selection and ordering data for the associated line reactors, line filters and the recommended line-side components, see Catalog PM 21, Section 3 "Basic Line Modules in booksize format".

Further information

For detailed technical information, see Catalog PM 21, Section 3 "Basic Line Modules in booksize format".

Booksize format
Smart Line Modules

Overview



Smart Line Modules are stable, line-commutated feed/feedback units (diode bridge for incoming supply; stable, line-commutated feedback via IGBTs) with 100 % continuous regenerative feedback power. The feedback regenerative capability of the modules can be deactivated via a digital input (Smart Line Modules 5 kW and 10 kW) or by parameterizing. Smart Line Modules are designed for connection to grounded (TN/TT) and non-grounded (IT) systems.

The DC link is pre-charged by means of integrated pre-charging resistors.

The associated line reactor is absolutely essential for operating a Smart Line Module.

Design

The Smart Line Modules in booksize format feature the following connections and interfaces as standard:

- 1 power connection via screw-type terminals
- 1 connection for the 24 V DC electronic power supply via the 24 V terminal adapter included in the scope of supply
- 1 DC link connection via integrated DC link busbars
- 2 PE/protective conductor connections
- 2 digital inputs
  (only on 5 kW and 10 kW Smart Line Modules)
- 1 digital output
  (only on 5 kW and 10 kW Smart Line Modules)
- 3 DRIVE-CLiQ sockets
  (only on 16 kW and 36 kW Smart Line Modules)

The status of the Smart Line Modules is indicated via two multi-color LEDs.

The signal cable shield can be connected to the Line Module by means of a shield connection terminal, e.g. type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control, length 0.11 m
  (on 16 kW and 36 kW Smart Line Modules only)
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
  (on 16 kW and 36 kW Smart Line Modules only)
- DRIVE-CLiQ cable (length depends on module width) to connect Smart Line Module to adjacent Motor Module, length = width of Smart Line Module + 0.11 m
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs/outputs
- Connector X22 for digital inputs and outputs
  (on 5 kW and 10 kW Smart Line Modules only)
- Connector X1 for line supply connection
  (on 5 kW and 10 kW Smart Line Modules only)
- 1 set of warning signs in 16 languages
- 1 heat conducting foil
  (for Smart Line Modules with cold plate cooling only)

Selection and ordering data

Rated output	Smart Line Module in booksize format		
	Internal air cooling	**External air cooling**	**Cold plate cooling**
kW	Order No.	Order No.	Order No.
Line voltage 380 … 480 V 3 AC			
5	**6SL3130-6AE15-0AB0**	**6SL3131-6AE15-0AA0**	**6SL3136-6AE15-0AA0**
10	**6SL3130-6AE21-0AB0**	**6SL3131-6AE21-0AA0**	**6SL3136-6AE21-0AA0**
16	**6SL3130-6TE21-6AA3**	–	–
36	**6SL3130-6TE23-6AA3**	–	–

Accessories

For technical data, selection and ordering data for the associated line reactors, line filters and the recommended line-side components, see Catalog PM 21, Section 3 "Smart Line Modules in booksize format".

Further information

For detailed technical information, see Catalog PM 21, Section 3 "Smart Line Modules in booksize format".

Overview

The self-commutated feed/feedback units (with IGBTs in infeed and regenerative feedback directions) generate a regulated DC link voltage.

This means that the connected Motor Modules are decoupled from the line voltage. Line voltage fluctuations within the permissible supply tolerances have no effect on the motor voltage. Active Line Modules are designed for connection to grounded (TN, TT) and non-grounded (IT) supply systems.

The DC link is pre-charged by means of integrated pre-charging resistors.

In order to operate an Active Line Module, it is absolutely essential to use the appropriate Active Interface Module or matching line reactor.

Design

The Active Line Modules in booksize format feature the following connections and interfaces as standard:

- 1 power connection via screw-type terminals
- 1 connection for the 24 V DC electronic power supply via the 24 V terminal adapter included in the scope of supply
- 1 DC link connection via integrated DC link busbars
- 1 temperature sensor input (KTY84-130 or PTC/PT100)
- 3 DRIVE-CLiQ sockets
- 2 PE/protective conductor connections

The status of the Active Line Modules is indicated via two multi-color LEDs.

On the 100 mm wide Active Line Module, the shield for the power supply cable can be connected to the integrated shield connection plate via a shield connection terminal or tube clip, e.g. Weidmüller type KLBÜ CO 4. The shield connection terminal must not be used for strain relief. Shield connection sets are available for the 150 mm, 200 mm and 300 mm wide modules.

The signal cable shield can be connected to the Line Module by means of a shield connection terminal, e.g. type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Active Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control, length 0.11 m
- DRIVE-CLiQ cable (length depends on module width) to connect Active Line Module to adjacent Motor Module, length = width of Active Line Module + 0.11 m
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs
- Fan insert for Active Line Modules of 80 kW and 120 kW (the voltage for the fan unit is supplied by the Active Line Module)
- 1 set of warning signs in foreign languages
- 1 heat conducting foil (for Active Line Modules with cold plate cooling only)

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Selection and ordering data

Rated output	Active Line Module in booksize format			
	Internal air cooling	**External air cooling**	**Cold plate cooling**	**Liquid cooling**
kW	Order No.	Order No.	Order No.	Order No.
Line voltage 380 … 480 V 3 AC				
16	**6SL3130-7TE21-6AA3**	**6SL3131-7TE21-6AA3**	**6SL3136-7TE21-6AA3**	–
36	**6SL3130-7TE23-6AA3**	**6SL3131-7TE23-6AA3**	**6SL3136-7TE23-6AA3**	–
55	**6SL3130-7TE25-5AA3**	**6SL3131-7TE25-5AA3**	**6SL3136-7TE25-5AA3**	–
80	**6SL3130-7TE28-0AA3**	**6SL3131-7TE28-0AA3**	**6SL3136-7TE28-0AA3**	–
120	**6SL3130-7TE31-2AA3**	**6SL3131-7TE31-2AA3**	**6SL3136-7TE31-2AA3**	**6SL3135-7TE31-2AA3**

Accessories

For technical data, selection and ordering data for the line reactors, Wideband Line Filters, Basic Line Filters and the recommended line-side components, see Catalog PM 21, Section 3 "Active Line Modules in booksize format".

Further information

For detailed technical information, see Catalog PM 21, Section 3 "Active Line Modules in booksize format".

Booksize format
Active Line Modules - Active Interface Modules

Overview

The Active Interface Modules combine with the Active Line Modules for forming a functional unit and are essential for operation of the associated Active Line Module. The Active Interface Modules contain a Clean Power Filter and basic interference suppression to ensure compliance with Category C3 in accordance with EN 61800-3 regarding emitted interference.

The Clean Power Filter protects the mains connection from switching-frequency harmonics. The drive system therefore draws a sinusoidal current from the supply and causes almost no harmonics.

The Active Line Modules in combination with the Active Interface Module can also be operated with supply systems with an isolated star point (IT systems).

The scope of supply of the Active Interface Modules includes:

- Connector X21 for temperature evaluation and fan control
- Connector X24 for connecting the 24 V supply for the integrated fan
- DRIVE-CLiQ cable for connecting the Control Unit to the Active Interface Module; length of the DRIVE-CLiQ cable = width of the Active Interface Module + 0.11 m
- 1 set of warning signs in foreign languages

Selection and ordering data

6

Suitable for Active Line Module in booksize format		**Active Interface Module**
Rated output of the Active Line Module		
kW	Order No.	Order No.
Line voltage 380 … 480 V 3 AC		
16	6SL3130-7TE21-6AA3	**6SL3100-0BE21-6AB0**
	6SL3131-7TE21-6AA3	
	6SL3136-7TE21-6AA3	
36	6SL3130-7TE23-6AA3	**6SL3100-0BE23-6AB0**
	6SL3131-7TE23-6AA3	
	6SL3136-7TE23-6AA3	
55	6SL3130-7TE25-5AA3	**6SL3100-0BE25-5AB0**
	6SL3131-7TE25-5AA3	
	6SL3136-7TE25-5AA3	
80	6SL3130-7TE28-0AA3	**6SL3100-0BE28-0AB0**
	6SL3131-7TE28-0AA3	
	6SL3136-7TE28-0AA3	
120	6SL3130-7TE31-2AA3	**6SL3100-0BE31-2AB0**
	6SL3131-7TE31-2AA3	
	6SL3136-7TE31-2AA3	
	6SL3135-7TE31-2AA3	

Accessories

For accessories, see Catalog PM 21, Section 3 "Active Interface Modules in booksize format".

Further information

For detailed technical information, see Catalog PM 21, Section 3 "Active Line Modules in booksize format – Active Interface Modules".

Overview

In principle, all Single Motor Modules can be operated on Basic Line Modules, Smart Line Modules, or Active Line Modules for the appropriate voltage range.

A broad range of Single Motor Modules is available graded according to current and power.

Accessories

For selection and ordering data regarding the load-side power components and the DC link components, see Catalog PM 21, Section 3 "Load-side power components" and "DC link components".

Further information

For detailed technical information, see Catalog PM 21, Section 3 "Single Motor Modules in booksize format".

Design

The Single Motor Modules in booksize format feature the following connections and interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 1 electronic power supply connection via integrated 24 V DC busbars
- 3 DRIVE-CLiQ sockets
- 1 motor connection, either plug-in (not included in scope of supply) or studs depending on rated output current
- 1 safe standstill input (enable pulses)
- 1 safe motor brake controller
- 1 temperature sensor input (KTY84-130 or PTC)
- 2 PE/protective conductor connections

The status of the Motor Modules is indicated via two multi-color LEDs.

The motor cable shield is inside the connector on 50 mm and 100 mm wide modules. A shield connection set can be supplied for 150 mm, 200 mm and 300 mm wide modules. On these modules, the motor cable shield can be connected using a tube clip.

The signal cable shield can be connected to the Motor Module by means of a terminal element, e.g. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable (length depends on module width) to connect Motor Module to adjacent Motor Module, length = width of Motor Module + 0.06 m
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connector X21
- Connector X11 for the motor brake connection (for Motor Modules with a rated output current of 45 A to 200 A)
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
- Fan insert for the 132 A and 200 A Motor Modules (the voltage for the fan insert is supplied by the Motor Module)
- 1 set of warning signs in foreign languages
- 1 heat conducting foil (for Motor Modules with cold plate cooling only)

Selection and ordering data

Rated output current	Type rating	Single Motor Module in booksize format			
		Internal air cooling	**External air cooling**	**Cold plate cooling**	**Liquid cooling**
A	kW	Order No.	Order No.	Order No.	Order No.
DC link voltage 510 … 720 V DC					
3	1.6	**6SL3120-1TE13-0AA3**	**6SL3121-1TE13-0AA3**	**6SL3126-1TE13-0AA3**	–
5	2.7	**6SL3120-1TE15-0AA3**	**6SL3121-1TE15-0AA3**	**6SL3126-1TE15-0AA3**	–
9	4.8	**6SL3120-1TE21-0AA3**	**6SL3121-1TE21-0AA3**	**6SL3126-1TE21-0AA3**	–
18	9.7	**6SL3120-1TE21-8AA3**	**6SL3121-1TE21-8AA3**	**6SL3126-1TE21-8AA3**	–
30	16	**6SL3120-1TE23-0AA3**	**6SL3121-1TE23-0AA3**	**6SL3126-1TE23-0AA3**	–
45	24	**6SL3120-1TE24-5AA3**	**6SL3121-1TE24-5AA3**	**6SL3126-1TE24-5AA3**	–
60	32	**6SL3120-1TE26-0AA3**	**6SL3121-1TE26-0AA3**	**6SL3126-1TE26-0AA3**	–
85	46	**6SL3120-1TE28-5AA3**	**6SL3121-1TE28-5AA3**	**6SL3126-1TE28-5AA3**	–
132	71	**6SL3120-1TE31-3AA3**	**6SL3121-1TE31-3AA3**	**6SL3126-1TE31-3AA3**	–
200	107	**6SL3120-1TE32-0AA4**	**6SL3121-1TE32-0AA4**	**6SL3126-1TE32-0AA4**	**6SL3125-1TE32-0AA4**

Chassis format
Basic Line Modules

Overview

Basic Line Modules are available for applications in which no energy is returned to the supply or where the energy exchange between motor and generator axes takes place in the DC link. The connected Motor Modules are pre-charged via the thyristor gate control. The thyristors are always fired at a delay angle of 0° in operation. Basic Line Modules are designed for connection to grounded (TN, TT) and non-grounded (IT) supply systems.

In a Basic Line Module in chassis format, a Braking Module of the corresponding size can be installed to support generating mode of the drive system in combination with an external braking resistor.

Design

The Basic Line Modules in chassis format feature the following connections and interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronic power supply
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 1 temperature sensor input (KTY84-130 or PTC/PT100)
- 3 DRIVE-CLiQ sockets

The status of the Basic Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Basic Line Modules includes:

- 0.6 m DRIVE-CLiQ cable for connection to a CU320 Control Unit or SIMOTION D4x5 Control Unit
- 1.45 m DRIVE-CLiQ cable for connection between the Control Unit and first Motor Module

Selection and ordering data

Rated output	**Basic Line Module in chassis format**
kW	Order No.
Line voltage 380 … 480 V 3 AC	
200	**6SL3330-1TE34-2AA3**
250	**6SL3330-1TE35-3AA3**
400	**6SL3330-1TE38-2AA3**
560	**6SL3330-1TE41-2AA3**
710	**6SL3330-1TE41-5AA3**
Line voltage 500 … 690 V 3 AC	
250	**6SL3330-1TG33-0AA3**
355	**6SL3330-1TG34-3AA3**
560	**6SL3330-1TG36-8AA3**
900	**6SL3330-1TG41-1AA3**
1100	**6SL3330-1TG41-4AA3**

Accessories

For accessories, technical data, and selection and ordering data for the associated line reactors, line filters and the recommended line-side components, see Catalog D 21.3, Section 2 "System components".

Further information

For detailed technical information, see Catalog D 21.3 Section 2 "SINAMICS S120 chassis units".

Overview

The Smart Line Modules are stable, line-commutated feed/feedback units with 100 % continuous regenerative feedback power. The feedback regenerative capability of the modules can be deactivated by means of parameterization.
Smart Line Modules are designed for connection to grounded (TN/TT) and non-grounded (IT) supply systems.

The DC link is pre-charged by means of integrated pre-charging resistors.

The associated line reactor is absolutely essential for operating a Smart Line Module.

Design

Smart Line Modules have the following connections and interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronic power supply
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 3 DRIVE-CLiQ sockets
- 1 PE/protective conductor connection (2 connections for sizes HX and JX)

The status of the Smart Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connecting to a CU320 Control Unit or SIMOTION D4x5 Control Unit
- DRIVE-CLiQ cable for connection between the Control Unit and first Motor Module (depends on type)

Selection and ordering data

Infeed power	**Smart Line Module in chassis format**
kW	Order No.
Line voltage 380 … 480 V 3 AC	
250	**6SL3330-6TE35-5AA3**
355	**6SL3330-6TE37-3AA3**
500	**6SL3330-6TE41-1AA3**
630	**6SL3330-6TE41-3AA3**
800	**6SL3330-6TE41-7AA3**
Line voltage 500 … 690 V 3 AC	
450	**6SL3330-6TG35-5AA3**
710	**6SL3330-6TG38-8AA3**
1000	**6SL3330-6TG41-2AA3**
1400	**6SL3330-6TG41-7AA3**

Accessories

For accessories, technical data, and selection and ordering data for the associated line reactors, line filters and the recommended line-side components, see Catalog D 21.3, Section 2 "System components".

Further information

For detailed technical information, see Catalog D 21.3 Section 2 "SINAMICS S120 chassis units".

Chassis format
Active Line Modules

Overview

The self-commutated feed/feedback units (with IGBTs in infeed and regenerative feedback directions) generate a regulated DC link voltage. This means that the connected Motor Modules are decoupled from the line voltage. Line voltage fluctuations within the permissible supply tolerances have no effect on the motor voltage.

Active Line Modules can if necessary feed a prespecified fundamental reactive current (capacitive or inductive) to the supply system so as to support simple compensation tasks.

Active Line Modules are designed for connection to grounded (TN, TT) and non-grounded (IT) supply systems.

In order to operate an Active Line Module, it is absolutely essential to use the appropriate Active Interface Module.

Design

The Active Line Modules in chassis format feature the following connections and interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronic power supply
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 1 temperature sensor input (KTY84-130 or PTC/PT100)
- 3 DRIVE-CLiQ sockets
- 2 PE/protective conductor connections

The status of the Active Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Active Line Modules includes:

- Frame sizes FX and GX:
  - 0.60 m DRIVE-CLiQ cable for connection to the CU320 Control Unit or SIMOTION D4x5 Control Unit
- Types HX and JX:
  - 0.35 m DRIVE-CLiQ cable for connection to the CU320 Control Unit or SIMOTION D4x5 Control Unit
  - 2.10 m DRIVE-CLiQ cable for connection to the first Motor Module

Selection and ordering data

Rated output	Active Line Module in chassis format
kW	Order No.
Line voltage 380 … 480 V 3 AC	
132	**6SL3330-7TE32-1AA3**
160	**6SL3330-7TE32-6AA3**
235	**6SL3330-7TE33-8AA3**
300	**6SL3330-7TE35-0AA3**
380	**6SL3330-7TE36-1AA3**
500	**6SL3330-7TE38-4AA3**
630	**6SL3330-7TE41-0AA3**
900	**6SL3330-7TE41-4AA3**
Line voltage 500 … 690 V 3 AC	
560	**6SL3330-7TG35-8AA3**
800	**6SL3330-7TG37-4AA3**
1100	**6SL3330-7TG41-0AA3**
1400	**6SL3330-7TG41-3AA3**

Accessories

For accessories and selection and ordering data for the recommended line-side components, see Catalog D 21.3, Section 2 "System Components".

Further information

For detailed technical information, see Catalog D 21.3 Section 2 "SINAMICS S120 chassis units".

Overview

Active Interface Modules are used in combination with Active Line Modules in chassis format. Active Interface Modules contain a Clean Power Filter with basic RI suppression, the precharging input circuit for the Active Line Module, the line supply voltage sensing circuit, and monitoring sensors. The bypass contactor is an integral component in frame sizes FI and GI, which ensures a highly compact design. The bypass contactor must be provided separately for frame sizes HI and JI.

The vast majority of line harmonics are suppressed by the Clean Power Filter.

The scope of supply of the Active Interface Modules includes:

- DRIVE-CLiQ cable for connection between Active Interface Module and Active Line Module
- DRIVE-CLiQ cable for connection between the Control Unit and first Motor Module

Selection and ordering data

Suitable for Active Line Module in chassis format		**Active Interface Module**
Rated output		
kW	Order No.	Order No.
Line voltage 380 … 480 V 3 AC		
132	6SL3330-7TE32-1AA3	**6SL3300-7TE32-6AA0**
160	6SL3330-7TE32-6AA3	**6SL3300-7TE32-6AA0**
235	6SL3330-7TE33-8AA3	**6SL3300-7TE33-8AA0**
300	6SL3330-7TE35-0AA3	**6SL3300-7TE35-0AA0**
380	6SL3330-7TE36-1AA3	**6SL3300-7TE38-4AA0**
500	6SL3330-7TE38-4AA3	**6SL3300-7TE38-4AA0**
630	6SL3330-7TE41-0AA3	**6SL3300-7TE41-4AA0**
900	6SL3330-7TE41-4AA3	**6SL3300-7TE41-4AA0**
Line voltage 500 … 690 V 3 AC		
560	6SL3330-7TG35-8AA3	**6SL3300-7TG35-8AA0**
800	6SL3330-7TG37-4AA3	**6SL3300-7TG37-4AA0**
1100	6SL3330-7TG41-0AA3	**6SL3300-7TG41-3AA0**
1400	6SL3330-7TG41-3AA3	**6SL3300-7TG41-3AA0**

Accessories

For accessories, see Catalog D 21.3, Section 2 "System Components".

Further information

For detailed technical information, see Catalog D 21.3 Section 2 "SINAMICS S120 chassis units".

Chassis format
Single Motor Modules

Overview

A Motor Module comprises a self-commutated inverter with IGBTs. It generates a variable voltage with variable frequency from the DC link voltage that feeds the connected motor.

Several Motor Modules can be interconnected through a common DC bus. This permits energy to be transferred between the Motor Modules.
This means that if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode.

Motor Modules are controlled by a Control Unit.

Design

The Single Motor Modules in chassis format feature the following connections and interfaces as standard:

- 1 DC link connection (DCP, DCN) for connecting to the supply DC busbar
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 1 DC link connection (DCPS, DCNS) to connect a dv/dt filter
- 1 electronic power supply connection
- 3 DRIVE-CLiQ sockets
- 1 motor connection
- 1 connection for Safety Integrated
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 PE/protective conductor connection

The status of the Motor Modules is indicated via two multi-color LEDs.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable for connection to the adjacent Motor Module (depends on type)
- DRIVE-CLiQ cable for connection to the CU320 Control Unit or SIMOTION D4x5 Control Unit

Selection and ordering data

Rated output current	Type rating	**Single Motor Module in chassis format**
A	kW	Order No.
DC link voltage 510 … 720 V DC		
210	110	**6SL3320-1TE32-1AA3**
260	132	**6SL3320-1TE32-6AA3**
310	160	**6SL3320-1TE33-1AA3**
380	200	**6SL3320-1TE33-8AA3**
490	250	**6SL3320-1TE35-0AA3**
605	315	**6SL3320-1TE36-1AA3**
745	400	**6SL3320-1TE37-5AA3**
840	450	**6SL3320-1TE38-4AA3**
985	560	**6SL3320-1TE41-0AA3**
1260	710	**6SL3320-1TE41-2AA3**
1405	800	**6SL3320-1TE41-4AA3**
DC link voltage 675 … 1035 V DC		
85	75	**6SL3320-1TG28-5AA3**
100	90	**6SL3320-1TG31-0AA3**
120	110	**6SL3320-1TG31-2AA3**
150	132	**6SL3320-1TG31-5AA3**
175	160	**6SL3320-1TG31-8AA3**
215	200	**6SL3320-1TG32-2AA3**
260	250	**6SL3320-1TG32-6AA3**
330	315	**6SL3320-1TG33-3AA3**
410	400	**6SL3320-1TG34-1AA3**
465	450	**6SL3320-1TG34-7AA3**
575	560	**6SL3320-1TG35-8AA3**
735	710	**6SL3320-1TG37-4AA3**
810	800	**6SL3320-1TG38-1AA3**
910	900	**6SL3320-1TG38-8AA3**
1025	1000	**6SL3320-1TG41-0AA3**
1270	1200	**6SL3320-1TG41-3AA3**

Accessories

For selection and ordering data for the load-side power components and the DC link components, see Catalog D 21.3, Section 2 "System Components".

Further information

For detailed technical information, see Catalog D 21.3 Section 2 "SINAMICS S120 chassis units".

Overview

In the SINAMICS S120 Cabinet Modules, the built-in units of the SINAMICS S120 chassis format are integrated to provide a modular cabinet system for multi-motor drives with a central line infeed and a common DC link busbar for crane systems. As standard, they are installed side by side in a row.

The main components of the system in crane applications are as follows:

- Line Connection Modules with line-side components such as contactors, fuses and circuit breakers
- Line Modules for infeed in the Active Line Module version for four-quadrant mode with negligible line harmonic distortion and integrated line contactors
- Motor Modules in chassis format for controlling motors
- Switch-Over Modules for both economic and redundant combinations of motors and Motor Modules
- Motor Multi Connection Modules for parallel connection of motors for gantry drives in particular
- Motor Double Choke Module for connecting a reactor between Motor Modules and motors when long cables are used, as is the case in gantry drives.

The sector-specific version Cranes option **B70** is based on the requirements of the EN 60204-32 standard and implements the measures required for the cabinets.

Specification in contrast to the available standard cabinet design:

- All auxiliary power supplies are routed to terminals for wiring in star topology
- Vibratory load during operation
  Excursion 1.0 mm at 2 to 13.2 Hz
  Acceleration 6.8 m/s^2 at 13.2 to 100 Hz
- The colors of the cores are in accordance with DIN EN 60204-32 except in the case of built-in modules in chassis format.
- The complete documentation is supplied for the cabinets for the ordered configuration
- Internal wiring of the transport units
- Prepared wiring for easy assembly

When used in cranes, the sector-specific option **B70** must be specified separately on ordering for all cabinets.

Technical data

General technical data	
Electrical data	
Line voltages	380 … 480 V 3 AC, ±10 % (–15 % < 1 min)
Line system configurations	Isolated systems (IT systems)
Line frequency	47 … 63 Hz
Output frequency	0 … 300 Hz (>100/160 Hz, observe the derating)
Line power factor fundamental component	Active Line Module: Adjustable (factory-set to cosφ = 1)
Efficiency	> 97.0 %
Control method	Servo control, vector control with and without encoder, or *U*/*f* control
Fixed speeds	15 fixed speeds plus 1 minimum speed, parameterizable
Skipped speed ranges	4, programmable
Braking operation	With regenerative feedback or by additional Braking Modules and braking resistors
Mechanical data	
Degree of protection	IP20, IP21 and IP23 (with options M26 and M27, side panels on the right and left respectively)
Protection class	Acc. to EN 61800-5-1
Cooling method	Forced air cooling AF according to EN 60146
Touch protection	BGV A3
Cabinet system	Rittal TS 8, doors with double-barb lock, three-section base plates for cable entry
Paint finish	RAL 7035 (indoor requirements)

Technical data (continued)

General technical data			
Compliance with standards			
Standards	EN 60146-1, EN 61800-2, EN 61800-3, EN 61800-5-1, EN 60204-1, EN 60529		
CE marking	Acc. to EMC Directive No. 2004/108/EC and Low-Voltage Directive No. 2006/95/EC		
RI suppression	In accordance with EMC product standard for variable-speed drives EN 61800-3, second environment (1st environment on request).		
Ambient conditions	**In operation [1]**	**During storage [1]**	**During transport [1]**
Ambient temperature	0 … +40 °C up to +50 °C see derating data	–25 … +55 °C	–25 … +70 °C as of –40 °C for 24 hours
Relative humidity (non-condensing)	5 … 95 % corr. to 3K3 acc. to IEC 60721-3-3	5 … 95 % corr. to 1K4 acc. to IEC 60721-3-1	5 … 95 % at 40 °C corr. to 2K3 acc. to IEC 60721-3-2
Installation altitude	Cabinet Modules in chassis format: Up to 2000 m above sea level without derating, > 2000 m, see characteristics/derating data		
Mechanical stability	**In operation [1]**	**During storage [1]**	**During transport [1]**
Vibratory load			
• Excursion - With option **B70**	0.075 mm at 10 … 58 Hz 1.0 mm at 2 … 13.2 Hz	1.5 mm at 5 … 9 Hz	3.1 mm at 5 … 9 Hz
• Acceleration - With option **B70**	9.8 m/s² at > 58 … 200 Hz 6.8 m/s² at > 13.2 … 100 Hz	5 m/s² at > 9 … 200 Hz	10 m/s² at > 9 … 200 Hz
Shock load			
• Acceleration	100 m/s² at 11 ms	40 m/s² at 22 ms	100 m/s² at 11 ms

Characteristics

Chassis current derating

If the Cabinet Modules in chassis format are operated at an **installation altitude > 2000 m** above sea level, factors relating to a reduction of the maximum permissible output current (derating) must be taken into account. These are specified in the tables below. The cooling air requirement (cooling air flow) specified for the relevant Cabinet Modules in the technical data must be guaranteed at all times. The specified values already include a permitted correction in respect of installation altitude and ambient temperature (incoming air temperature at the inlet to the Cabinet Module).

Current derating depending on ambient temperature (temperature of inlet air) and installation height for Cabinet Modules with degree of protection IP20, IP21 and IP23

Installation altitude above sea level	Current derating at an ambient temperature (air intake temperature) of						
m	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0 … 2000	100 %					95.0 %	87.0 %
2001 … 2500					96.3 %	91.4 %	83.7 %
2501 … 3000				96.2 %	92.5 %	87.9 %	80.5 %
3001 … 3500			96.7 %	92.3 %	88.8 %	84.3 %	77.3 %
3501 … 4000		97.8 %	92.7 %	88.4 %	85.0 %	80.8 %	74.0 %

Chassis voltage derating

In addition to current derating, voltage derating must be taken into consideration according to the following table for **installation altitudes > 2000 m** above sea level:

Voltage derating as a function of the installation altitude for units with rated voltages between 380 V and 480 V

Installation altitude above sea level	Voltage derating for a rated input voltage of					
m	380 V	400 V	420 V	440 V	460 V	480 V
0 … 2000	100 %					
2001 … 2250						96 %
2251 … 2500					98 %	94 %
2501 … 2750				98 %	94 %	90 %
2751 … 3000				95 %	91 %	88 %
3001 … 3250			97 %	93 %	89 %	85 %
3251 … 3500		98 %	93 %	89 %	85 %	82 %
3501 … 3750		95 %	91 %	87 %	83 %	79 %
3751 … 4000	96 %	92 %	87 %	83 %	80 %	76 %

[1] Deviations from the specified class are underlined.

Characteristics (continued)

Overload capability

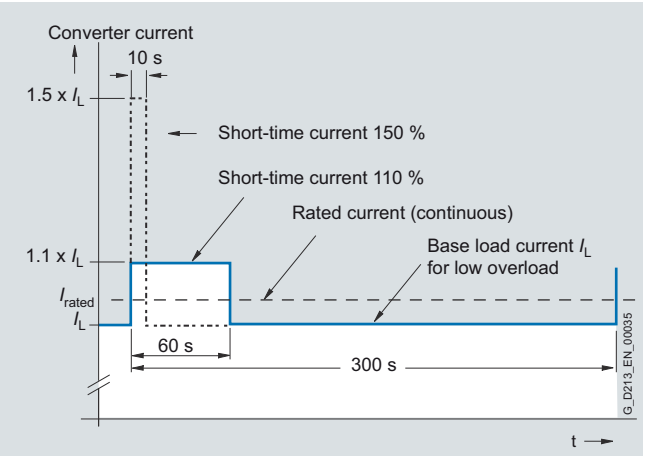
Motor Modules have an overload reserve e.g. to handle breakaway torques. If larger surge loads occur, these must be taken into account when configuring. In drives with overload requirements, the appropriate base-load current must, therefore, be used as a basis for the required load.

Permissible overload assumes that the drive converter is operated at its base-load current before and after the overload occurs, based on a duty cycle duration of 300 s.

Chassis format units

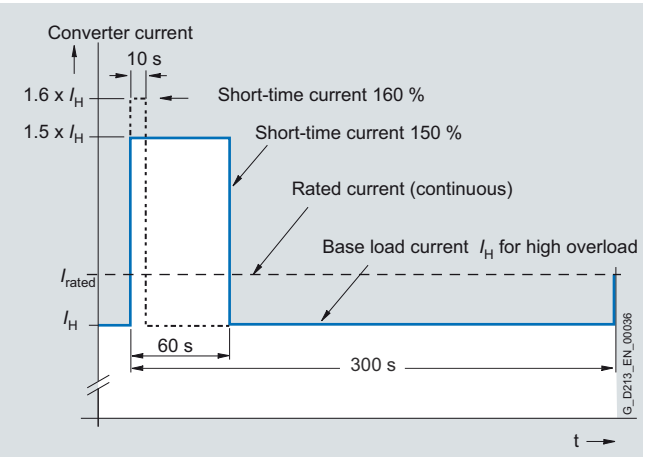
Cabinet Modules with power units in the chassis format can be configured on the basis of different base-load currents.

The base-load current I_L for a low overload is based on a load cycle of 110 % for 60 s or 150 % for 10 s.



Low overload

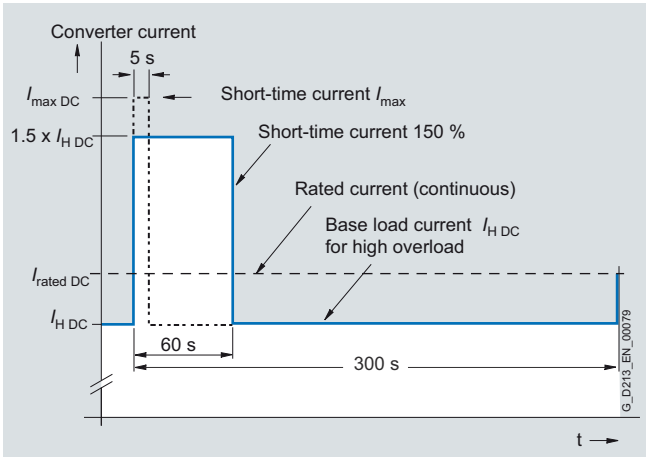
The base-load current I_H for a high overload is based on a load cycle of 150 % for 60 s or 160 % for 10 s.



High overload

Line Connection Modules

The base-load current $I_{H\,DC}$ for a high overload is based on a duty cycle of 150 % for 60 s or $I_{max\,DC}$ for 5 s.



High overload

Degrees of protection of Cabinet Modules

The EN 60529 standard covers the protection of electrical equipment by means of housings, covers or equivalent, and includes:

- Protection of persons against accidental contact with live or moving parts within the enclosure, and protection of the equipment against the ingress of solid foreign matter (touch protection and protection against ingress of solid foreign bodies)
- Protection of the equipment against the ingress of water (water protection)
- Abbreviations for the internationally agreed degrees of protection

The degrees of protection are specified by abbreviations comprising the code letters IP and two digits.

Degree of protection	First digit (touch protection and protection against ingress of foreign solid matter)	Second digit (protection of the equipment against the ingress of water)
IP20	Protected against solid foreign bodies, diameter 12.5 mm and larger	No water protection
IP21	Protected against solid foreign bodies, diameter 12.5 mm and larger	Drip-proof. Vertically falling drip water must not have a harmful effect.
IP23	Protected against solid foreign bodies, diameter 12.5 mm and larger	Protected against spray water. Water sprayed at an angle of max. 60° from either side of the vertical will not have a harmful effect.

Cabinet Modules fulfill the criteria for degree of protection IP20 as standard. The other degrees of protection outlined here are available as an option.

6

Cabinet Modules
Line Connection Modules

Overview

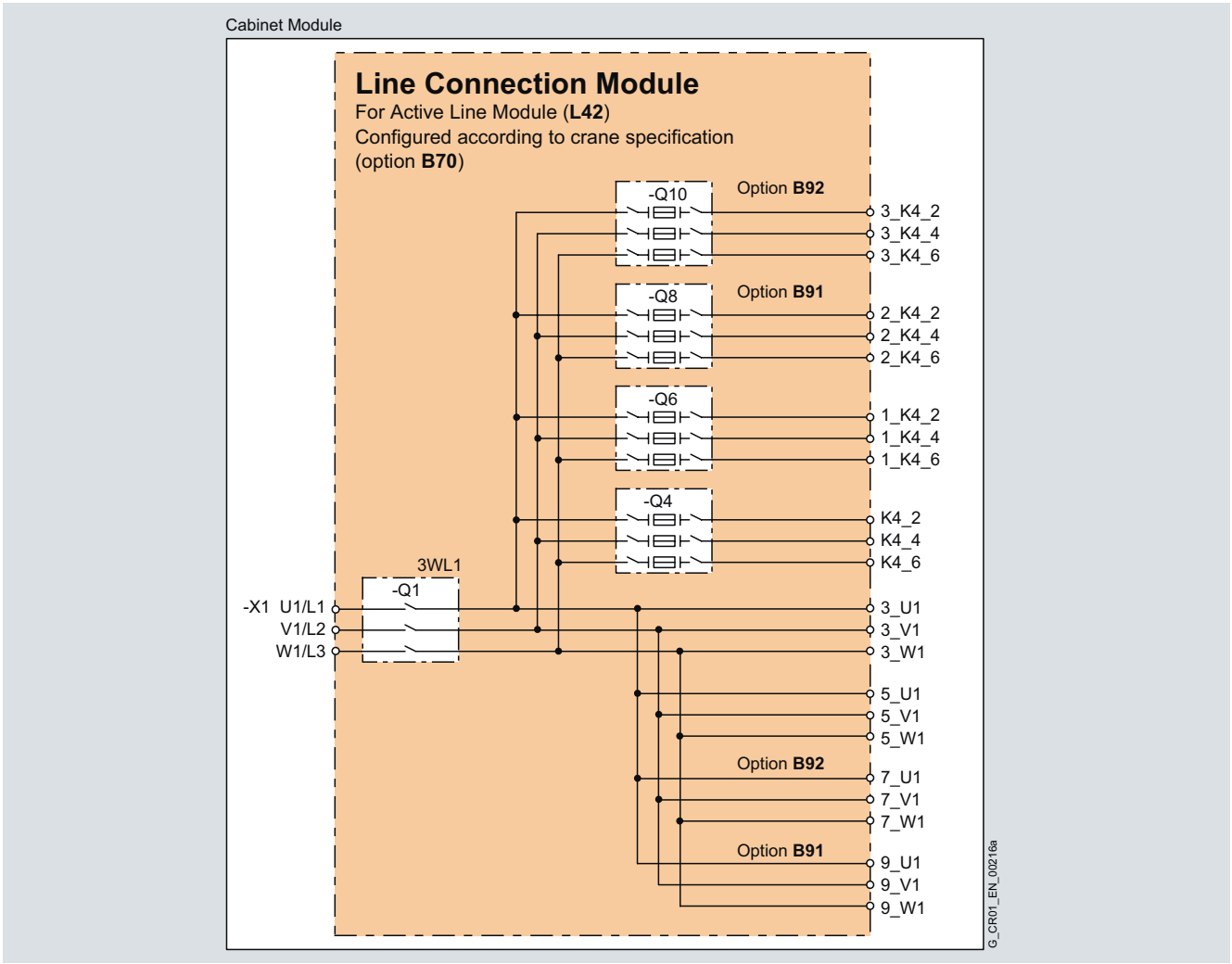
Line Connection Modules (LCM) contain the line-side infeed with main circuit breaker and fuse switch disconnector or circuit breaker and provide the connection between the plant power system and the Line Modules.

Line Connection Modules are available for the following voltages and currents in crane applications:

Line voltage	Rated input current
380 ... 480 V 3 AC	1250 … 6300 A

Design

Units with an input current > 800 A include a fixed-mounted circuit breaker (a withdrawable circuit breaker is optionally possible).



Example of connection of a Line Connection Module ≥ 2000 A to connect to the Active Line Modules in a parallel circuit configuration

Technical data

Line voltage 380 … 480 V 3 AC		Line Connection Modules					
		Type					
		6SL3700 -0LE41-3AA3	6SL3700- 0LE41-6AA3	6SL3700- 0LE42-0BA3	6SL3700- 0LE43-2BA3	6SL3700- 0NE44-0BA3	6SL3700- 0NE46-3BA3
				Prepared for connection to Line Modules connected in parallel			
Infeed/regenerative feedback current							
• Rated current I_{NE}	A	**1250**	**1600**	**2000**	**3200**	**4000**	**6300**
Power requirement							
• 24 V DC aux. power supply	A	–	–	–	–	–	–
• 230 V 2 AC	A	1.07	1.07	2.14	2.14	4	4
Power loss, max. [1]							
at 50 Hz 400 V							
• Option **L42/L44**	kW	0.29	0.41	0.6	0.95	1.8	1.8
at 60 Hz 460 V							
• Option **L42/L44**	kW	0.29	0.41	0.6	0.95	1.8	1.8
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB (A)	68/70	68/70	70/72	70/72	72/74	72/74
Line supply connection L1, L2, L3		5/M12 + 4/M16	5/M12 + 4/M16	5/M12 + 4/M16	5/M12 + 4/M16	64/M12	64/M12
• Conductor cross-section, max. (IEC)	mm^2	8 × 240	8 × 240	10 × 240	10 × 240	64 × 240	64 × 240
PE/GND connection		PE bar	PE bar	PE bar	PE bar	PE bar	PE bar
• Busbar cross-section	mm^2	600	600	600	600	600	600
• Conductor cross-section, max. (IEC)	mm^2	240	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width with option **B70**	mm	1000	1000	1000	1000	1200	1200
• Height [2]	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight							
• Option **L42/L44**	kg	470	490	620	720	1100	1100
Frame size		JL	JL	CL	LL	–	–

[1] The specified power loss equals the maximum value at 100 % utilization. The value is lower under normal operating conditions.

[2] The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23 degree of protection.

Selection and ordering data

Line Connection Modules		Active Line Modules			
Current [1]	Order No. with order code **B70** for Cranes sector version and order code **L42** for operation on Active Line Modules. Further special versions with order codes under "Options".	Number of Active Line Modules connected in parallel	Total rated current	Total rated output	Type
A			A	kW	
Line voltage 380 V … 480 V 3 AC					
1250	**6SL3700-0LE41-3AA3-Z B70+L42**	2	931	570	2 × 6SL3730-7TE35-0BA3
		1	985	630	6SL3730-7TE41-0BA3
1600	**6SL3700-0LE41-6AA3-Z B70+L42**	1	1405	900	6SL3730-7TE41-4BA3
		2	1596	950	1 × 6SL3730-7TE38-4BA3 1 × 6SL3730-7TE38-4BA3-Z B91
2000	**6SL3700-0LE42-0BA3-Z B70+L42**	2	1871	1197	1 × 6SL3730-7TE41-0BA3 1 × 6SL3730-7TE41-0BC3
3200	**6SL3700-0LE43-2BA3-Z B70+L42**	2	2669	1710	1 × 6SL3730-7TE41-4BA3 1 × 6SL3730-7TE41-4BC3
		3	2807	1795	2 × 6SL3730-7TE41-0BA3 1 × 6SL3730-7TE41-0BC3 or 1 × 6SL3730-7TE41-0BA3 2 × 6SL3730-7TE41-0BC3
4000	**6SL3700-0NE44-0BA3-Z B70+L42**	4	3740	2394	2 × 6SL3730-7TE41-0BA3 2 × 6SL3730-7TE41-0BC3
		3	4000	2565	2 × 6SL3730-7TE41-4BA3 1 × 6SL3730-7TE41-4BC3 or 1 × 6SL3730-7TE41-4BA3 2 × 6SL3730-7TE41-4BC3
6300	**6SL3700-0NE46-3BA3-Z B70+L42**	4	5340	3420	2 × 6SL3730-7TE41-4BA3 2 × 6SL3730-7TE41-4BC3

[1] The current values listed are based on an ambient temperature (air intake temperature) of 40 °C.

Options

The table below lists the options available for Line Connection Modules (for details, see description of options from Page 6/59):

Brief description of options	Order No. suffix **-Z** with order code
Cranes sector version	**B70**
Indicator for supply system variables	**B81**
Transformer fuse 350 kVA	**B82**
Surge arrester 600 V	**B83**
Additional connection for left of Active Line Module	**B91**
Additional connection for right of Active Line Module	**B92**
Withdrawable circuit breaker in place of a fixed-mounted circuit breaker	**L25**
Line Connection Modules for Active Line Modules	**L42**
EMERGENCY OFF pushbutton in cabinet door	**L45**
Cabinet standstill heating	**L55**
Insulation monitoring	**L87**
Base 100 mm high, RAL 7022	**M06**
Cable compartment 200 mm high, RAL 7035	**M07**
Degree of protection IP21	**M21**
IP23 degree of protection (includes additional touch protection)	**M23**
Side panel (left)	**M27**
EMC shield bus	**M70**
DC busbar system (I_d = 1170 A, 1 × 60 × 10 mm)	**M80**
DC busbar system (I_d = 1500 A, 1 × 80 × 10 mm)	**M81**
DC busbar system (I_d = 1840 A, 1 × 100 × 10 mm)	**M82**
DC busbar system (I_d = 2150 A, 2 × 60 × 10 mm)	**M83**
DC busbar system (I_d = 2730 A, 2 × 80 × 10 mm)	**M84**
DC busbar system (I_d = 3320 A, 2 × 100 × 10 mm)	**M85**
DC busbar system (I_d = 3720 A, 3 × 80 × 10 mm)	**M86**
DC busbar system (I_d = 4480 A, 3 × 100 × 10 mm)	**M87**
Crane transport assembly (top-mounted)	**M90**
Special paint finish for cabinet	**Y09**
Assembly into transport units at factory	**Y11**
One-line label for plant identification, 40 × 80 mm	**Y31**
Two-line label for plant identification, 40 × 180 mm	**Y32**
Four-line label for plant identification, 40 × 180 mm	**Y33**
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	**D02**

Certain options may be mutually exclusive.

Inadmissible option combinations:

- **M21** (IP21 degree of protection) and **M23** (IP23 degree of protection)
- **Y31**, **Y32**, **Y33** (1, 2 or 4-line label for plant identification)

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

✓ Combination possible
– Combination not possible

Overview

Active Line Modules can supply energy and return regenerative energy to the supply system. Active Line Modules generate a regulated DC voltage that is kept consistent regardless of fluctuations in the line voltage (the line voltage must range within the permissible tolerances).

Active Line Modules draw a virtually sinusoidal current from the supply system and do not, therefore, cause any harmful harmonics.

A Braking Module and braking resistor are required only if the drives need to be decelerated in a controlled manner after a power failure (i.e. if energy cannot be recovered to the supply). Please refer to Catalog D 21.3 for detailed information regarding these components.

Up to 4 identical Active Line Modules can be connected in parallel to increase the power and to provide a redundant configuration.

Active Line Modules are available for the following voltages and power ratings:

Line voltage	Rated output
380 … 480 V 3 AC	300 … 900 kW (power can be increased to up to 3420 kW through parallel connection)

Design

Active Line Modules are always operated together with an Active Interface Module, which contains the associated Clean Power Filter and pre-charging circuit. The integrated line filter ensures compliance with the EMC requirements for the "second environment".

The Active Line Module and Active Interface Module are supplied as a complete, fully wired unit, i.e. additional cabling and wiring by the customer is not required.

Parallel connection of Active Line Modules to increase power rating

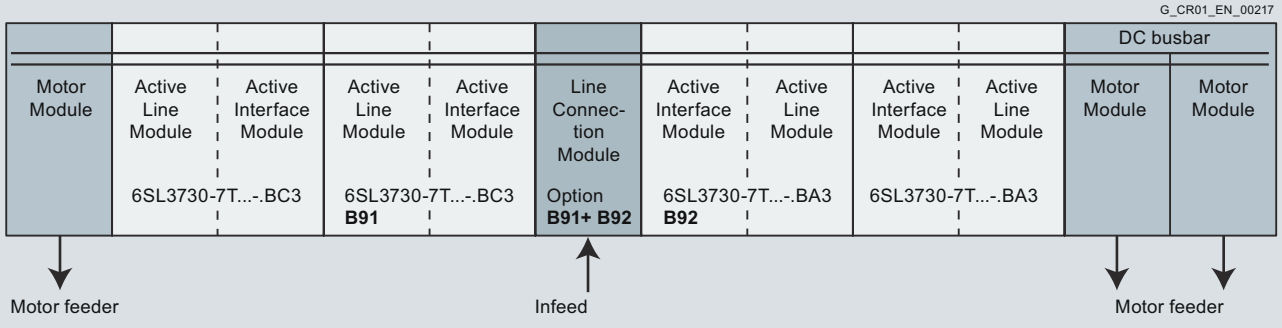
For configuring drive groups with higher outputs, Active Line Modules are available, which can be operated in parallel on a common Line Connection Module. Up to 4 identical Active Line Modules can be arranged to the left and right of the Line Connection Module. Up to 2 Active Line Modules each can be arranged on the left and right. The power connections on the Active Line Module on the left of the Line Connection Module are a mirror image (Order No. with "**C**" in the next to last position, example: 6SL3730-7T.41.-.B**C**0), which results in a very compact design for the line infeed.

If a second Active Line Module has to be arranged on the left side, the order code **B91** must be specified for the option "2nd parallel infeed on left". If a second Active Line Module has to be arranged on the right side, the order code **B92** must be specified for the option "2nd parallel infeed on right".

Please note that only Active Line Modules with exactly the same output rating may be connected in parallel. The potential for imbalances in current distribution means that a current derating of 5 % applies; this must be taken into account when the modules are dimensioned.

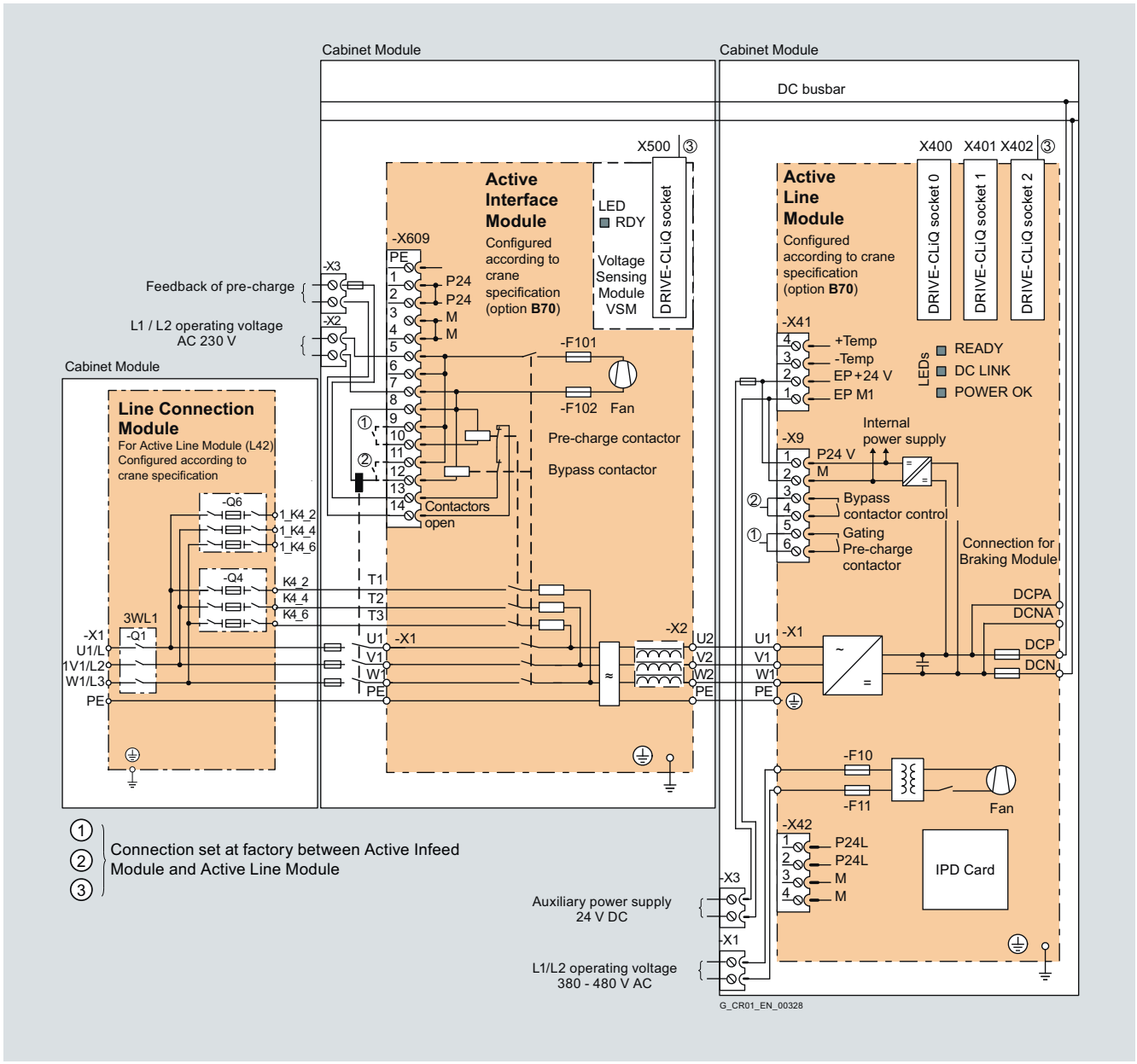
When configuring, it must be ensured that the maximum DC link capacitance for the drive group that can be charged through the Active Line Modules is not exceeded.

If the Active Line Modules are connected in parallel using DRIVE-CLiQ, this must be taken into account during configuration.



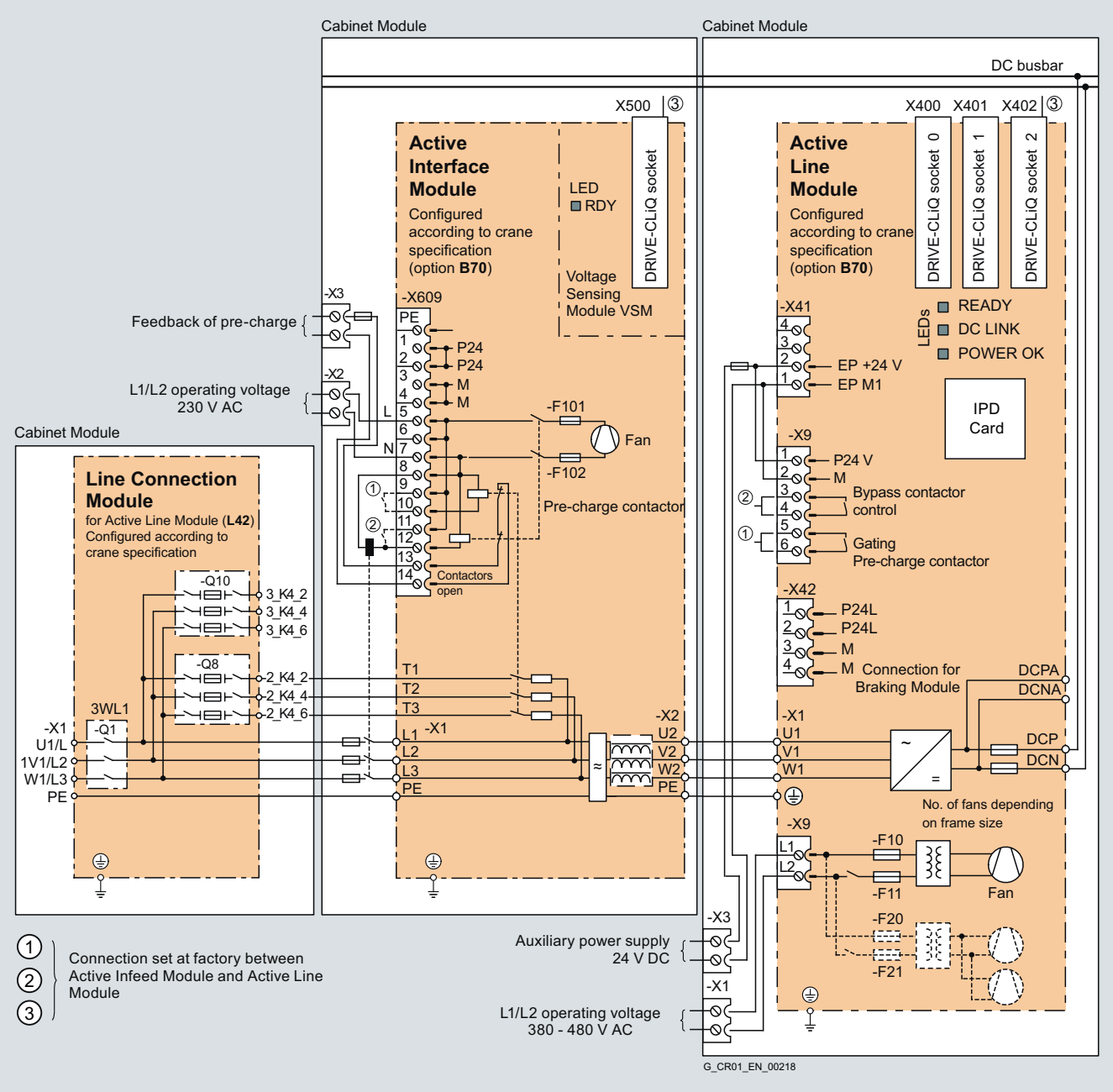
Integration

The Active Line Module is controlled by the CU320 Control Unit. Data is exchanged between the Control Unit and module via the DRIVE-CLiQ connections. The Active Interface Module is included in the scope of delivery for the Active Line Module.



Example of connection of an Active Line Module (frame sizes GI/GX)

Integration (continued)



Example of connection of an Active Line Module (frame sizes HI/HX and JI/JX)

Technical data

Line voltage 380 … 480 V 3 AC		Active Line Modules Type 6SL3730-7TE35-0BA3	6SL3730-7TE38-4BA3	6SL3730-7TE41-0BA3 For parallel connection, mounted to the *left* of the Line Connection Module: 6SL3730-7TE41-0BC3	6SL3730-7TE41-4BA3 6SL3730-7TE41-4BC3
Rated output					
• at $I_{N\,DC}$ (50 Hz 400 V)	kW	**300**	**500**	**630**	**900**
• at $I_{H\,DC}$ (50 Hz 400 V)	kW	270	465	545	780
• at $I_{N\,DC}$ (60 Hz 460 V)	hp	500	700	900	1250
• at $I_{H\,DC}$ (60 Hz 460 V)	hp	400	700	800	1000
DC link current					
• Rated current $I_{N\,DC}$	A	549	940	1103	1574
• Base-load current $I_{H\,DC}$ [1]	A	489	837	982	1404
• Maximum current $I_{max\,DC}$	A	823	1410	1654	2361
Infeed/regenerative feedback current					
• Rated current $I_{N\,E}$	A	490	840	985	1405
• Maximum current $I_{max\,E}$	A	735	1260	1477	2107
Power requirement					
• 24 V DC aux. power supply	A	1.52	1.57	1.67	1.67
• 400 V AC, 50/60 Hz	A	1.8/2.7	3.6/5.4	5.4/8.1	5.4/8.1
DC link capacitance					
• Active Line Module	µF	9600	16800	18900	28800
• Drive line-up, max.	µF	76800	134400	230400	230400
Power loss, max. [2]					
• at 50 Hz 400 V	kW	8.7	13.8	17.6	21.8
• at 60 Hz 460 V	kW	9.0	14.3	18.3	22.7
Cooling air requirement	m^3/s	1.3	1.58	1.88	1.88
Sound pressure level L_{pA} [3] (1 m) at 50/60 Hz	dB (A)	76/78	78/80	78/80	78/80
PE/GND connection		PE bar	PE bar	PE bar	PE bar
• Busbar cross-section	mm^2	600	600	600	600
• Conductor cross-section, max. (DIN VDE)	mm^2	240	240	240	240
Cable length, max. [4]					
• Shielded	m	2700	3900	3900	3900
• Unshielded	m	4050	5850	5850	5850
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width with option **B70**	mm	1000	1200	1600	1600
• Height [5]	mm	2200	2200	2200	2200
• Depth	mm	600	600	600	600
Weight	kg	530	930	1360	1360
Frame size		GX + GI	HX + HI	JX + JI	JX + JI

[1] The base-load current $I_{H\,DC}$ is based on a duty cycle of 150 % for 60 s or $I_{max\,DC}$ for 5 s with a duty cycle duration of 300 s.

[2] The specified power loss equals the maximum value at 100 % utilization. The value is lower under normal operating conditions.

[3] Total sound pressure level of Active Interface Module and Active Line Module.

[4] Sum of all motor cables and DC link. Longer cable lengths for specific configurations are available on request

[5] The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23 degree of protection.

Selection and ordering data

Rated output	Active Line Module (incl. Active Interface Module)	
kW	Order No. with order code **B70** for Cranes sector version. Further special versions with order codes under "Options".	
Line voltage 380 … 480 V 3 AC (DC link voltage 540 … 720 V DC)		
300	**6SL3730-7TE35-0BA3-Z B70**	
500	**6SL3730-7TE38-4BA3-Z B70**	
630	**6SL3730-7TE41-0BA3-Z B70**	
630	**6SL3730-7TE41-0BC3-Z B70**	For parallel connection, mounted on *left* of LCM (mirror-image design)
900	**6SL3730-7TE41-4BA3-Z B70**	
900	**6SL3730-7TE41-4BC3-Z B70**	For parallel connection, mounted on *left* of LCM (mirror-image design)

Options

The table below lists the options available for Active Line Modules (for details, see description of options from Page 6/59):

Brief description of options	Order No. suffix **-Z** with order code
Cranes sector version	**B70**
Additional connection for left of Active Line Module	**B91**
Additional connection for right of Active Line Module	**B92**
Cabinet standstill heating	**L55**
Base 100 mm high, RAL 7022	**M06**
Cable compartment 200 mm high, RAL 7035	**M07**
Degree of protection IP21	**M21**
IP23 degree of protection (includes additional touch protection)	**M23**
Side panel (right)	**M26**
Side panel (left)	**M27**
DC busbar system (I_d = 1170 A, 1 × 60 × 10 mm)	**M80**
DC busbar system (I_d = 1500 A, 1 × 80 × 10 mm)	**M81**
DC busbar system (I_d = 1840 A, 1 × 100 × 10 mm)	**M82**
DC busbar system (I_d = 2150 A, 2 × 60 × 10 mm)	**M83**
DC busbar system (I_d = 2730 A, 2 × 80 × 10 mm)	**M84**
DC busbar system (I_d = 3320 A, 2 × 100 × 10 mm)	**M85**
DC busbar system (I_d = 3720 A, 3 × 80 × 10 mm)	**M86**
DC busbar system (I_d = 4480 A, 3 × 100 × 10 mm)	**M87**
Crane transport assembly (top-mounted)	**M90**
Special paint finish for cabinet	**Y09**
Assembly into transport units at factory	**Y11**
One-line label for plant identification, 40 × 80 mm	**Y31**
Two-line label for plant identification, 40 × 180 mm	**Y32**
Four-line label for plant identification, 40 × 180 mm	**Y33**
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	**D02**

Certain options may be mutually exclusive.

Inadmissible option combinations:

- **M21** (IP21 degree of protection) and **M23** (IP23 degree of protection)
- **Y31**, **Y32**, **Y33** (1, 2 or 4-line label for plant identification)

Options (continued)

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

✓ Combination possible

– Combination not possible

6

Cabinet Modules
Motor Modules in chassis format

Overview

Motor Modules in chassis format are available in the power range from 110 kW to 800 kW.

Line voltage	DC link voltage	Type rating
380 … 480 V 3 AC	510 … 720 V DC	110 … 800 kW

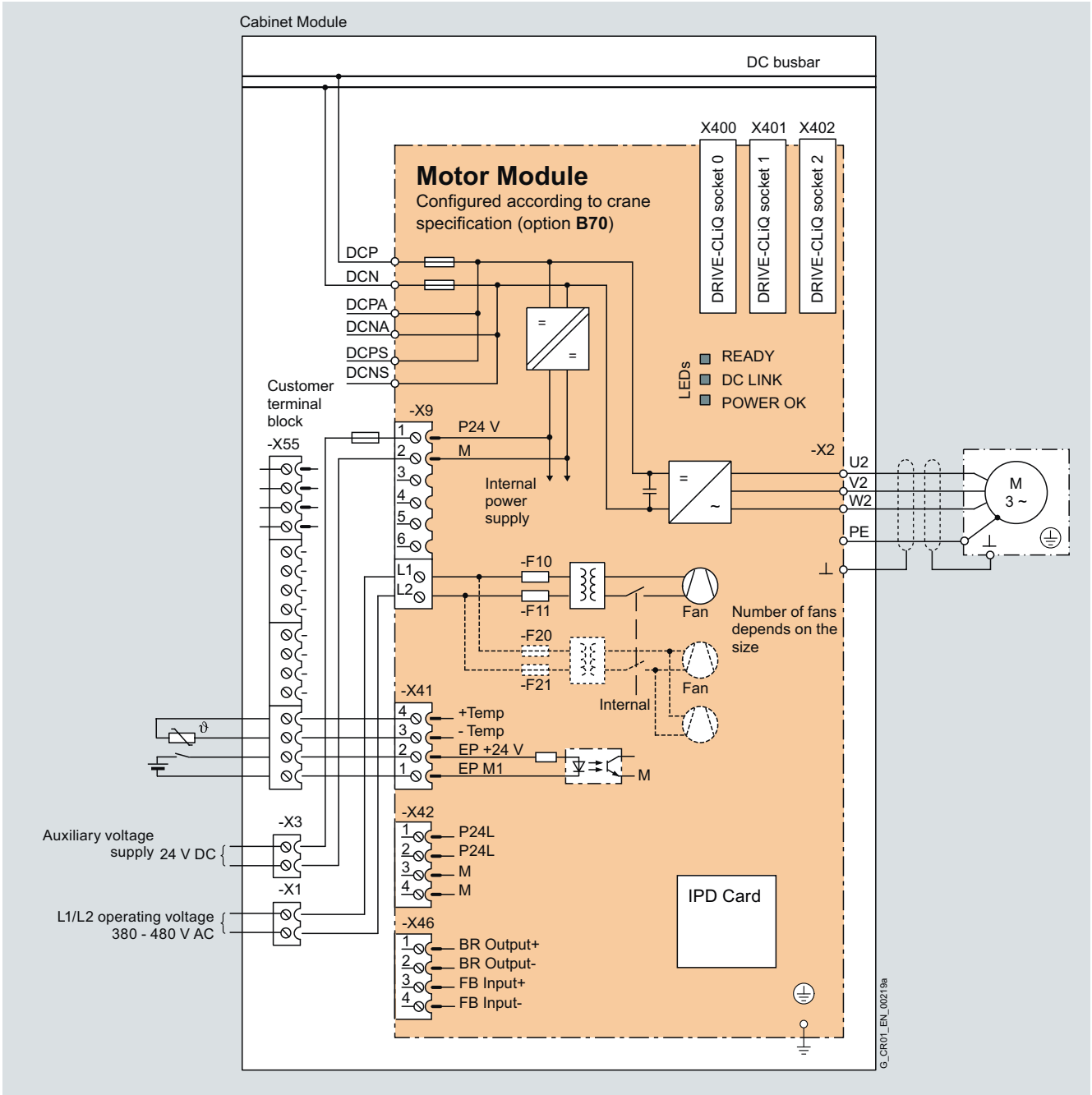
Design

Motor Modules contain the following components as standard:

- Retaining device for the DC busbar, including the connection to the DC connections of the Motor Module
- Nickel-plated connection busbars for motor cables with Motor Modules of frame sizes FX and GX; connection is made directly on device with Motor Modules of frame sizes HX and JX.
- Cable clamping bar for the electric power cables
- DRIVE-CLiQ interface (3 DRIVE-CLiQ sockets), without Control Unit
- Customer interface -X55
- Nickel-plated PE busbar (60 × 10 mm), including jumper for looping through to the next Cabinet Module
- EMC-compliant design thanks to additional shielding measures and appropriate cable routing.

Integration

Motor Modules are controlled by the SIMOTION D435 and CX32 Control Units. Communication takes place over the DRIVE-CLiQ connection. The Control Units and the DRIVE-CLiQ cable are not included in the scope of supply and must be configured by the customer.



Connection example of a Motor Module

Technical data

Line voltage 380 … 480 V 3 AC DC link voltage 510 … 720 V DC		Motor Modules in chassis format Type					
		6SL3720-1TE32-1AA3	6SL3720-1TE32-6AA3	6SL3720-1TE33-1AA3	6SL3720-1TE33-8AA3	6SL3720-1TE35-0AA3	6SL3720-1TE36-1AA3
Type rating							
• at I_L (50 Hz 400 V) [1]	kW	**110**	**132**	**160**	**200**	**250**	**315**
• at I_H (50 Hz 400 V) [1]	kW	90	110	132	160	200	250
• at I_L (60 Hz 460 V) [2]	hp	150	200	250	300	400	500
• at I_H (60 Hz 460 V) [2]	hp	150	200	200	250	350	350
Output current							
• Rated current $I_{N\,A}$	A	210	260	310	380	490	605
• Base-load current I_L [3]	A	205	250	302	370	477	590
• Base-load current I_H [4]	A	178	233	277	340	438	460
• Maximum current $I_{max\,A}$	A	307	375	453	555	715	885
DC link current							
• Rated current $I_{N\,DC}$ when supplied via Active Line Module	A	227	281	335	411	529	653
• Base-load current $I_{L\,DC}$ [3] when supplied via Active Line Module	A	221	273	326	400	515	636
• Base-load current $I_{H\,DC}$ [4] when supplied via Active Line Module	A	202	250	298	365	470	581
Power requirement							
• 24 V DC aux. power supply	A	0.8	0.8	0.9	0.9	0.9	1.0
• 400 V AC, 50/60 Hz	A	0.63/0.95	1.13/1.7	1.8/2.7	1.8/2.7	1.8/2.7	3.6/5.4
DC link capacitance	µF	4200	5200	6300	7800	9600	12600
Pulse frequency [5]							
• Rated frequency	kHz	2	2	2	2	2	1.25
• Pulse frequency, max.							
- without current derating	Hz	2	2	2	2	2	1.25
- with current derating	Hz	8	8	8	8	8	7.5
Power loss, max. [6]							
• at 50 Hz 400 V	kW	1.86	2.5	2.96	3.67	4.28	5.84
• at 60 Hz 460 V	kW	1.94	2.6	3.1	3.8	4.5	6.3
Cooling air requirement	m^3/s	0.17	0.23	0.36	0.36	0.36	0.78
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB (A)	67	69	69	69	69	72
Motor connection U2, V2, W2							
• With option **B70,** for each phase		3 × M12	3 × M12	3 × M12	3 × M12	3 × M12	6 × M12
Cable length, max. [7]							
• Shielded	m	300	300	300	300	300	300
• Unshielded	m	450	450	450	450	450	450
PE/GND connection		PE bar	PE bar	PE bar	PE bar	PE bar	PE bar
• Busbar cross-section	mm^2	600	600	600	600	600	600
• Conductor cross-section, max. (DIN VDE)	mm^2	240	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	400	400	400	400	400	600
• Height [8]	mm	2200	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600	600
Weight, approx.	kg	145	145	286	286	286	490
Frame size		FX	FX	GX	GX	GX	HX

See footnotes at bottom of Page 6/40.

Technical data (continued)

Line voltage 380 … 480 V 3 AC DC link voltage 510 … 720 V DC		Motor Modules in chassis format Type				
		6SL3720-1TE37-5AA3	6SL3720-1TE38-4AA3	6SL3720-1TE41-0AA3	6SL3720-1TE41-2AA3	6SL3720-1TE41-4AA3
Type rating						
• at I_L (50 Hz 400 V) [1]	kW	**400**	**450**	**560**	**710**	**800**
• at I_H (50 Hz 400 V) [1]	kW	315	400	450	560	710
• at I_L (60 Hz 460 V) [2]	hp	600	700	800	1000	1000
• at I_H (60 Hz 460 V) [2]	hp	450	600	700	900	1000
Output current						
• Rated current $I_{N\,A}$	A	745	840	985	1260	1405
• Base-load current I_L [3]	A	725	820	960	1230	1370
• Base-load current I_H [4]	A	570	700	860	1127	1257
• Maximum current $I_{max\,A}$	A	1087	1230	1440	1845	2055
DC link current						
• Rated current $I_{N\,DC}$ when supplied via Active Line Module	A	805	907	1064	1361	1517
• Base-load current $I_{L\,DC}$ [3] when supplied via Active Line Module	A	784	884	1037	1326	1479
• Base-load current $I_{H\,DC}$ [4] when supplied via Active Line Module	A	716	807	946	1211	1350
Power requirement						
• 24 V DC aux. power supply	A	1.0	1.0	1.25	1.4	1.4
• 400 V AC, 50/60 Hz	A	3.6/5.4	3.6/5.4	5.4/8.1	5.4/8.1	5.4/8.1
DC link capacitance	µF	15600	16800	18900	26100	28800
Pulse frequency [5]						
• Rated frequency	kHz	1.25	1.25	1.25	1.25	1.25
• Pulse frequency, max.						
- without current derating	kHz	1.25	1.25	1.25	1.25	1.25
- with current derating	kHz	7.5	7.5	7.5	7.5	7.5
Power loss, max. [6]						
• at 50 Hz 400 V	kW	6.68	7.15	9.5	11.1	12
• at 60 Hz 460 V	kW	7.3	7.8	10.2	12.0	13
Cooling air requirement	m^3/s	0.78	0.78	1.1	1.1	1.1
Sound pressure level L_{pA} (1 m) at 50/60 Hz	dB (A)	72	72	72	72	72
Motor connection U2, V2, W2						
• With option **B70,** for each phase		6 × M12	6 × M12	8 × M12	8 × M12	8 × M12
Cable length, max. [7]						
• Shielded	m	300	300	300	300	300
• Unshielded	m	450	450	450	450	450
PE/GND connection		PE bar	PE bar	PE bar	PE bar	PE bar
• Busbar cross-section	mm^2	600	600	600	600	600
• Conductor cross-section, max. (DIN VDE)	mm^2	240	240	240	240	240
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	600	600	800	800	800
• Height [8]	mm	2200	2200	2200	2200	2200
• Depth	mm	600	600	600	600	600
Weight, approx.	kg	490	490	700	700	700
Frame size		HX	HX	JX	JX	JX

See footnotes at bottom of Page 6/40.

Selection and ordering data

Type rating	Rated output current I_{rated}	Motor Modules in chassis format Order No. with order code **B70** for Cranes sector version. Further special versions with order codes under "Options".
kW	A	
Line voltage 380 … 480 V 3 AC (DC link voltage 510 … 720 V DC)		
110	210	**6SL3720-1TE32-1AA3-Z B70**
132	260	**6SL3720-1TE32-6AA3-Z B70**
160	310	**6SL3720-1TE33-1AA3-Z B70**
200	380	**6SL3720-1TE33-8AA3-Z B70**
250	490	**6SL3720-1TE35-0AA3-Z B70**
315	605	**6SL3720-1TE36-1AA3-Z B70**
400	745	**6SL3720-1TE37-5AA3-Z B70**
450	840	**6SL3720-1TE38-4AA3-Z B70**
560	985	**6SL3720-1TE41-0AA3-Z B70**
710	1260	**6SL3720-1TE41-2AA3-Z B70**
800	1405	**6SL3720-1TE41-4AA3-Z B70**

Footnotes from Pages 6/38 and 6/39.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 400 V 3 AC 50 Hz.

2) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 460 V 3 AC 60 Hz.

3) The base-load current I_L is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.

4) The base-load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.

5) For details of the relationship between pulse frequency and maximum output current/output frequency, see Catalog PM 21.

6) The specified power loss equals the maximum value at 100 % utilization. The value is lower under normal operating conditions.

7) Sum of all motor cables. Longer cable lengths for specific configurations are available on request. See also SINAMICS Low Voltage Configuration Manual.

8) The cabinet height increases by 250 mm with IP21 degree of protection, and by 400 mm with IP23 degree of protection.

Options

The table below lists the options available for Motor Modules (for details, see description of options from Page 6/59):

Brief description of options	Order No. suffix **-Z** with order code
Cranes sector version	**B70**
SMC10 Sensor Module Cabinet-Mounted	**K46**
SMC20 Sensor Module Cabinet-Mounted	**K48**
SMC30 Sensor Module Cabinet-Mounted	**K50**
Terminal module for controlling the "Safe Torque Off" and "Safe Stop 1" safety functions	**K82**
Motor reactor	**L08**
DC interface incl. pre-charging input circuit of the relevant DC link capacitance	**L37**
Cabinet standstill heating	**L55**
Base 100 mm high, RAL 7022	**M06**
Cable compartment 200 mm high, RAL 7035	**M07**
Degree of protection IP21	**M21**
IP23 degree of protection (includes additional touch protection)	**M23**
Side panel (right)	**M26**
Side panel (left)	**M27**
EMC shield bus	**M70**
DC busbar system (I_d = 1170 A, 1 × 60 × 10 mm)	**M80**
DC busbar system (I_d = 1500 A, 1 × 80 × 10 mm)	**M81**
DC busbar system (I_d = 1840 A, 1 × 100 × 10 mm)	**M82**
DC busbar system (I_d = 2150 A, 2 × 60 × 10 mm)	**M83**
DC busbar system (I_d = 2730 A, 2 × 80 × 10 mm)	**M84**
DC busbar system (I_d = 3320 A, 2 × 100 × 10 mm)	**M85**
DC busbar system (I_d = 3720 A, 3 × 80 × 10 mm)	**M86**
DC busbar system (I_d = 4480 A, 3 × 100 × 10 mm)	**M87**
Crane transport assembly (top-mounted)	**M90**
Special paint finish for cabinet	**Y09**
Assembly into transport units at factory	**Y11**
One-line label for plant identification, 40 × 80 mm	**Y31**
Two-line label for plant identification, 40 × 180 mm	**Y32**
Four-line label for plant identification, 40 × 180 mm	**Y33**
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	**D02**

Certain options may be mutually exclusive.

Inadmissible option combinations:

- **M21** (IP21 degree of protection) and **M23** (IP23 degree of protection)
- **Y31**, **Y32**, **Y33** (1, 2 or 4-line label for plant identification)

Option **L08** (motor reactor for Motor Module) is only available for frame sizes FX and GH (110 to 250 kW). For implementing a motor reactor at 315 kW to 450 kW, a Motor Double Choke Module is available.

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

✓ Combination possible
– Combination not possible

Cabinet Modules
Motor Double Choke Modules

Overview

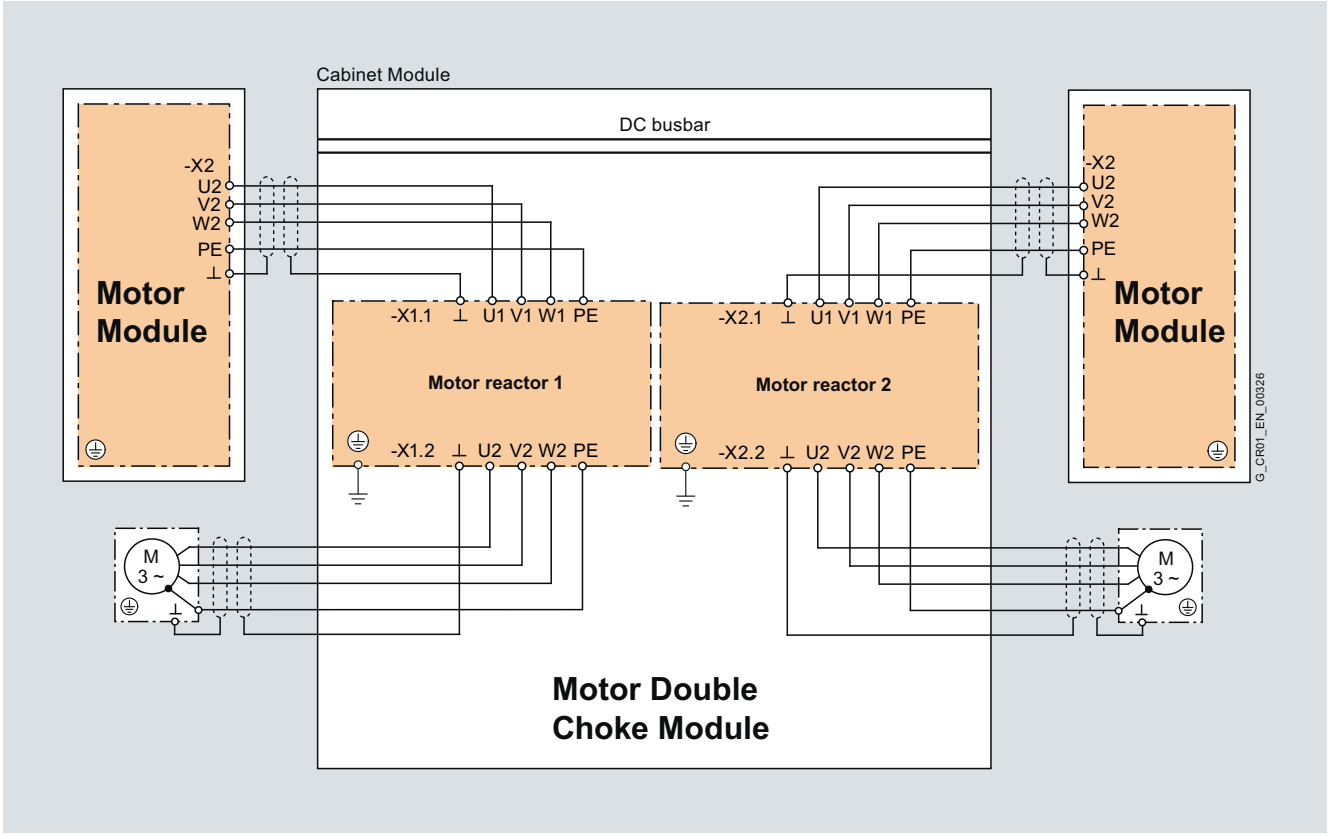
Motor reactors reduce the voltage stress on the motor windings by reducing the voltage gradients at the motor terminals that occur when motors are fed from drive converters. At the same time, the capacitive charge/discharge currents that occur at the converter output when long motor cables are used are reduced. Appropriately dimensioned motor reactors therefore enable large capacitances and therefore longer motor cables to be connected. Their use is generally recommended in the case of multi-motor drives.
With option **L08** for Motor Modules, a motor reactor is integrated into the Motor Module up to cabinet size GX (outputs of less than 315 kW). Due to space constraints, a separate cabinet must be planned for the output range 315 kW to 450 kW (cabinet size HX).

Design

The Motor Double Choke Modules are equipped as standard with 2 identical motor reactors. Two Motor Modules can be connected to one Motor Double Choke Module, depending on the type selected.

Integration

The Motor Modules connected to the Motor Double Choke Module must be arranged immediately to the left and right of the Motor Double Choke Module.



Connection example of a Motor Double Choke Module

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Technical data

Line voltage 380 … 480 V 3 AC		Motor Double Choke Module Type		
		6SL3700-2AE36-1BA3	6SL3700-2AE38-4BA3	6SL3700-2AE38-4BA3
Type rating	kW	315	450	450
Number of reactors		2	2	2
Rated current	A	605	840	840
Power loss	kW	< 2	< 2	< 2
Cooling air requirement		Convection	Convection	Convection
Sound pressure level	dB (A)	–	–	–
Line supply/load connection		2 × M12	2 × M12	2 × M12
PE connection		PE bar 600 8 × M12	PE bar 600 8 × M12	PE bar 600 8 × M12
Cable length, max.				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	600	600	600
• Height	mm	220	220	220
• Depth	mm	600	600	600
Weight, approx.	kg	420	450	450
Matching Motor Module		**6SL3720-1TE36-1AA3**	**6SL3720-1TE37-5AA3**	**6SL3720-1TE38-4AA3**

Selection and ordering data

Type rating	Motor Double Choke Module Order No. with order code **B70** for Cranes sector version. Further special versions with order codes under "Options".	Motor Module in chassis format Type
kW		
315	**6SL3700-2AE36-1BA3-Z B70**	6SL3720-1TE36-1AA3
400	**6SL3700-2AE38-4BA3-Z B70**	6SL3720-1TE37-5AA3
450	**6SL3700-2AE38-4BA3-Z B70**	6SL3720-1TE38-4AA3

Options

The table below lists the options available for Motor Double Choke Modules (for details, see description of options from Page 6/59):

Brief description of options	Order No. suffix **-Z** with order code
Cranes sector version	**B70**
Cabinet standstill heating	**L55**
Base 100 mm high, RAL 7022	**M06**
Cable compartment 200 mm high, RAL 7035	**M07**
Degree of protection IP21	**M21**
IP23 degree of protection (includes additional touch protection)	**M23**
Side panel (right)	**M26**
Side panel (left)	**M27**
EMC shield bus	**M70**
DC busbar system (I_d = 1170 A, 1 × 60 × 10 mm)	**M80**
DC busbar system (I_d = 1500 A, 1 × 80 × 10 mm)	**M81**
DC busbar system (I_d = 1840 A, 1 × 100 × 10 mm)	**M82**
DC busbar system (I_d = 2150 A, 2 × 60 × 10 mm)	**M83**
DC busbar system (I_d = 2730 A, 2 × 80 × 10 mm)	**M84**
DC busbar system (I_d = 3320 A, 2 × 100 × 10 mm)	**M85**
DC busbar system (I_d = 3720 A, 3 × 80 × 10 mm)	**M86**
DC busbar system (I_d = 4480 A, 3 × 100 × 10 mm)	**M87**
Crane transport assembly (top-mounted)	**M90**
Special paint finish for cabinet	**Y09**
Assembly into transport units at factory	**Y11**
One-line label for plant identification, 40 × 80 mm	**Y31**
Two-line label for plant identification, 40 × 180 mm	**Y32**
Four-line label for plant identification, 40 × 180 mm	**Y33**
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	**D02**

Certain options may be mutually exclusive.

Inadmissible option combinations:

- **M21** (IP21 degree of protection) and **M23** (IP23 degree of protection)
- **Y31**, **Y32**, **Y33** (1, 2 or 4-line label for plant identification)

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

✓ Combination possible

– Combination not possible

6

Cabinet Modules
Motor Multi Connection Modules

Overview

If the drive output of a gantry with drive motors is distributed over multiple axes to achieve a more compact design and enhanced motion, these motors can be operated cost-optimized in parallel with a converter with an appropriate total power rating.

The Motor Multi Connection Modules are used to protect the individual motors from the total power of the converter. Motor Multi Connection Modules contain the motor circuit breakers. Each motor circuit breaker protects one motor. Several motor circuit breakers are connected in parallel on the input side into a section for connection to a Motor Module.

The Motor Multi Connection Modules can be equipped with optional analog measuring instruments built into the cabinet door for indicating the current motor currents and current output voltage of the Motor Modules.

Design

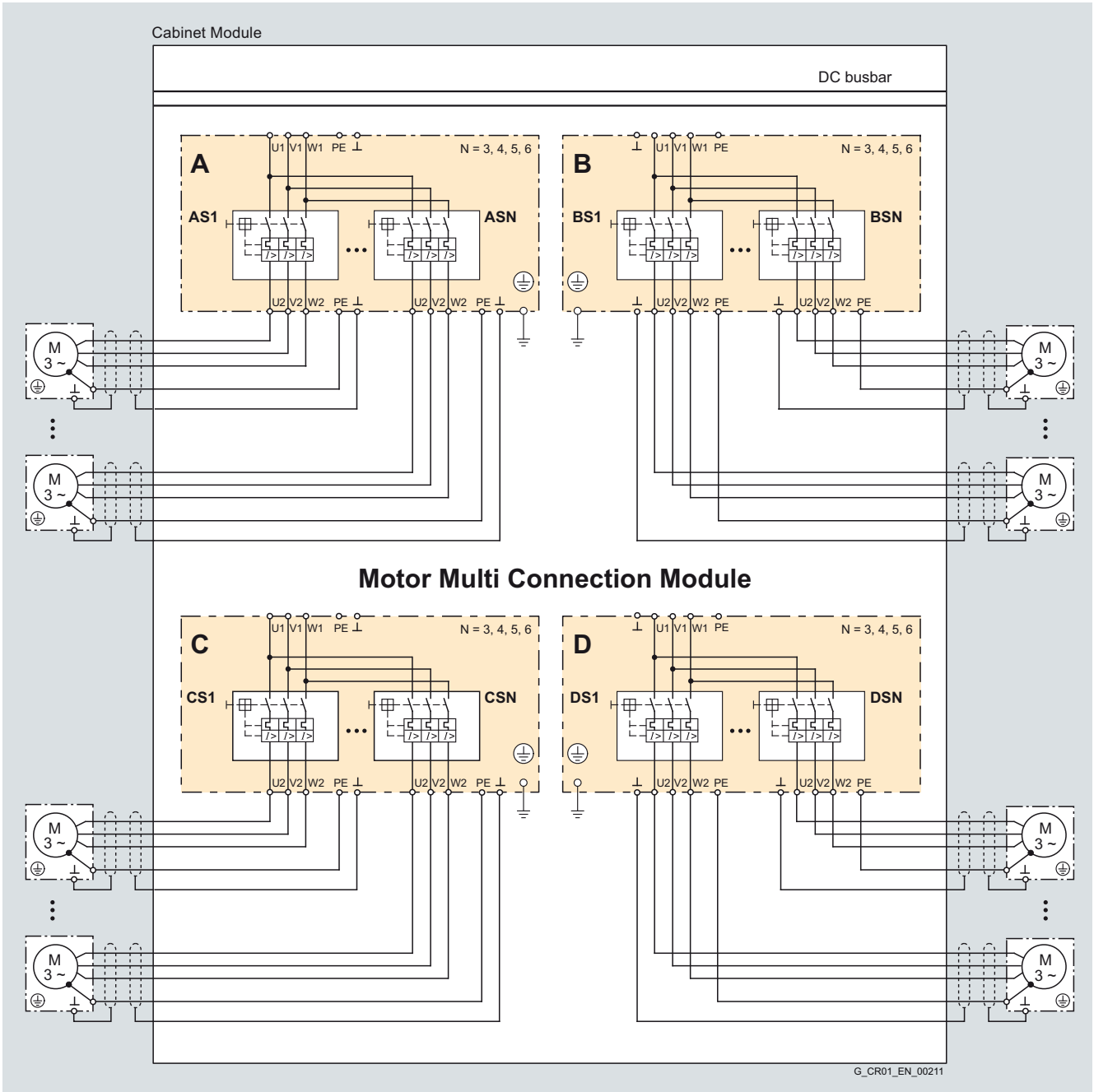
In total, 4 control cabinet versions are available for connecting 12, 16, 20, or 24 motors with an appropriate number of motor circuit breakers. The motor circuit breakers are designed for a rated current of 45 A to 63 A. The motor circuit breakers are always connected at the input side into 4 groups of 3, 4, 5 or 6 motor circuit breakers for connection to Motor Modules.

Up to 2 Motor Modules can be connected to one Motor Multi Connection Module for operating up to 2 sections of motors connected in parallel.

As an option, depending on the control cabinet version, 12, 16, 20 or 24 ammeters for indicating the motor currents as well as 2 voltmeters for indicating the output voltages of the Motor Modules can be integrated in the cabinet door of the Motor Multi Connection Module.

Integration

The motors and Motor Modules are connected to the Motor Multi Connection Module in accordance with the grouping.



Connection example of a Motor Multi Connection Module

Cabinet Modules
Motor Multi Connection Modules

Technical data

Line voltage 380 … 480 V 3 AC		Motor Multi Connection Module Type			
		6SL3700-2EE34-0AA3-Z B70	6SL3700-2EE34-0BA3-Z B70	6SL3700-2EE34-0CA3-Z B70	6SL3700-2EE34-0DA3-Z B70
Number of motor circuit breakers		12	16	20	24
Rated current per group	A	400	400	400	400
Power loss	kW	< 1	< 1	< 1	< 1
Cooling air requirement		Convection	Convection	Convection	Convection
Sound pressure level	dB (A)	–	–	–	–
Line supply/load connection		Screw-type terminal 16 mm^2	Screw-type terminal 16 mm^2	Screw-type terminal 16 mm^2	Screw-type terminal 16 mm^2
PE connection		PE bar 600 8 × M12	PE bar 600 10 × M12	PE bar 600 10 × M12	PE bar 600 10 × M12
Cable length, max					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	600	800	800	800
• Height	mm	2200	2200	2200	2200
• Depth	mm	600	600	600	600
Weight, approx.	kg	240	280	290	300

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Selection and ordering data

Number of motor circuit breakers	Number of connectable motors	**Motor Multi Connection Module** Order No. with order code **B70** for Cranes sector version. Further special versions with order codes under "Options".	Option "Measuring instruments in control cabinet door" Further special versions with order codes under "Options".	Order No. suffix **-Z** with order code
12	12	**6SL3700-2EE34-0AA3-Z B70**	• 12 ammeters Analog measuring instruments of moving-iron type, 90° scale, 0 ... 60/120 A, direct measuring • 2 voltmeters Analog measuring instrument of moving-coil type, 90° scale, 0 ... 520 V, 4 ... 20 mA	**B80**
16	16	**6SL3700-2EE34-0BA3-Z B70**	• 16 ammeters Analog measuring instruments of moving-iron type, 90° scale, 0 ... 60/120 A, direct measuring • 2 voltmeters Analog measuring instrument of moving-coil type, 90° scale, 0 ... 520 V, 4 ... 20 mA	**B80**
20	20	**6SL3700-2EE34-0CA3-Z B70**	• 20 ammeters Analog measuring instruments of moving-iron type, 90° scale, 0 ... 60/120 A, direct measuring • 2 voltmeters Analog measuring instrument of moving-coil type, 90° scale, 0 ... 520 V, 4 ... 20 mA	**B80**
24	24	**6SL3700-2EE34-0DA3-Z B70**	• 24 ammeters Analog measuring instruments of moving-iron type, 90° scale, 0 ... 60/120 A, direct measuring • 2 voltmeters Analog measuring instrument of moving-coil type, 90° scale, 0 ... 520 V, 4 ... 20 mA	**B80**

Ordering example 1:

A gantry with 12 motors is to be operated in two sections with 6 motors connected in parallel to one Motor Multi Connection Module.
Selection: Motor Multi Connection Module with 12 motor circuit breakers or 12 connectable motors and the option "Cranes sector version".

Order:
6SL3700-2EE34-0AA3-Z
B70

Ordering example 2:

A gantry with 24 motors is to be operated in two sections with 12 motors connected in parallel to one Motor Multi Connection Module with the ability to control the output voltage and motor currents.
Selection: Motor Multi Connection Module with 24 motor circuit breakers or 24 connectable motors in the "Cranes sector version" with measuring instruments for indicating motor current and voltage in the cabinet door.

Order:
6SL3700-2EE34-0DA3-Z
B70+B80

Options

The table below lists the options available for Motor Multi Connection Modules (for details, see description of options from Page 6/59):

Brief description of options	Order No. suffix **-Z** with order code
Cranes sector version	**B70**
Measuring instruments in control cabinet door	**B80**
Cabinet standstill heating	**L55**
Base 100 mm high, RAL 7022	**M06**
Cable compartment 200 mm high, RAL 7035	**M07**
Degree of protection IP21	**M21**
IP23 degree of protection (includes additional touch protection)	**M23**
Side panel (right)	**M26**
Side panel (left)	**M27**
EMC shield bus	**M70**
DC busbar system (I_d = 1170 A, 1 × 60 × 10 mm)	**M80**
DC busbar system (I_d = 1500 A, 1 × 80 × 10 mm)	**M81**
DC busbar system (I_d = 1840 A, 1 × 100 × 10 mm)	**M82**
DC busbar system (I_d = 2150 A, 2 × 60 × 10 mm)	**M83**
DC busbar system (I_d = 2730 A, 2 × 80 × 10 mm)	**M84**
DC busbar system (I_d = 3320 A, 2 × 100 × 10 mm)	**M85**
DC busbar system (I_d = 3720 A, 3 × 80 × 10 mm)	**M86**
DC busbar system (I_d = 4480 A, 3 × 100 × 10 mm)	**M87**
Crane transport assembly (top-mounted)	**M90**
Special paint finish for cabinet	**Y09**
Assembly into transport units at factory	**Y11**
One-line label for plant identification, 40 × 80 mm	**Y31**
Two-line label for plant identification, 40 × 180 mm	**Y32**
Four-line label for plant identification, 40 × 180 mm	**Y33**
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	**D02**

Certain options may be mutually exclusive.

Inadmissible option combinations:

- **M21** (IP21 degree of protection) and **M23** (IP23 degree of protection)
- **Y31**, **Y32**, **Y33** (1, 2 or 4-line label for plant identification)

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

✓ Combination possible

– Combination not possible

Cabinet Modules
Switch-Over Modules

Overview

Switch-Over Modules switch Motor Modules and motors together in accordance with their type. This results in an increase in plant availability due to redundancy and optimum utilization of the available plant components. The Switch-Over Modules can be optionally equipped with analog measuring instruments integrated into the cabinet door for indication of the output voltage of the Motor Modules and for indicating the motor currents.

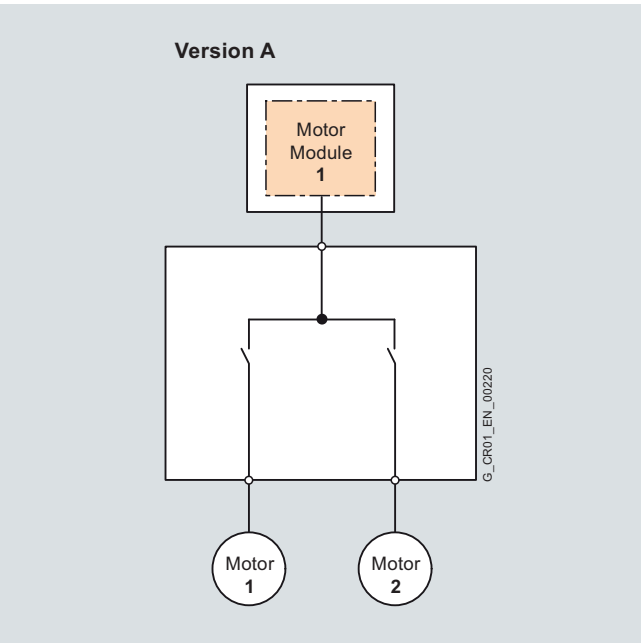
Design

There are a total of 4 circuit versions available.

Version A

- A Motor Module operates either Motor 1 or Motor 2

Function diagram for version A

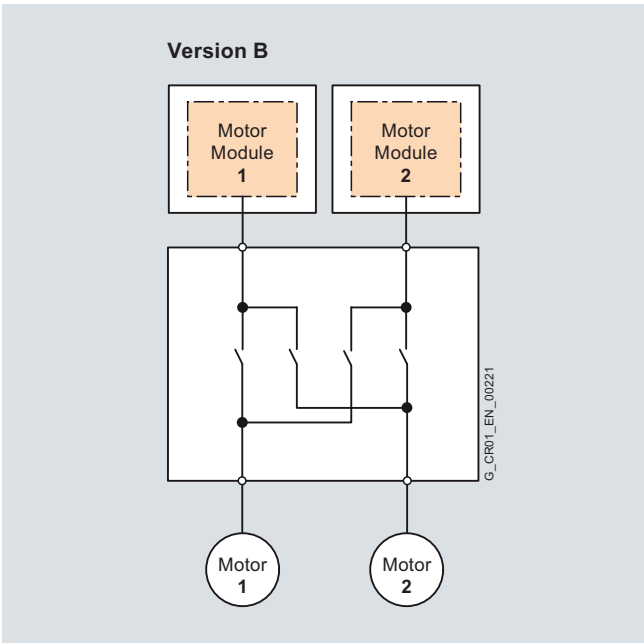


Implementation of version A with option **B80**:
2 ammeters (analog measuring instrument of moving-coil type, 240° scale) for indicating the motor currents and a voltmeter (analog measuring instrument of moving-coil type, 240° scale) for indicating the output voltage of the Motor Module.

Version B

- Motor Module 1 operates Motor 1 and Motor Module 2 operates Motor 2 or
- Motor Module 1 operates Motor 2 and Motor Module 2 operates Motor 1

Function diagram for version B



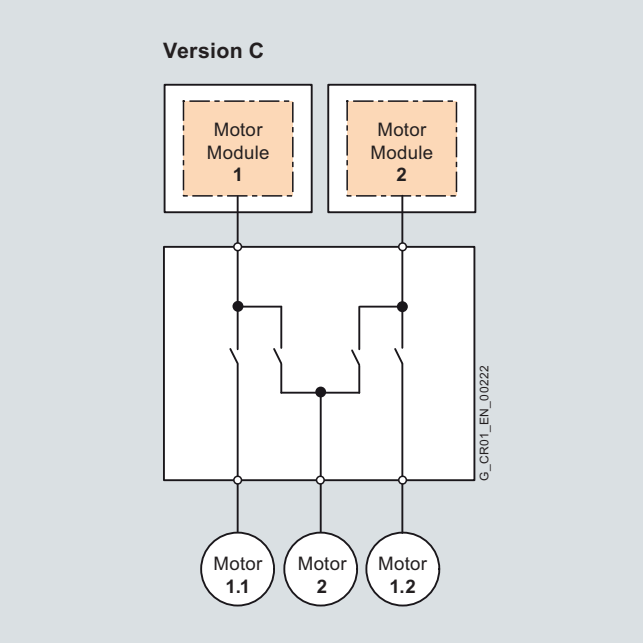
Implementation of version B with option **B80**:
2 ammeters (analog measuring instrument of moving-coil type, 240° scale) for indicating the motor currents and 2 voltmeters (analog measuring instrument of moving-coil type, 240° scale) for indicating the output voltage at the Motor Modules.

Design (continued)

Version C

- Motor Module 1 operates Motor 1.1 and
- Motor Module 2 operates Motor 1.2 or
- Motor Module 1 operates Motor 2 or
- Motor Module 2 operates Motor 2

Function diagram for version C

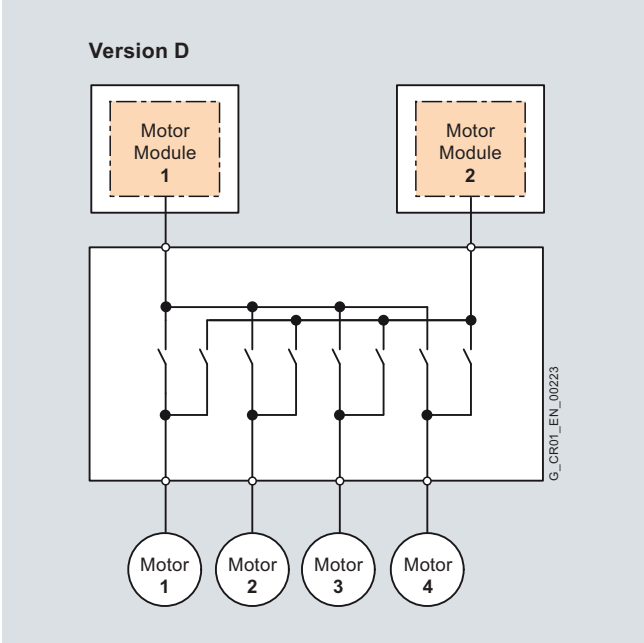


Implementation of version C with option **B80**:
3 ammeters (analog measuring instrument of moving-coil type, 240° scale) for indicating the motor currents and 2 voltmeters (analog measuring instrument of moving-coil type, 240° scale) for indicating the output voltage at the Motor Modules.

Version D

- Motor Module 1 operates Motor 1 or 2 or 3 or 4 and
- Motor Module 2 operates a motor other than Motor Module 1

Function diagram for version D



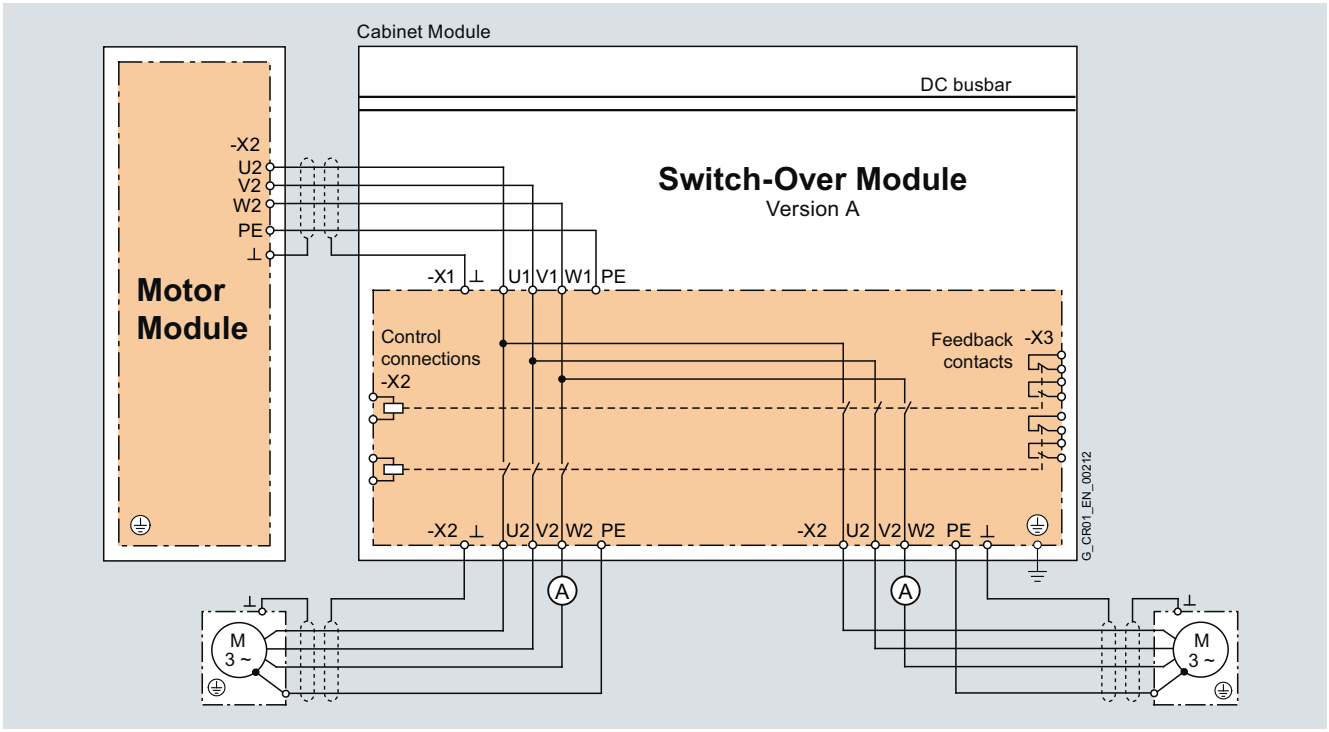
Implementation of version D with option **B80**:
2 ammeters (analog measuring instrument of moving-coil type, 240° scale) for indicating the motor currents and 2 voltmeters (analog measuring instrument of moving-coil type, 240° scale) for indicating the output voltages at the Motor Modules.

The checkback contacts of the individual contactors are connected to terminals to support plant-specific interlocks.

Integration

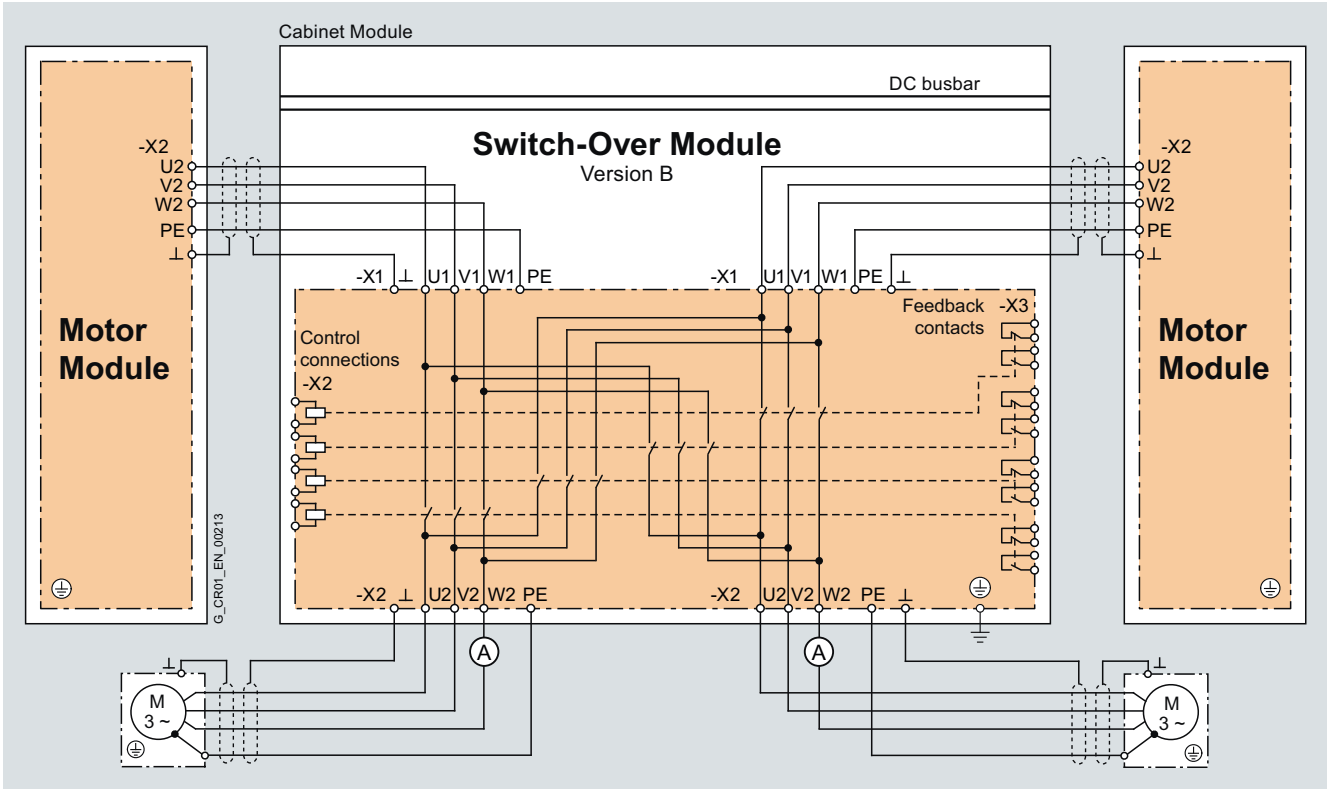
The motors and Motor Modules are connected to the Switch-Over Module in accordance with the grouping.

Version A



Connection example of a Switch-Over Module, version A

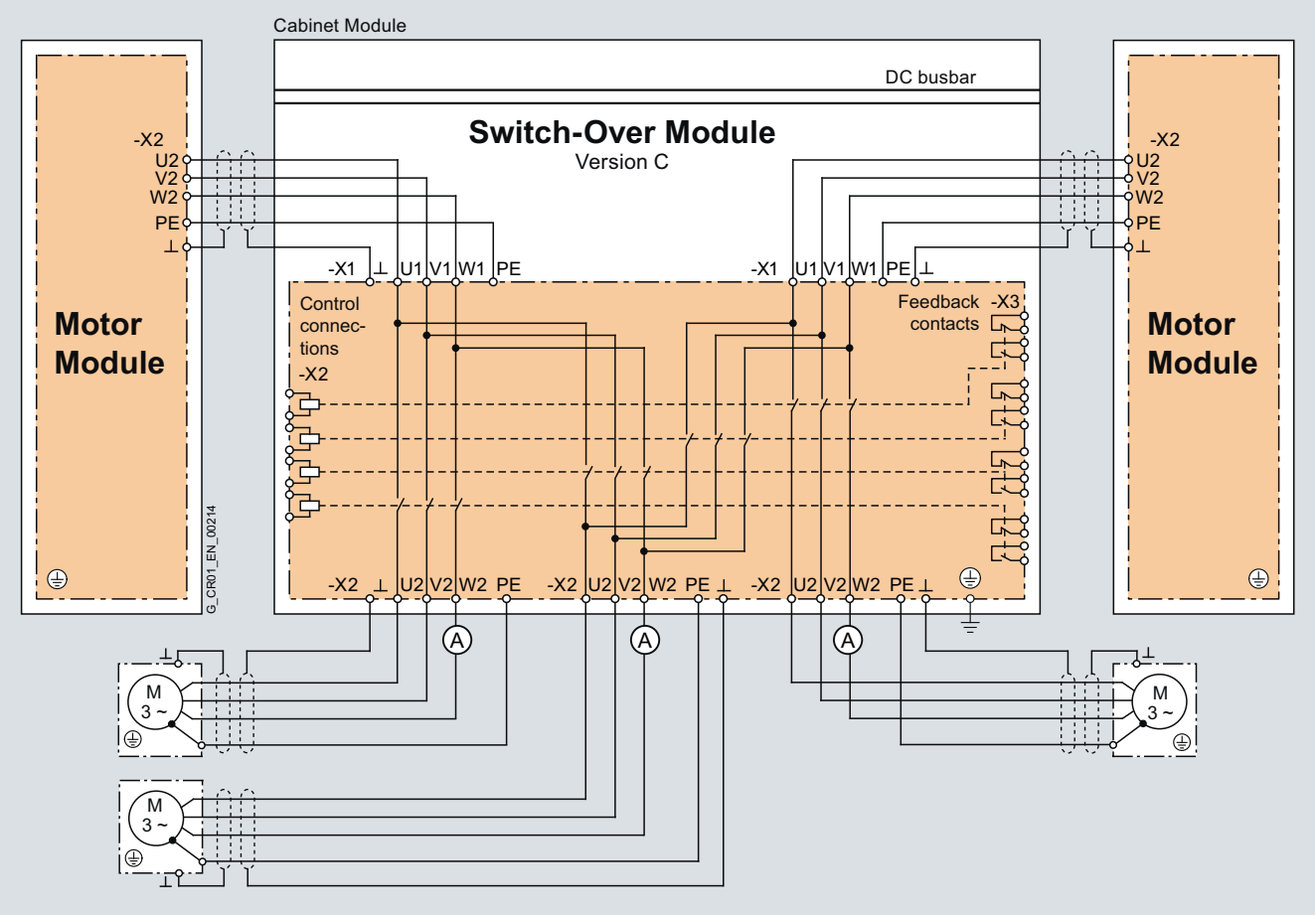
Version B



Connection example of a Switch-Over Module, version B

Integration (continued)

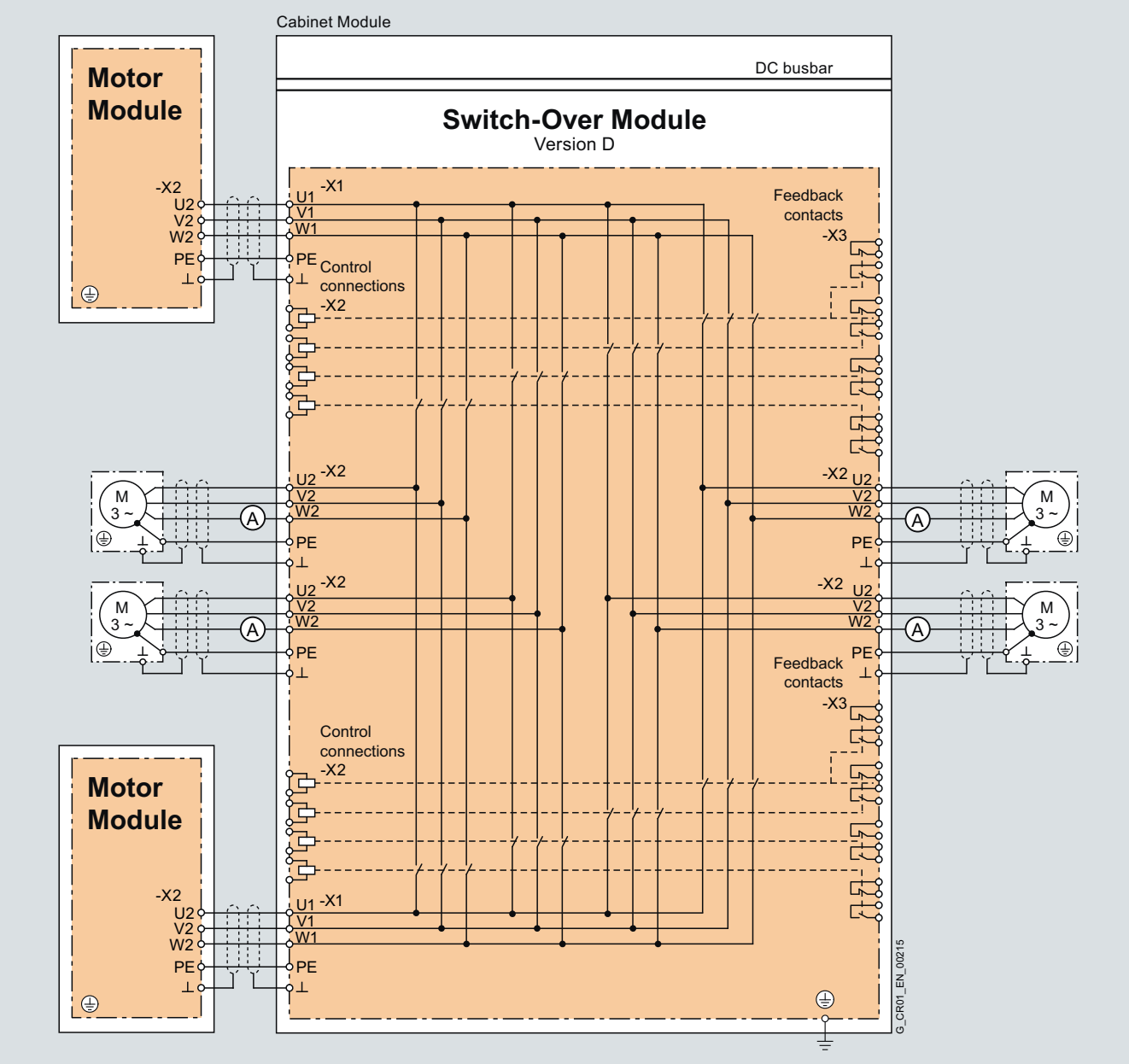
Version C



Connection example of a Switch-Over Module, version C

Integration (continued)

Version D



Connection example of a Switch-Over Module, version D

Technical data

Line voltage 380 … 480 V 3 AC		Switch-Over Module Type			
		6SL3700-2FE36-1AA3-Z B70	6SL3700-2FE36-1BA3-Z B70	6SL3700-2FE36-1CA3-Z B70	6SL3700-2FE36-1DA3-Z B70
Version		**A**	**B**	**C**	**D**
Number of contactors		2	4	4	8
Rated current	A	605	605	605	605
Power loss	kW	< 1	< 1	< 1	< 1
Cooling air requirement		Convection	Convection	Convection	Convection
Sound pressure level	dB (A)	–	–	–	–
Line supply/load connection		6 × M12	6 × M12	6 × M12	6 × M12
PE connection		PE bar 600 8 × M12	PE bar 600 8 × M12	PE bar 600 8 × M12	PE bar 600 8 × M12
Cable length, max					
• Shielded	m	300	300	300	300
• Unshielded	m	450	450	450	450
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	600	600	600	600
• Height	mm	2200	2200	2200	2200
• Depth	mm	600	600	600	600
Weight, approx.	kg	320	360	380	430
Matching Motor Modules		**6SL3720-1TE35-0AA3** **6SL3720-1TE36-1AA3**	**6SL3720-1TE35-0AA3** **6SL3720-1TE36-1AA3**	**6SL3720-1TE35-0AA3** **6SL3720-1TE36-1AA3**	**6SL3720-1TE35-0AA3** **6SL3720-1TE36-1AA3**

Line voltage 380 … 480 V 3 AC		Switch-Over Module Type		
		6SL3700-2FE39-9AA3-Z B70	6SL3700-2FE39-9BA3-Z B70	6SL3700-2FE39-9CA3-Z B70
Version		**A**	**B**	**C**
Number of contactors		4	8	8
Rated current	A	985	985	985
Power loss	kW	< 1	< 2	< 2
Cooling air requirement		Convection	Convection	Convection
Sound pressure level	dB (A)	–	–	–
Line supply/load connection		10 × M12	10 × M12	10 × M12
PE connection		PE bar 600 8 × M12	PE bar 800 10 × M12	PE bar 800 10 × M12
Cable length, max				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	600	800	800
• Height	mm	2200	2200	2200
• Depth	mm	600	600	600
Weight, approx.	kg	400	600	650
Matching Motor Modules		**6SL3720-1TE37-5AA3** **6SL3720-1TE38-4AA3** **6SL3720-1TE41-0AA3**	**6SL3720-1TE37-5AA3** **6SL3720-1TE38-4AA3** **6SL3720-1TE41-0AA3**	**6SL3720-1TE37-5AA3** **6SL3720-1TE38-4AA3** **6SL3720-1TE41-0AA3**

Technical data (continued)

Line voltage 380 … 480 V 3 AC		Switch-Over Module Type		
		6SL3700-2FE41-3AA3-Z B70	6SL3700-2FE41-3BA3-Z B70	6SL3700-2FE41-3CA3-Z B70
Version		**A**	**B**	**C**
Number of contactors		6	8	8
Rated current	A	1260	1260	1260
Power loss	kW	< 1.5	< 2	< 2
Cooling air requirement		Convection	Convection	Convection
Sound pressure level	dB (A)	–	–	–
Line supply/load connection		14 × M12	14 × M12	14 × M12
PE connection		PE bar 800 10 × M12	PE bar 800 10 × M12	PE bar 800 10 × M12
Cable length, max				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	800	800	800
• Height	mm	2200	2200	2200
• Depth	mm	600	600	600
Weight, approx.	kg	550	650	750
Matching Motor Modules		**6SL3720-1TE41-2AA3**	**6SL3720-1TE41-2AA3**	**6SL3720-1TE41-2AA3**

Line voltage 380 … 480 V 3 AC		Switch-Over Module Type		
		6SL3700-2FE41-4AA3-Z B70	6SL3700-2FE41-4BA3-Z B70	6SL3700-2FE41-4CA3-Z B70
Version		**A**	**B**	**C**
Number of contactors		6	12	12
Rated current	A	1405	1405	1405
Power loss	kW	< 1.5	< 2.5	< 2.5
Cooling air requirement		Convection	Convection	Convection
Sound pressure level	dB (A)	–	–	–
Line supply/load connection		14 × M12	14 × M12	14 × M12
PE connection		PE bar 800 10 × M12	PE bar 1200 10 × M12	PE bar 1200 10 × M12
Cable length, max				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	800	1200	1200
• Height	mm	2200	2200	2200
• Depth	mm	600	600	600
Weight, approx.	kg	550	800	850
Matching Motor Modules		**6SL3720-1TE41-4AA3**	**6SL3720-1TE41-4AA3**	**6SL3720-4TE41-2AA3**

Selection and ordering data

Version	**Switch-Over Module** Order No. with order code **B70** for Cranes sector version. Further special versions with order codes under "Options".	Connectable Motor Modules Type	Type rating kW
A	**6SL3700-2FE36-1AA3-Z B70**	6SL3720-1TE35-0AA3	250
		6SL3720-1TE36-1AA3	315
	6SL3700-2FE39-9AA3-Z B70	6SL3720-1TE37-5AA3	400
		6SL3720-1TE38-4AA3	450
		6SL3720-1TE41-0AA3	560
	6SL3700-2FE41-3AA3-Z B70	6SL3720-1TE41-2AA3	710
	6SL3700-2FE41-4AA3-Z B70	6SL3720-1TE41-4AA3	800
B	**6SL3700-2FE36-1BA3-Z B70**	6SL3720-1TE35-0AA3	250
		6SL3720-1TE36-1AA3	315
	6SL3700-2FE39-9BA3-Z B70	6SL3720-1TE37-5AA3	400
		6SL3720-1TE38-4AA3	450
		6SL3720-1TE41-0AA3	560
	6SL3700-2FE41-3BA3-Z B70	6SL3720-1TE41-2AA3	710
	6SL3700-2FE41-4BA3-Z B70	6SL3720-1TE41-4AA3	800
C	**6SL3700-2FE36-1CA3-Z B70**	6SL3720-1TE35-0AA3	250
		6SL3720-1TE36-1AA3	315
	6SL3700-2FE39-9CA3-Z B70	6SL3720-1TE37-5AA3	400
		6SL3720-1TE38-4AA3	450
		6SL3720-1TE41-0AA3	560
	6SL3700-2FE41-3CA3-Z B70	6SL3720-1TE41-2AA3	710
	6SL3700-2FE41-4CA3-Z B70	6SL3720-1TE41-4AA3	800
D	**6SL3700-2FE36-1DA3-Z B70**	6SL3720-1TE35-0AA3	250
		6SL3720-1TE36-1AA3	315

Options

The table below lists the options available for Motor Modules (for details, see description of options from Page 6/59):

Brief description of options	Order No. suffix **-Z** with order code
Cranes sector version	**B70**
Measuring instruments in control cabinet door	**B80**
Cabinet standstill heating	**L55**
Base 100 mm high, RAL 7022	**M06**
Cable compartment 200 mm high, RAL 7035	**M07**
Degree of protection IP21	**M21**
IP23 degree of protection (includes additional touch protection)	**M23**
Side panel (right)	**M26**
Side panel (left)	**M27**
EMC shield bus	**M70**
DC busbar system (I_d = 1170 A, 1 × 60 × 10 mm)	**M80**
DC busbar system (I_d = 1500 A, 1 × 80 × 10 mm)	**M81**
DC busbar system (I_d = 1840 A, 1 × 100 × 10 mm)	**M82**
DC busbar system (I_d = 2150 A, 2 × 60 × 10 mm)	**M83**
DC busbar system (I_d = 2730 A, 2 × 80 × 10 mm)	**M84**
DC busbar system (I_d = 3320 A, 2 × 100 × 10 mm)	**M85**
DC busbar system (I_d = 3720 A, 3 × 80 × 10 mm)	**M86**
DC busbar system (I_d = 4480 A, 3 × 100 × 10 mm)	**M87**
Crane transport assembly (top-mounted)	**M90**
Special paint finish for cabinet	**Y09**
Assembly into transport units at factory	**Y11**
One-line label for plant identification, 40 × 80 mm	**Y31**
Two-line label for plant identification, 40 × 180 mm	**Y32**
Four-line label for plant identification, 40 × 180 mm	**Y33**
Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format	**D02**

Certain options may be mutually exclusive.

Inadmissible option combinations:

- **M21** (IP21 degree of protection) and **M23** (IP23 degree of protection)
- **Y31**, **Y32**, **Y33** (1, 2 or 4-line label for plant identification)

DC busbar system mechanical options (busbars between individual Cabinet Modules)

	M80	M81	M82	M83	M84	M85	M86	M87
M80		–	–	✓	–	–	–	–
M81	–		–	–	✓	–	✓	–
M82	–	–		–	–	✓	–	✓
M83	✓	–	–		–	–	–	–
M84	–	✓	–	–		–	✓	–
M85	–	–	✓	–	–		–	✓
M86	–	✓	–	–	✓	–		–
M87	–	–	✓	–	–	✓	–	

✓ Combination possible

– Combination not possible

Options (continued)

B70
Cranes sector version

The modules are designed for increased mechanical stress. Operation is permitted for the following vibratory load:

- Excursion: ±1 mm at 2.0 to 13.2 Hz
- Acceleration: 0.7 g at 13.2 to 100 Hz

The core colors of the wiring are in accordance with DIN EN 60204-32 except in the case of built-in modules in chassis format. The auxiliary voltage terminals are marked and implemented as follows:

- X1: 230 > V AC, spring-loaded terminal
- X2: 230 V AC, spring-loaded terminal
- X3: 24 V DC, spring-loaded terminal
- X21: LCM, spring-loaded terminal
- X10: Pre-charging, screw-type terminal

The scope of supply includes documentation for the control cabinets for the ordered configuration of a crane.

The equipment designations and core end designations are in accordance with EN 61346-2. All auxiliary voltages are routed to terminals and must be externally fed.

B80
Measuring instruments in control cabinet door

Measuring instruments for measuring the output currents and voltages of the Motor Modules are installed in the cabinet door of the Switch-Over Modules and Motor Multi Connection Modules. The number of measuring instruments is dependent on the function version of the Switch-Over Module and Motor Multi Connection Module.

B81
Measuring instrument for measuring line voltage and line current

The Line Connection Module is equipped with an additional measuring instrument for measuring and indicating the line voltage and line current (SIMEAS 7KG7500-0AA01-0AA0).

B82
Circuit breaker for auxiliary power supply

With this option, the LCM is equipped with an additional fuse switch disconnector for a maximum of 500 A which allows a transformer (max. 350 kVA) to be used to supply the auxiliary drives, control circuits and special current circuits.

B83
Surge arrester

The Line Connection Modules are equipped with a 600 V surge arrester.

B91
2nd Active Line Module on left

With this ordering option, additional DC busbars are supplied for connecting the 2nd Active Line Module to the left of the Line Connection Module.

B92
2nd Active Line Module on right

With this ordering option, additional DC busbars are supplied for connecting the 2nd Active Line Module to the right of the Line Connection Module.

D02
Customer documentation in DXF format

Option **D02** can be used to order documents such as circuit diagrams, terminal diagrams, the layout diagram, and the dimension drawing in DXF format, e.g. for further processing in AutoCAD systems.

K46
SMC10 Sensor Module Cabinet-Mounted for resolvers

The SMC10 Sensor Module can be used to simultaneously record the speed and the rotor position angle. The signals received from the resolver are converted here and made available to the closed-loop controller via the DRIVE-CLiQ interface for evaluation purposes.

The following encoders are supported by the SMC10:

- 2-pole resolver
- Multipole resolver

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

K48
SMC20 Sensor Module Cabinet-Mounted for sin/cos incremental encoder or EnDat absolute encoder

The SMC20 Sensor Module can be used to simultaneously record the speed and position. The signals emitted by the incremental encoder are converted here and made available to the closed-loop controller via the DRIVE-CLiQ interface for evaluation purposes.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1Vpp
- EnDat absolute encoder
- SSI encoder

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

K50
SMC30 Sensor Module Cabinet-Mounted for the acquisition of the actual motor speed

The SMC30 Sensor Module can be used to sense speed. The signals emitted by the rotary pulse encoder are converted here and made available to the closed-loop control via the DRIVE-CLiQ interface for evaluation purposes.

The following encoder signals can be evaluated:

- TTL encoder
- HTL encoder
- SSI encoder

The motor temperature can also be detected using a temperature sensor (KTY84-130 or PTC).

K82
Terminal module for controlling the "Safe Torque Off" and "Safe Stop 1" safety functions

The terminal module is used to control the "Basic Safety Functions" over a wide voltage range from 24 V to 240 V DC/AC. This means that the "STO" and "SS1" safety functions can be flexibly controlled from the signal voltages in the plant.

The integrated safety functions, starting from the Safety Integrated (SI) input terminals of the components (Control Unit and Motor Module), satisfy the requirements of Machinery Directive 98/37/EC, EN 60204-1, and DIN EN ISO 13849-1 Category 3 (formerly EN 954-1), as well as Performance Level (PL) d and IEC 61508 SIL 2.

These Safety Integrated functions of the SINAMICS S120 are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.

Options (continued)

***K82** (continued)*
With option **K82**, the requirements specified in Machinery Directive 98/37/EC, EN 60204-1, DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) as well as Performance Level (PL) d and IEC 61508 SIL 2 are fulfilled. The Safety Integrated functions using option **K82** are only available in conjunction with certified components and software versions.

The following Safety Integrated functions are controlled using option **K82**:

- Safe Torque Off (STO)
- Safe Stop 1 (SS1) (time-controlled)

With the Motor Modules in chassis format, option **K82** cannot be ordered together with Option **L55** (cabinet with standstill heating).

L08
Motor reactor

Motor reactors reduce the voltage stress on the motor windings by reducing the voltage gradients at the motor terminals that occur when motors are fed from drive converters. At the same time, the capacitive charge/discharge currents that occur at the converter output when long motor cables are used are reduced.

Suitably dimensioned motor reactors or series connections of motor reactors therefore offer a solution which allows a higher capacitance and thus also longer motor cables to be connected. It is generally recommended that motor reactors are used in the case of multi-motor drives.

With option **L08** for Motor Modules, a motor reactor is integrated, fully wired, into the Motor Module up to cabinet size GX (outputs of less than 315 kW). Due to space constraints, a separate cabinet must be planned for the output range 315 kW to 450 kW (cabinet size HX; see Motor Double Choke Module).

L25
Circuit breaker in a withdrawable unit design

Line Connection Modules with an input current of > 800 A are equipped with fixed-mounted circuit breakers as standard. Where the customer requires a visible isolating distance, a withdrawable circuit breaker can be ordered as an option.

L37
DC interface incl. pre-charging input circuit of the relevant DC link capacitance

If, for reasons relating to the process or availability, the Motor Module needs to be disconnected from or connected to the common DC link for an entire drive line-up during operation, a manually operated isolating distance can be ordered as an option. With chassis format power units, this takes the form of switch disconnectors, and with Booksize Cabinet Kits, of a contactor combination.

Option **L37** is installed on the busbar between the Motor Module and the main DC busbar. This option also includes a pre-charging switch for the DC link capacitors of the relevant Motor Module so that it can be switched in to the pre-charged DC link.

The switching operation is performed externally. The operating levers can be locked using a padlock (padlock not included in scope of delivery). The degree of protection of the cabinets is not affected.

L42
Line Connection Module for Active Line Modules

Order code **L42** is specified in the order to indicate that the Line Connection Module will be connected to an Active Line Module. The Line Connection Module is then adapted accordingly (pre-charging input circuit, connection busbars, etc.). Also refer to the assignment table in the "Line Connection Modules".

L45
EMERGENCY OFF pushbutton installed in the cabinet door

The EMERGENCY OFF pushbutton with protective collar is installed in the cabinet door of the Line Connection Module and its contacts are connected to a terminal block. From here, the EMERGENCY STOP button can be integrated in the plant-side EMERGENCY STOP chain.

L55
Cabinet standstill heating

The standstill heating is recommended for low ambient temperatures and high levels of humidity to prevent condensation. Depending on the cabinet width, a 100 W cabinet heater is installed for each Cabinet Module.

One heating element up to a cabinet width of 600 mm, two heating elements as of a cabinet width of 800 mm.

The power supply for the standstill heating (110 V to 230 V AC, at terminal block -X240) must be provided externally and fused with max. 16 A.

Within the transport units, the heaters are internally connected and must only be fed once.

Option **L55** cannot be ordered together with option **K82** (terminal module for the control of safety functions).

L87
Insulation monitoring

An insulation monitor must be used if the converter is operated on an isolated-neutral system. The device monitors the entire galvanically coupled circuit for insulation faults. An alarm is output by the insulation monitor in the event of a fault.

Notice:
Only one insulation monitor can be used in a galvanically connected network.

As there are different response strategies when a ground fault occurs in an isolated supply system, output relays of the insulation monitor are provided for integration in a line-side control. It is also possible to integrate the outputs into the monitoring of the Cabinet Modules on the line side.

Terminal A1-A101:	Meaning
11	Signaling relay ALARM 1
12	Signaling relay ALARM 1
14	Signaling relay ALARM 1
21	Signaling relay ALARM 2
22	Signaling relay ALARM 2
24	Signaling relay ALARM 2
M+	External kΩ display (0 ... 400 µA)
M-	External kΩ display (0 ... 400 µA)
R1	External reset key (NC contact or wire jumper, otherwise the fault code is not stored)
R2	External reset key (NC contact or wire jumper)
T1	External test button
T2	External test button

Options (continued)

M06
Base 100 mm high, RAL 7022

The additional cabinet base allows larger bending radii for cables (cable inlet from below) and enables them to be routed within the cabinet base.

The cabinet base is supplied in RAL 7022 in all cases. A special paint finish is not available for the base. It is delivered completely assembled with the cabinet.

M07
Cable compartment 200 mm high, RAL 7035

The cable compartment is made of strong sheet steel and allows cables to be connected more flexibly (entry from below). It also allows routing of cables within the compartment. It is delivered completely assembled with the cabinet.

Notice:
The cable compartment is colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the cable compartment is also painted in this color.

M21
Degree of protection IP21

Cabinet version in IP20, but with additional roof or canopy. This increases the cabinet height by 250 mm.

For transport reasons, the roofs or canopies are delivered separately and must be fitted on site.

Notice:
The roof or canopies are painted in RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the roofs or canopies will also be painted this color.

M23
IP23 degree of protection

Cabinet Modules with IP23 degree of protection are supplied with additional hoods, plastic ventilation grilles, and a filter medium in the air inlet and outlet. The cabinet height is increased by 400 mm. The filter medium must be maintained according to the local environmental conditions.

For transport reasons, the hoods are delivered separately and must be fitted on site.

Notice:
The hoods are colored RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the hoods are also painted in this color. The molded plastic parts (e.g. ventilation grilles) are colored RAL 7035 and cannot be painted.

M26
Side panel mounted (right)

For side-by-side installation of Cabinet Modules from left to right, cabinets can be ordered ready-prepared at the factory for assembly on-site. If option **M26** is ordered, the Cabinet Module is shipped with a side panel fitted on the right.

This side panel is essential for ensuring compliance with IP20 and higher degrees of protection.

M27
Side panel mounted (left)

For side-by-side installation of Cabinet Modules from right to left, cabinets can be ordered ready-prepared at the factory for assembly on-site. If option **M27** is ordered, the Cabinet Module is shipped with a side panel fitted on the left.

This side panel is essential for ensuring compliance with IP20 and higher degrees of protection.

M70
EMC shield bus

The EMC shield bus is used for the connection of line and motor shielded supply cables. The supplied EMC shield clamps provide a large surface area for the connection.

M80 to M87
DC busbar system

The correct DC busbar for the Cabinet Module must be ordered. This is fitted in the upper section of the Cabinet Modules and connects the Line Modules to the Motor Modules.

The busbar is dimensioned according to the load requirements and demand factor associated with operation of the individual drives, and according to the specific Cabinet Module layout. For these reasons, the DC busbar is not supplied as standard, but must be ordered as an option.

When selecting busbars, it is important to ensure that the systems of adjacent Cabinet Modules are compatible with one another (refer to the table below and option selection matrix for the Cabinet Modules in question).

Where Cabinet Modules are ordered as a factory-assembled transport unit with option **Y11**, all busbars in the transport unit must be identical.

Order code	DC busbar system, rated current I_N	Number	Dimensions	Compatible with
	A		mm	
M80	1170	1	60 × 10	**M83**
M81	1500	1	80 × 10	**M84** and **M86**
M82	1840	1	100 × 10	**M85** and **M87**
M83	2150	2	60 × 10	**M80**
M84	2730	2	80 × 10	**M81** and **M86**
M85	3320	2	100 × 10	**M82** and **M87**
M86	3720	3	80 × 10	**M81** and **M84**
M87	4480	3	100 × 10	**M82** and **M85**

The DC busbars are nickel-plated as standard and are available in different designs for a variety of current-carrying capacities. The scope of delivery also includes the jumpers required to link the busbar systems of individual Cabinet Modules.

Options (continued)

M90
Crane transport assembly (top-mounted)

A top-mounted crane transport assembly can be ordered as an option for Cabinet Modules. Depending on the width of the module, it consists of either transport eyebolts (width ≤ 800 mm) or transport rails (width ≥ 800 mm).

When Cabinet Modules are ordered as factory-assembled transport units (order code **Y11**), they are shipped with transport rails, i.e. option **M90** is automatically included in the scope of delivery of option **Y11** and does not need to be ordered separately.

Y09
Special paint finish for cabinet

As standard, the Cabinet Modules are delivered in RAL 7035. The special paint finish must be specified in plain text when ordering. All RAL colors which are available as powdered coatings can be selected.

Notice:
If options such as roofs or canopies (option **M21**) or hoods (option **M23**) are desired for the Cabinet Modules, these are also painted in the ordered cabinet color. The molded plastic parts (e.g. ventilation grilles) are colored RAL 7035 and cannot be painted.

Y11
Assembly into transport units at factory

Cabinet Modules can be ordered as factory-assembled transport units with a maximum width of 2400 mm. In this case, the relevant modules are shipped as interconnected units (both electrically and mechanically).

When DC busbars (options **M80** to **M87**) are selected for these "units", it must be ensured that identical busbars are installed within the transport unit and are compatible with all adjacent Cabinet Modules.

In a transport unit order, all the Cabinet Modules included in the unit and their installation sequence from left to right must be specified in plain text according to the syntax below:

Plain text required to order:	TE	1	-	1 ... 6
• Transport unit				
• Serial number of the transport unit				
• Position of Cabinet Module within transport unit from left to right				

Option **Y11** is particularly recommended for units comprising Line Connection Modules and Line Modules because the required pre-charging input circuits and connection busbars, for example, can be incorporated in the transport unit for certain versions. Please refer to the assignment tables in "Line Connection Modules".

The transport unit is shipped with a crane transport rail, which means that option **M90** is not required.

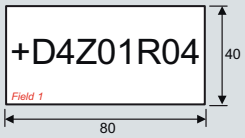
Y31
One-line label for plant identification, 40 × 80 mm

Labels made of Formica (white with black engraving) are offered for the identification of the Cabinet Modules. The labels are stuck onto the cabinet door.

Dimensions H × W: 40 × 80 mm

The text must be specified in plain text when ordering.

Field 1: Max. 9 characters, font size 10 mm.



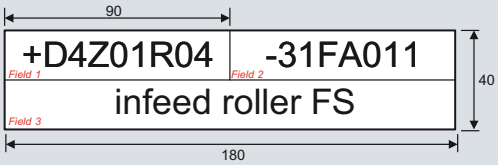
Y32
Two-line label for plant identification, 40 x 180 mm

Labels made of Formica (white with black engraving) are offered for the identification of the Cabinet Modules. The labels are stuck onto the cabinet door.

Dimensions H × W: 40 × 180 mm

The text must be specified in plain text when ordering.

Field 1: Max. 9 characters, font size 10 mm
Field 2: Max. 9 characters, font size 10 mm
Field 3: Max. 20 characters, font size 10 mm.



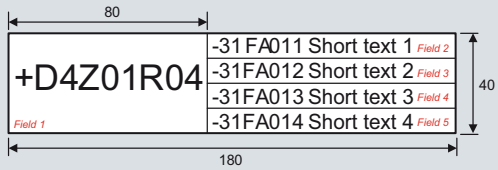
Y33
Four-line label for plant identification, 40 x 180 mm

Labels made of Formica (white with black engraving) are offered for the identification of the Cabinet Modules. The labels are stuck onto the cabinet door.

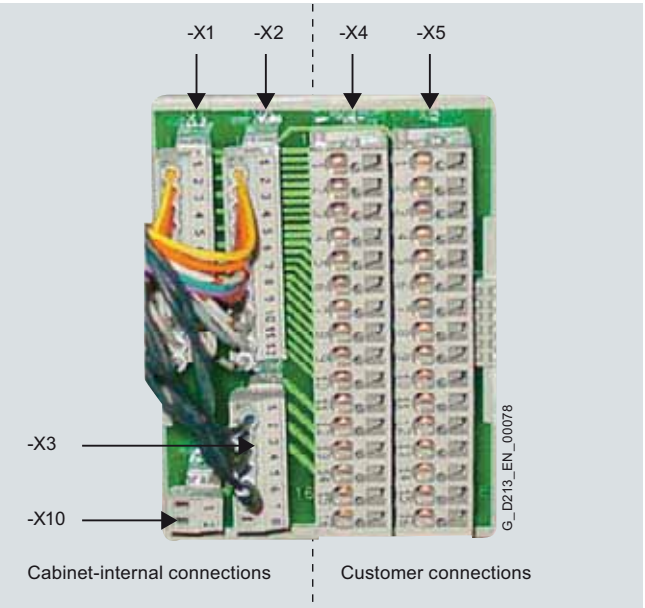
Dimensions H × W: 40 × 180 mm

The text must be specified in plain text when ordering.

Field 1: Max. 9 characters, font size 10 mm
Field 2: Max. 20 characters, font size 6 mm
Field 3: Max. 20 characters, font size 6 mm
Field 4: Max. 20 characters, font size 6 mm
Field 5: Max. 20 characters, font size 6 mm.



Overview



Customer terminal block -X55 represents the interface to the I/O devices and marshals a range of cabinet-internal signals to a central terminal block module mounted in the lower part of the cabinet.

This terminal block module is an interface that has been specially designed for plant construction. It is integrated as standard in the Motor Modules in chassis format and, in combination with a CU320 Control Unit, in the Cabinet-Active Line Modules.

Design

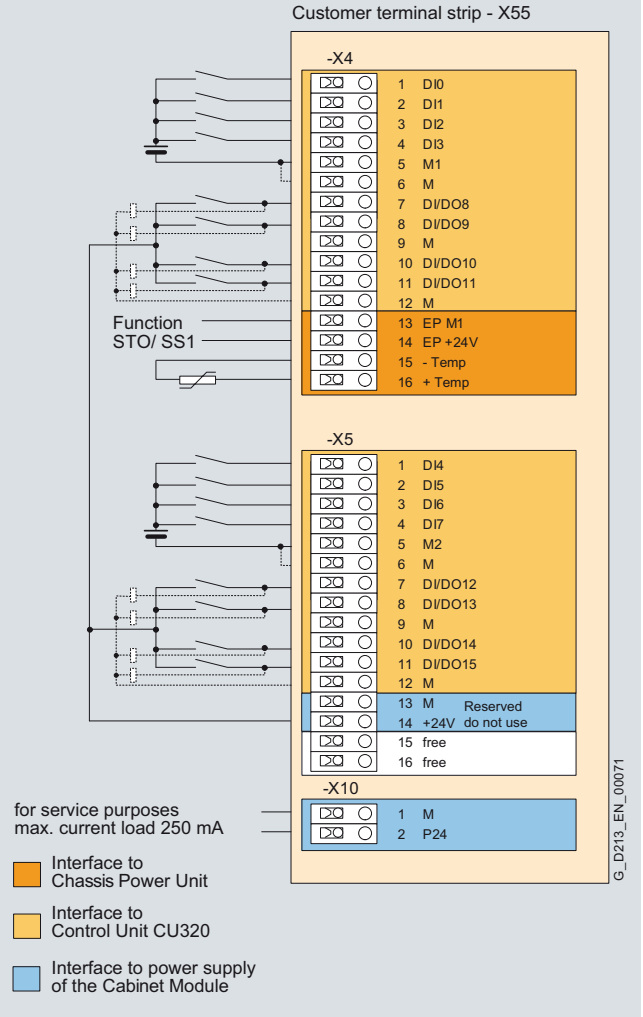
Terminals -X4 and -X5 are provided for the connection of customer signal lines. A cable cross-section of 0.14 to 2.5 mm² can be connected, meaning that both solid and stranded cables can be used.

Terminals -X1 to -X3 are assigned internally in the cabinet depending on the cabinet version (with/without option **K90** or **K91**).

Customer terminal block –X55 comprises:	**Motor Modules**		**Line Modules**	
	With CU320 (**K90**/**K91**)	Without CU320	With CU320 (**K90**/**K91**)	Without CU320
8 digital inputs	✓	–	✓	–
8 bidirectional inputs/outputs (DI/DO)	✓	–	✓	–
Temperature sensor connection (KTY84/PTC)	✓	✓	–	–
Auxiliary voltage output +24 V	✓	✓	✓	✓ [1]
Safety function ("Safe Torque Off/ Safe Stop1")	✓	✓	–	–

Terminal -X10 provides a 24 V power supply for service purposes and has a connector. The maximum current rating is 250 mA. Cable cross-sections of 0.14 up to 1.5 mm² can be connected.

Terminal assignment



Terminal assignment of customer terminal block -X55

[1] Not for Line Modules.

Design (continued)

Terminal block at **-X55**:		Factory pre-assignment	Comment
-X4			
1	DI0	Free	Digital inputs of the CU320 Control Unit voltage -3 V to +30 V Current consumption at 24 V DC, approx. 10 mA
2	DI1	Free	
3	DI2	Free	
4	DI3	Free	
5	M1		
6	M		
7	DI/DO8	Free	Bidirectional digital inputs/outputs (not floating) Max. load current per digital output: 100 mA
8	DI/DO9	Free	
9	M		
10	DI/DO10	Free	Bidirectional digital inputs/outputs (not floating) Max. load current per digital output: 100 mA
11	DI/DO11	Free	
12	M		
13	EP M1	Free	Connection to power unit, "Safe Torque Off" and "Safe Stop 1" functions
14	EP +24 V	Free	
15	-Temp	Free	Connection to power unit, Connection of a KTY84-1C130/PTC temperature sensor
16	+Temp	Free	
-X5			
1	DI4	Free	Digital inputs of the CU320 Control Unit voltage -3 V to +30 V Current consumption at 24 V DC, approx. 10 mA
2	DI5	Free	
3	DI6	Free	
4	DI7	Free	
5	M2		
6	M		
7	DI/DO12	Free	Bidirectional digital inputs/outputs (not floating) Max. load current per digital output: 100 mA
8	DI/DO13	Free	
9	M		
10	DI/DO14	Free	Bidirectional digital inputs/outputs (not floating) Max. load current per digital output: 100 mA
11	DI/DO15	Free	
12	M		
13	M		Reserved
14	+24 V		
15		Free	
16		Free	
-X10			
1	M		24 V power supply from the CU320, for servicing purposes only, max. load rating of 250 mA
2	P24		

DI: Digital input
DI/DO: Bidirectional digital input/output
M: Electronic ground
M1/M2: Ground reference
Temp: Motor temperature sensor

Overview

The SIMOTRAS HD AC power controller is used for the open and closed-loop control of three-phase hoisting gear motors with slip-ring rotors. The devices are ideally suited to crane modernization applications, because the existing components such as motors, resistors, cables, etc. can usually be reused. They can be used for single motor drives and for multi-motor drives. For high ambient temperatures up to 65 °C, devices are available in special versions.

Design

Technical features

SIMOTRAS HD is a fully controlled, three-phase, digital thyristor AC power controller in a compact design.

Electronic switchover of the rotating field makes stator contactors superfluous.

SIMOTRAS HD combines two principles of speed control for slip-ring motors:

- Changing the motor voltage with the help of the stator phase angle control whereby the infeed frequency of the motor is not changed (it is constantly identical to the respective line frequency)
- Tilting the motor characteristic by means of variable rotor resistors

The stator phase angle control is characterized by stepless and load-independent closed-loop control in four-quadrant mode. The control range is parameterizable and is approximately 60 % of the rated speed for hoists and up to 100 % for gantries. Mechanical wear is reduced by speed-dependent switching of the rotor contactors. Braking and reversing of the drive is always performed via the control range. Switching in the zero position causes electrical braking; mechanical braking only occurs at 5 % of rated speed.

The device has various monitoring functions, e.g.:

- Phase failure
- Setpoint – actual value
- Device overtemperature

Function

- The incoming signals from the master switch, such as setpoint and control enable, are loaded.
- The series-connected ramp-function generator with adjustable ramps forms the speed setpoint.
- The speed controller with the subordinate current control circuit is connected down-circuit of the ramp-function generator and forms the actual control loop.
- A start pulse is also generated so that the machine is activated in the hoisting direction of rotation immediately after switch-on. This prevents the load from dropping on starting.
- For switching through the rotor stages, a control mechanism is installed that selects the planned stages speed-dependently and activates reversing.
- The integral zero-speed monitoring supports guided, electrical braking of the drive. For replacing the cable, e.g. in hoists, jog mode with creep speed is provided.
- The operating states are indicated in the device on a 5-digit, 7-segment display as well as the LEDs of the PMU operator panel or on the optional OP1S operator panel.

Operating modes

The threshold for switchover between closed-loop and open-loop controlled operation can be defined in accordance with the control characteristic and set on the parameters of the device.

Parallel connection

- To increase the performance, up to 6 devices can be connected in parallel. The terminal expansion option (CUD2) is required in this case for every device and (n-1) patch cable. For current splitting, identical, separate parallel switching reactors are required for each SIMOTRAS device. The difference in reactor tolerances determines the current splitting. For operation without derating (current reduction), a tolerance of 5 % or more is recommended. Only devices with the same current ratings are permitted to be connected in parallel.

Integration

The SIMOTRAS HD device comprises:

- the power unit
- basic electronics
- add-on modules

Power unit

The power unit is a thyristor AC power controller in a compact design. Two additional thyristor modules in the lateral branch of the power unit enable reversing of the rotating field, and therefore 4Q operation of the drive. Current transformers in two phases generate the actual value of current for current control.

Basic electronics

The basic electronics contains the gating unit that activates the thyristors. It generates line-synchronized firing pulses. The control electronics is isolated from the line potential via firing pulse transformers.

All device settings (e.g. controller parameters, limits, etc.) are stored in the device in a non-volatile memory. Adjustment is performed digitally, via the operator panel on the device or via the optional OP1S operator panel. The values are therefore easy to reproduce at any time.

Depending on the load conditions, the converter operates in motor mode (driving direction of rotating field, 1st and 3rd quadrant) or in braking mode with reversing current braking (2nd and 4th quadrant). Through omission of the conventional stator contactors, fast torque reversal is possible and therefore highly dynamic control.

AC power controller

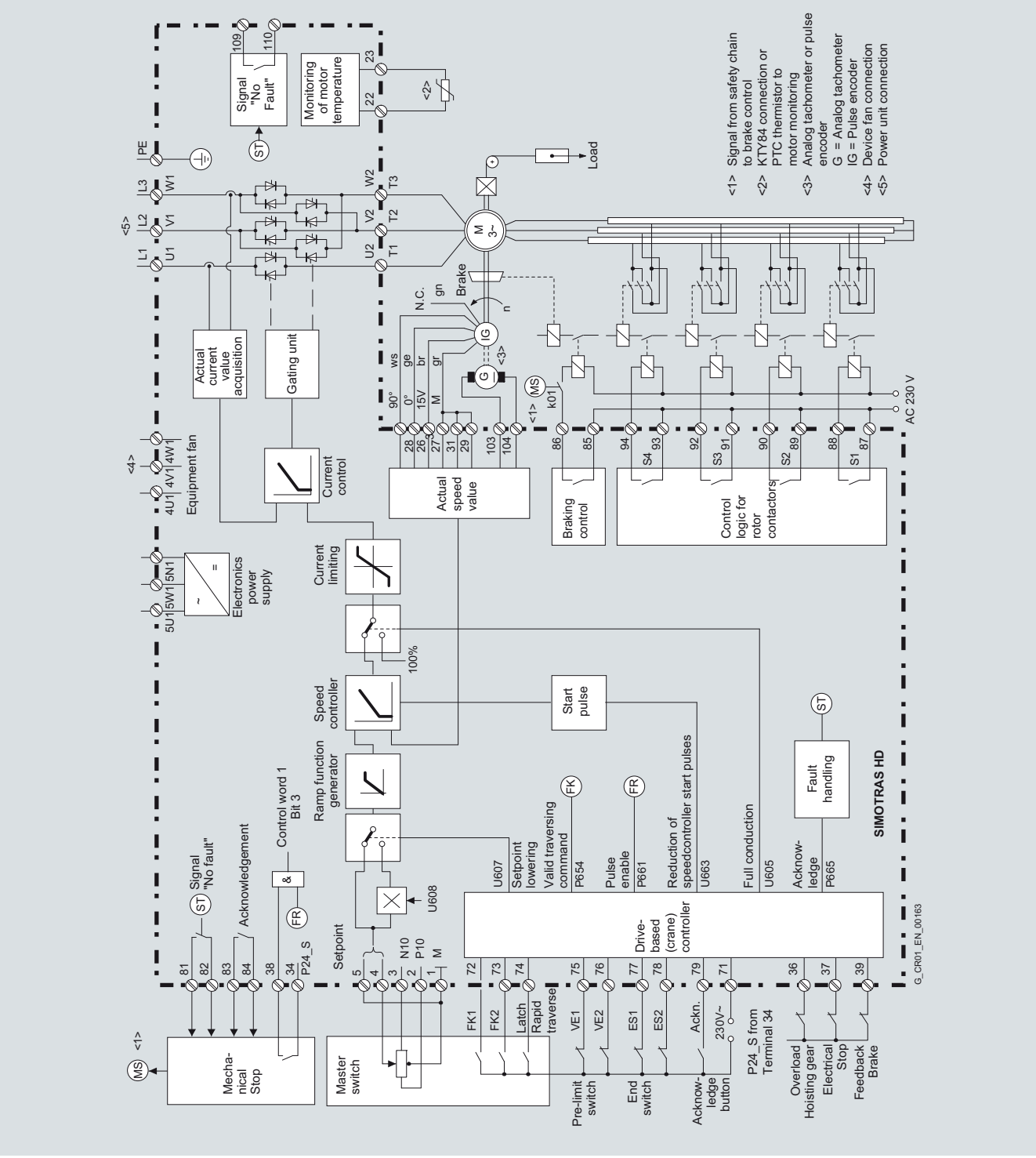
Integration (continued)

Hoist technology

The drive-based (crane) control is integrated into the SIMOTRAS HD device. The SIMOTRAS HD device comprises:

- Power unit
- Electronics box with basic electronics and optional additional modules

The drive-based (crane) control is designed to permit easy switchover between master switches with setpoint potentiometers and 4-stage master switches: The control function can be specified by terminals or over PROFIBUS.



Technical data

AC power controller in the basic version

110 ... 500 V 3 AC, 60 ... 180 A

Order No.		6SG70■■-0EB60-0					
		50	**52**	**55**	**60**	**62**	**65**
Rated line-side voltage power unit	V	110 (-10 %) ... 500 (+10 %) 3 AC					
Rated frequency	Hz	50/60 The devices automatically adjust to the frequency of the applied line voltage in a range from 45 ... 65 Hz					
Rated current	A	60	78	98	112	142	180
Rated line-side voltage electronic power supply	V	380 (–25 %) ... 460 (+15 %) 2 AC I_n = 1 A or 190 (–25 %) ... 230 (+15 %) 1 AC I_n = 2 A (–35 % for 1 min.)					
Phase fuse [1] 3 units	A/V	3NE1820-0 80/690	3NE1021-0 100/690	3NE10220-0 125/690	3NE1024-0 160/690	3NE1224-0 160/690	3NE1225-0 200/690
Rated line-side voltage fan	V	–		DC 24 internal			
Rated current for fan	A	–					
Overload possibility [2]		20 s duration: I = 2 x I_{rated} then 70 s duration: I = I_{rated} then 60 s duration: I = 0 A (cycle duration 150 s)					
Power loss for rated current, approx.	W	272	306	386	439	500	630
Minimum load	A	3	6			7	
Ambient temperature during operation at rated current	°C	0 ... 45 Self-ventilated		0 ... 40 Forced ventilation			
Upper limit temperature with current derating	°C	55		50			
Cooling air requirement	m^3/h	–		100			
Sound pressure level L_{pA} (1 m)	dB	–		40			
Storage and transport temperature	°C	–25 ... +70					
Installation altitude above sea level	m	≤ 1000 at rated current max. 3500 with reduced voltage and current					
Environmental class IEC 60721-3-3		3K3					
DIN EN 60529 degree of protection		IP00					
D400 device type		60MRE	78MRE	98MRE	112MRE	142MRE	180MRE
Dimensions		See dimension drawings					
Weight, approx.	kg	16				17	

[1] The device is not supplied with the fuses listed. The fuses listed are recommended fuses that must be ordered separately.

[2] The device can be operated continuously at the rated line-side current I_{rated}. This will cause the thyristors to reach their limit temperature. It is not possible to accelerate, i.e. to increase the current, from this operating state.

Technical data (continued)

AC power controller in the basic version

110 ... 500 V 3 AC, 225 ... 900 A

Order No.		6SG70■■-0EB60-0					
		70	**72**	**76**	**80**	**82**	**85**
Rated line-side voltage power unit	V	110 (-10 %) ... 500 (+10 %) 3 AC					
Rated frequency	Hz	50/60 The devices automatically adjust to the frequency of the applied line voltage in a range from 45 ... 65 Hz					
Rated current	A	225	285	360	525	680	900
Rated line-side voltage electronic power supply	V	380 (–25 %) ... 460 (+15 %) 2 AC I_n = 1 A or 190 (–25 %) ... 230 (+15 %) 1 AC I_n = 2 A (–35 % for 1 min.)					
Phase fuse [1] 3 units	A/V	3NE1227-0 250/690	3NE1331-0 350/690	3NE1332-0 400/690	3NE1435-0 560/690	3NE3340-8 900/690	6RY1702-0BA01 [2] 1250/660
Rated line-side voltage fan	V	400 (± 15 %) 3 AC, 50 Hz 460 (± 10 %) 3 AC, 60 Hz					
Rated current for fan	A	0.24				1.1	
Overload possibility [3]		20 s duration: I = 2 x I_{rated} then 70 s duration: I = I_{rated} then 60 s duration: I = 0 A (cycle duration 150 s)					
Power loss for rated current, approx.	W	839	1020	1300	1827	2890	3550
Minimum load	A	10			15		
Ambient temperature during operation at rated current	°C	0 ... 40 Forced ventilation					
Upper limit temperature with current derating	°C	50					
Cooling air requirement	m^3/h	570				1400	2400
Sound pressure level L_{pA} (1 m)	dB	73				88	
Storage and transport temperature	°C	–25 ... +70					
Installation altitude above sea level	m	≤ 1000 at rated current max. 3500 with reduced voltage and current					
Environmental class IEC 60721-3-3		3K3					
DIN EN 60529 degree of protection		IP00					
D400 device type		225MRE	285MRE	360MRE	525MRE	680MRE	900MRE
Dimensions		See dimension drawings					
Weight, approx.	kg	30			45	85	137

[1] The device is not supplied with the fuses listed. The fuses listed are recommended fuses that must be ordered separately.

[2] Fuses are included in the device. No semiconductor fuses are necessary.

[3] The device can be operated continuously at the rated line-side current I_{rated}. This will cause the thyristors to reach their limit temperature. It is not possible to accelerate, i.e. to increase the current, from this operating state.

Technical data (continued)

AC power controller in the special version

110 ... 500 V 3 AC, 42 ... 125 A, ambient temperature 65 °C (option -Z = **H78**)

Order No.		**6SG70■■-0EB60-0-Z H78**					
		50	**52**	**55**	**60**	**62**	**65**
Rated line-side voltage power unit	V	110 (-10 %) ... 500 (+10 %) 3 AC					
Rated frequency	Hz	50/60 The devices automatically adjust to the frequency of the applied line voltage in a range from 45 ... 65 Hz					
Rated current	A	42	55	70	80	100	125
Rated line-side voltage electronic power supply	V	380 (–25 %) ... 460 (+15 %) 2 AC I_n = 1 A or 190 (–25 %) ... 230 (+15 %) 1 AC I_n = 2 A (–35 % for 1 min.)					
Phase fuse [1] 3 units	A/V	3NE1820-0 80/690	3NE1021-0 100/690	3NE1022-0 125/690	3NE1024-0 160/690	3NE1224-0 160/690	3NE1225-0 200/690
Rated line-side voltage fan	V	–		24 V DC internal			
Rated current for fan	A	–					
Overload possibility [2]		20 s duration: I = 2 x I_{rated} then 70 s duration: I = I_{rated} then 60 s duration: I = 0 A (cycle duration 150 s)					
Power loss for rated current, approx.	W	205	230	288	322	365	445
Minimum load	A	3	6			7	
Ambient temperature during operation at rated current	°C	0 ... 45 Self-ventilated		0 ... 40 Forced ventilation			
Upper limit temperature with current derating	°C	65					
Cooling air requirement	m^3/h	–		100			
Sound pressure level L_{pA} (1 m)	dB	–		40			
Storage and transport temperature	°C	–25 ... +70					
Installation altitude above sea level	m	≤ 1000 at rated current max. 3500 with reduced voltage and current					
Environmental class IEC 60721-3-3		3K3					
DIN EN 60529 degree of protection		IP00					
D400 device type		60MRE	78MRE	98MRE	112MRE	142MRE	180MRE
Dimensions		See dimension drawings					
Weight, approx.	kg	16				17	

[1] The device is not supplied with the fuses listed. The fuses listed are recommended fuses that must be ordered separately.

[2] The device can be operated continuously at the rated line-side current I_{rated}. This will cause the thyristors to reach their limit temperature. It is not possible to accelerate, i.e. to increase the current, from this operating state.

Technical data (continued)

AC power controller in the special version

110 ... 500 V 3 AC, 150 ... 700 A, ambient temperature 65 °C (option -Z = **H78**)

Order No.		**6SG70■■-0EB60-0-Z H78**					
		70	**72**	**76**	**80**	**82**	**85**
Rated line-side voltage power unit	V	110 (-10 %) ... 500 (+10 %) 3 AC					
Rated frequency	Hz	50/60 The devices automatically adjust to the frequency of the applied line voltage in a range from 45 ... 65 Hz					
Rated current	A	150	200	250	365	475	700
Rated line-side voltage electronic power supply	V	380 (–25 %) ... 460 (+15 %) 2 AC I_n = 1 A or 190 (–25 %) ... 230 (+15 %) 1 AC I_n = 2 A (–35 % for 1 min.)					
Phase fuse [1] 3 units	A/V	3NE1227-0 250/690	3NE1331-0 350/690	3NE1332-0 400/690	3NE1435-0 560/690	3NE13340-8 900/690	6RY1702-0BA01 [2] 1250/660
Rated line-side voltage fan	V	400 (± 15 %) 3 AC, 50 Hz 460 (± 10 %) 3 AC, 60 Hz					
Rated current for fan	A	0.24				1.1	
Overload possibility [3]		20 s duration: I = 2 x I_{rated} then 70 s duration: I = I_{rated} then 60 s duration: I = 0 A (cycle duration 150 s)					
Power loss for rated current, approx.	W	595	731	895	1280	2146	2865
Minimum load	A	10			15		
Ambient temperature during operation at rated current	°C	0 ... 40 Forced ventilation					
Upper limit temperature with current derating	°C	65					
Cooling air requirement	m^3/h	570				1400	2400
Sound pressure level L_{pA} (1 m)	dB	73				88	
Storage and transport temperature	°C	–25 ... +70					
Installation altitude above sea level	m	≤ 1000 at rated current max. 3500 with reduced voltage and current					
Environmental class IEC 60721-3-3		3K3					
DIN EN 60529 degree of protection		IP00					
D400 device type		225MRE	285MRE	360MRE	525MRE	680MRE	900MRE
Dimensions		See dimension drawings					
Weight, approx.	kg	30			45	85	137

Note:
The overtemperature protection is designed for 65 °C. The devices are not permitted to be operated at full rated current up to 40 °C ambient temperature.

[1] The device is not supplied with the fuses listed. The fuses listed are recommended fuses that must be ordered separately.

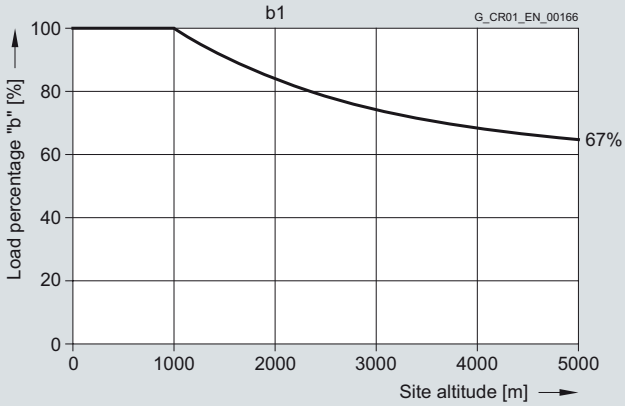
[2] Fuses are included in the device. No semiconductor fuses are necessary.

[3] The device can be operated continuously at the rated line-side current I_{rated}. This will cause the thyristors to reach their limit temperature. It is not possible to accelerate, i.e. to increase the current, from this operating state.

Technical data (continued)

Load values depending on the temperature of the coolant and installation altitude

Ambient or coolant temperature	Change in load values			
	Standard version		Special version	
	Devices with self-ventilation	Devices with forced ventilation	Devices with self-ventilation	Devices with forced ventilation
+35 °C	0 %	0 %	0 %	0 %
+40 °C	0 %	0 %	0 %	0 %
+45 °C	0 %	–5 %	0 %	0 %
+50 °C	–6 %	–10 %	0 %	–12 %
+55 °C	0 %	0 %	–11 %	–18 %
+60 °C	0 %	0 %	–18 %	–24 %
+65 °C	0 %	0 %	–30 %	–30 %



Reduction factor for load values at installation altitudes above 1000 m.

Configuration

Configuration information

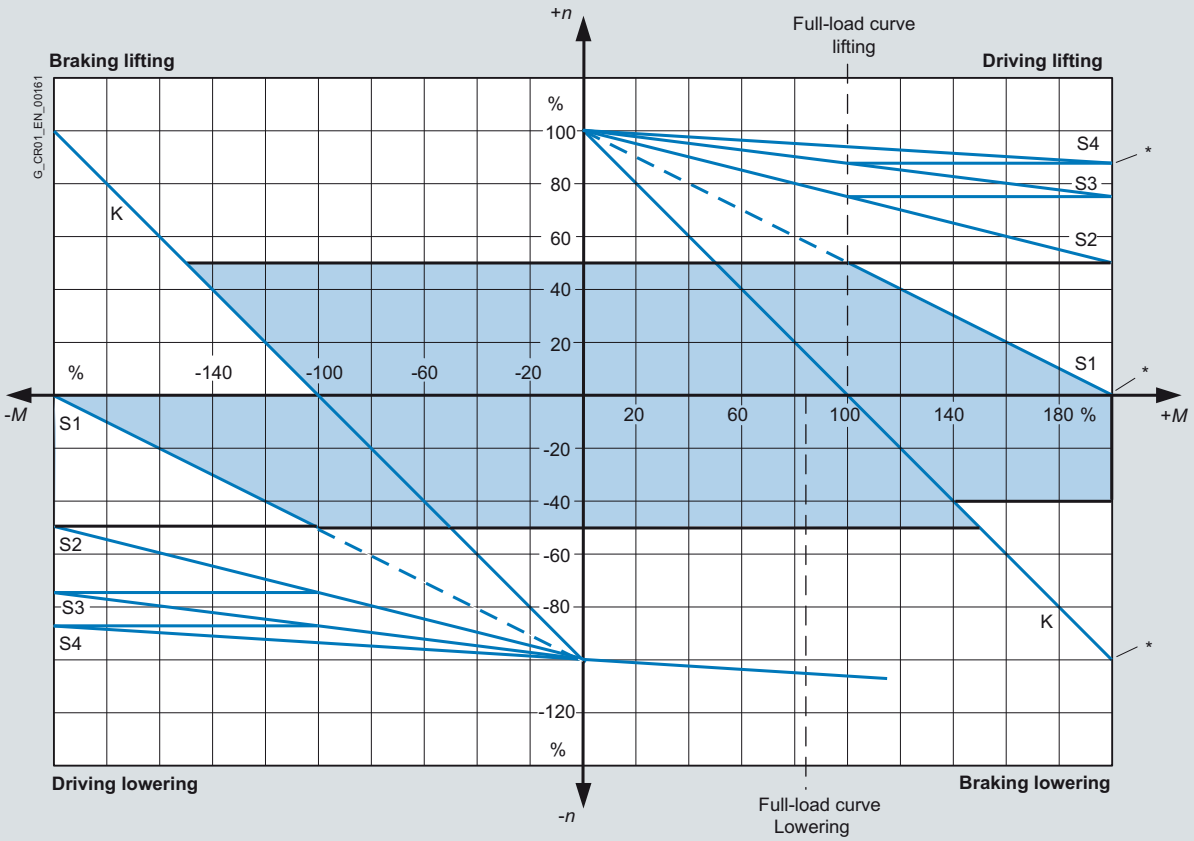
- In hoisting operation, the motors are not operated continuously, but with variable load, at varying speeds, and with different ON durations. Under these conditions, it is sufficient when the rated current for the device I_{rated} is greater than the motor rated current. The devices can carry twice the rated device current of I_{rated} for 20 s in intermittent duty with appropriate pauses in operation. This covers all the normal acceleration situations that occur with hoists.
- To ensure a reliable ramp-up from the closed-loop control characteristic to rated speed, it is recommended that four rotor contactors are used. Activation of the rotor contactors through contactor relays.
- Under unusual operating conditions, such as traversing with full load at extremely low speed for a long time, motors, resistors and SIMOTRAS HD must be dimensioned appropriately. When phase angle control is used, due to the reduced magnetization, a higher stator current flows to achieve the necessary torque. The motors can be thermally overloaded, because the thermal power losses rise with the quadrant of the current. The resistors are overloaded when the closed-loop control characteristic is traversed for an extended period. The current values in the list therefore only refer to a cycle duration of 150 s; i.e. at S3 – 40 %, the permissible ON time is 60 s. The SIMOTRAS HD devices can be operated continuously at the rated current for the device I_{rated}; the limit temperature for the thyristors will, however, be reached. Acceleration is not permitted from this operating state. The thyristors could be overloaded.
- Due to influencing the speed with additional rotor resistors, the rotor performance is largely converted into heat in the external resistor. This ensures that excessive heating of the motor is avoided when traversing at low speed over long periods.
- Due to the lack of stator contactors, the motor can no longer be galvanically isolated from the AC power controller, e.g. when an operational limit switch is actuated. If the controller could not block the thyristors due to a device fault, this could result in an impermissible operating state.
  It is therefore recommended that emergency or safety limit switches are used.
  These respond when the operational limit switch is passed and act on a line contactor or the crane switch.

AC power controller

Characteristics

The speed changes steplessly in the control range when the master switch is operated. The crane driver only detects the end of the control range through latching of the master switch. Furthermore, the final stage is reached sub-synchronously or super-synchronously depending on the load by traversing the characteristics that are determined by the resistor increments. Current control is always operating to ensure that the set maximum torques are not exceeded. The circuits are protected against reversal.

Control characteristics for hoists



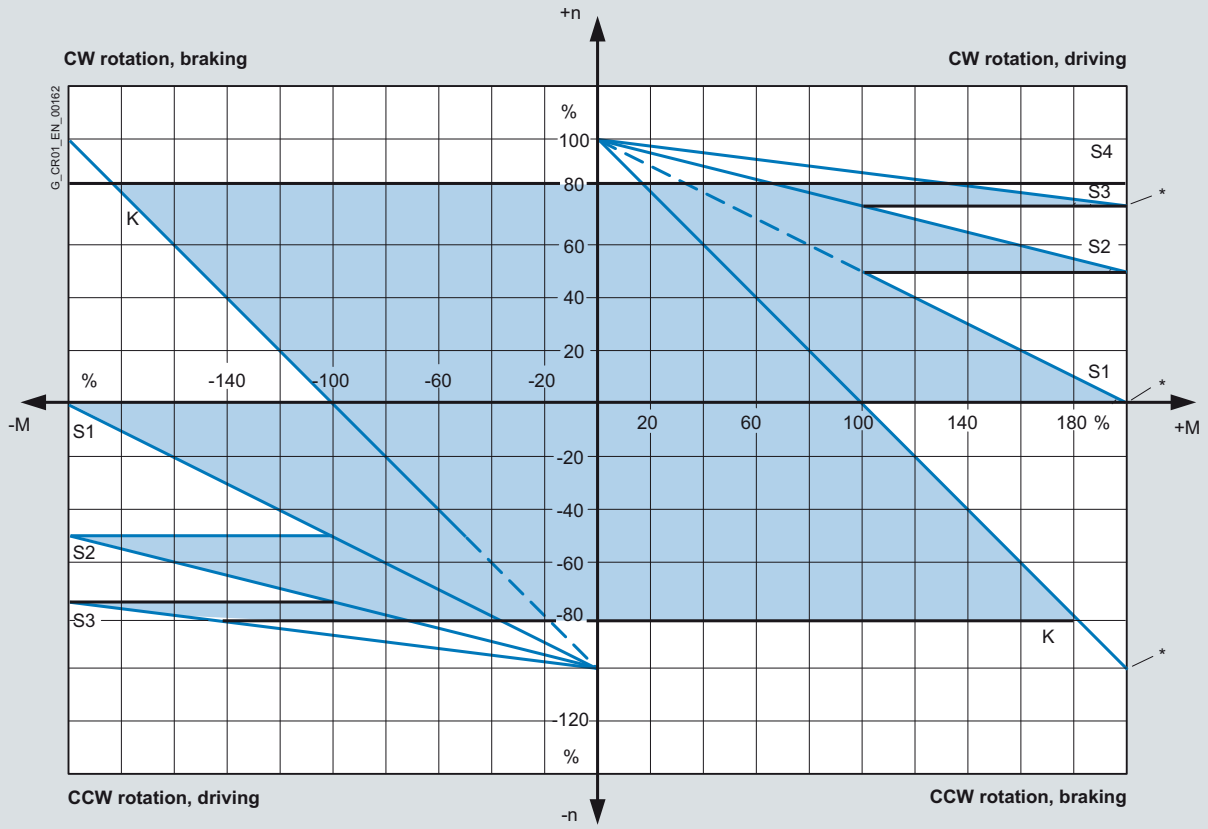
	SIMOTRAS HD closed-loop control range
K	Characteristics for reversing mode (counter-current braking), i.e. Delay lowering with pull-through loads or Delay lifting when active reversing mode is required
S2, S3, S4	Characteristics for controlled mode
*	Use of current limiting (e.g. $I_{max} = 2 \times I_{rated}$)

Up to 4 rotor resistor switching stages can be implemented. If less than 4 stages are implemented, the top stages (S3/S4) remain unused.

If the upper stages S3/S4 are not used, the over-synchronized speed increases in accordance with the parameterized characteristic on lowering. This must be taken into account when selecting the overspeed protection. For this reason, a speed corresponding to the characteristic can also only be achieved during lifting.

Characteristics (continued)

Control characteristics for gantries



	Control range SIMOTRAS HD
K	Characteristics for reversing mode (counter-current braking)
S3	Characteristics for controlled mode
*	Use of current limiting (e.g. I_{max} = 2 x I_{rated})

Up to 4 rotor resistor switching stages can be implemented.
If less than 4 stages are implemented, the top stages (S3/S4) remain unused.

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AC power controller

Selection and ordering data

Basic version	**Up to +40 °C or +45 °C**
Special version, order code H78	**Up to +65 °C**

(Add **-Z** to Order No. and specify order code **H78**)

6 S G ■ ■ ■ ■ - ■ ■ ■ ■ ■ - 0

Version • DC and AC power controllers for power control		**7 0**
Rated current		
Basic version	Special version	
60 A	42 A	**5 0**
78 A	55 A	**5 2**
98 A	70 A	**5 5**
112 A	80 A	**6 0**
142 A	100 A	**6 2**
180 A	125 A	**6 5**
225 A	150 A	**7 0**
285 A	200 A	**7 2**
360 A	250 A	**7 6**
525 A	365 A	**8 0**
680 A	475 A	**8 2**
900 A	700 A	**8 5**
Version • Thyristor		**0**
Rated voltage • 500 V		**E**
Current transformer • With current transformer		**B**
Converter circuit • 4-quadrant device		**6 0**

Ordering information for options with order codes	**6 S G 7 0 ■ ■ - ■ ■ ■ ■ ■ - 0 - Z** **+ +**	Order No. of SIMOTRAS HD device with suffix -Z and order codes (multiple order codes additively) and/or plain text if required.

The SIMOTRAS HD converters can be ordered with the following options:

Options	Order code	Order No.
Operation of the SIMOTRAS HD devices at 65 °C ambient temperature	**H78**	
Operating Instructions (English)	**D76**	**6SG7000-0BA76**
Operating Instructions and Drive Monitor in German and English on CD-ROM	**D64**	**6SG7000-0CD00**

German Operating Instructions are supplied with every device.

Accessories

Spare parts

Order No.	Description	6SG70■■-0EB60-0						6SG70■■-0EB60-0					
		50	52	55	60	62	65	70	72	76	80	82	85
		60A	78A	98A	112A	142A	180A	225A	285A	360A	525A	680A	900A
Printed circuit boards													
6RY1703-0AA00	Electronics + terminals A7001-L1	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x
6RY1703-1HD06	Power interface + terminals A7022-L4	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x
6RY1704-0AA00	Operator panel A7005-L1	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x
6RY1703-1HD02	Snubber circuit A7021-L1	1x	1x	1x	1x	1x	1x	1x	1x	1x			
6RY1703-1HD03	Snubber circuit A7011-L1										1x	1x	
Thyristors													
6RY1700-0HD01	W98624-S7000-C2 SKKT72/16E	5x											
6RY1700-0AA05	W98624-S1002-C82 SKKT106/18EH1		5x	5x	5x								
6SY7010-0AA02	W97020-Z1009-C412 TT162 N16					5x	5x						
6RY1700-0HD04	W98624-S1000-C1 MCC170-16 i01							5x					
6SY7010-0AA03	W98624-S1002-C8 TT251 N16								5x				
6SY7010-0AA05	W98624-S1002-C48 MCC312-16I01									5x			
6SY7010-0AA04	W98624-S1002-C39 TT500 N16										5x		
6RY1700-0AA04	W98624-S1002-C97 TT570N16											5x	
6RY1702-0CA01	Thyristor line C98130-A1256-B320												5x
Miscellaneous spare parts													
6RY1701-0AA04	Radial-flow fan C98247-S1002-C25											1x	1x
6RY1701-0AA07	Complete fan C98130-A1256-C553			2x	2x	2x	2x						
6RY1701-0AA08	Fan module C98130-A1256-B140							1x	1x	1x	1x		
6RY1702-0AA01	Current transformer C98130-A1023-C751	2x	2x	2x	2x								
6RY1702-0AA02	Current transformer C98130-A1023-C752					2x	2x						
6RY1702-0AA03	Current transformer C98130-A1023-C771							2x	2x	2x			
6RY1702-0AA05	Current transformer C98130-A1023-C773												2x
6RY1702-0AA06	Current transformer C98130-A1023-C850										2x	2x	
6RY1702-0BA00	Fuse link F1, F2 C97327-Z1006-C215	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	2x	
6RY1702-0BA01	Fuse links C98327-S1002-C83												3x
6RY1705-0AA02	Snubber resistor W98511-S1001-C207										3x		
6RY1710-3AA06	Snubber resistor W98511-S1001-C105											5x	
6SY7010-6AA01	NTC thermistor W98628-S1001-C24	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	1x	
6RY1700-0TF00	NTC thermistor												1x

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Accessories (continued)

Notes on spare parts:
Refer to the SIMOTRAS HD Operating Instructions for any information to be considered regarding repair of these devices.

Demonstration model

A demonstration model is available for presenting the features of SIMOTRAS HD. The demonstration model can be used for customer presentations and to teach technical know-how for configuring, commissioning, and service.

The features of the demonstration model are:

- Ready-to-use device with a pulse encoder and brake built onto the slip-ring motor, 3-stage rotor resistor and stepped master switch or master switch with potentiometer, closed-loop controlled eddy-current brake for simulating a load torque
- Indication of main operating values on instruments and LEDs
- Simulation of limit switches, centrifugal switches, etc.
- The demonstration model is installed in 2 rigid cases, which also permit shipping, e.g. as air freight.
  The second case can be stacked on the case with fixed, braking wheels and transported.

Dimensions and weights with hood fitted:

- Case on wheels with motor, brake, rotor resistor, etc.:
  Width x length x height = 72 cm x 125 cm x 64 cm
  Weight approx. 180 kg
- Case with operator panel and SIMOTRAS:
  Width x length x height = 72 cm x 125 cm x 58 cm
  Weight approx. 60 kg

Training devices for SIMOTRAS HD

Practical demonstration systems can be used for successful presentations, courses and for staff training.

For information regarding the demonstration systems, refer to

www.siemens.com/sidemo

under → Products & Solutions → Demonstration → Drives

Further information

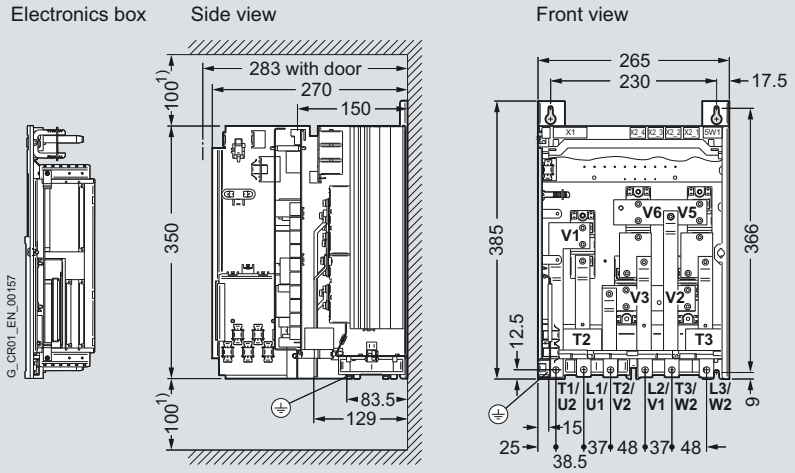
Reference to SIMOTRAS HE

SIMOTRAS HD is almost fully compatible with SIMOTRAS HE (6GA4625 series).

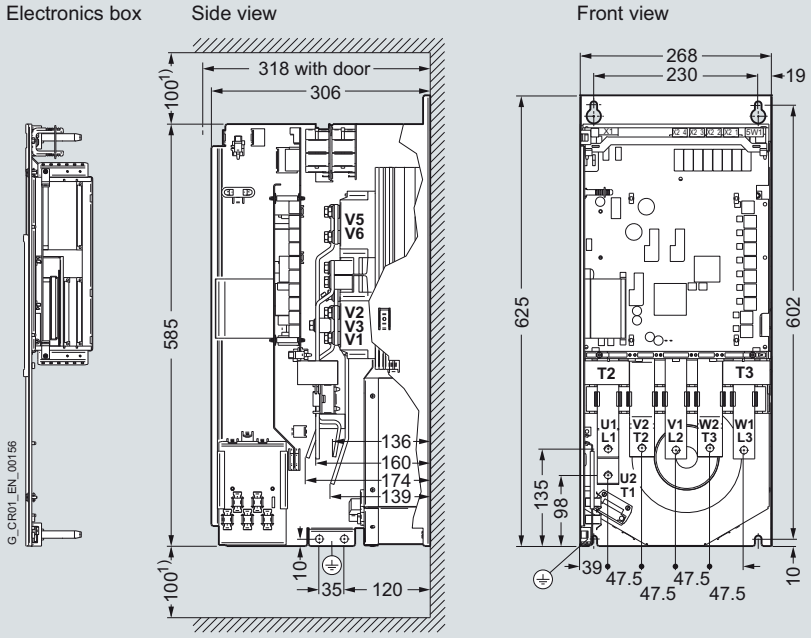
Comparative feature	SIMOTRAS HD	SIMOTRAS HE
Circuitry	Digital	Analog
Voltage range	110 V (-10 %) ... 500 V (+10 %) 3 AC	110 V (-10 %) ... 500 V (+10 %) 3 AC
Current range	42 ... 900 A	27 ... 1125 A
Isolated binary signals	8 inputs and 8 outputs	7 inputs and 8 outputs
Is drive-based control available?	Yes	No
Do rotor contactors switch at zero current?	Yes	No
Are the devices interchangeable?	HE can be replaced with HD easily, taking the installation conditions into account. External activation of the HE must be adapted to the internal drive-based control of the HD!	HD can only be replaced with HE after careful inspection, possibly by external service providers. Additional equipment is necessary. Check the installation conditions!
Are the pulse generator evaluation, setpoint encoder, etc. standard?	Yes	No
Is PROFIBUS DP connection possible?	Yes, via add-on module	No
Are freely connectable terminals and spare function blocks for calculation and closed-loop control as well as for logical operations available?	Yes	No
Is binary and analog terminal expansion possible?	Yes, via add-on module	No
Is there CE marking?	Yes	No

Dimension drawings

Device type D400 / 60-180 MRE



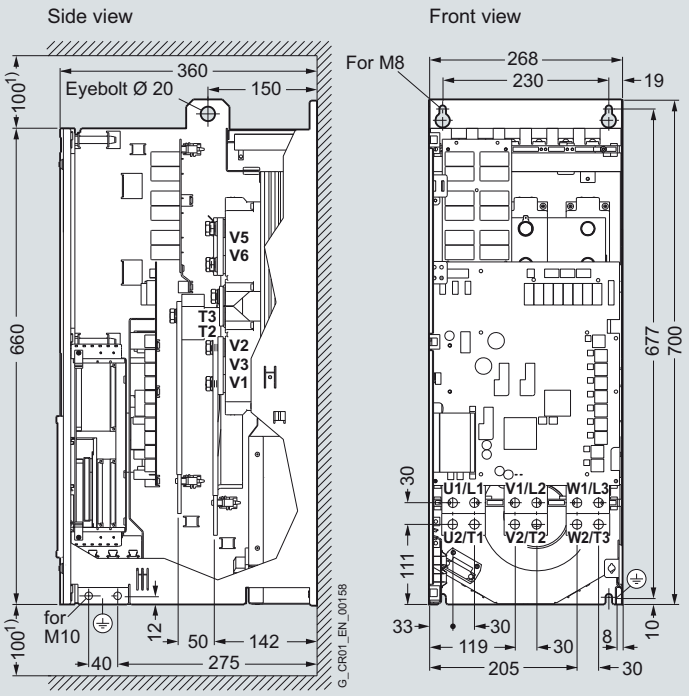
Device type D400 / 225-360 MRE



1) Minimum spacing for air circulation.
An adequate flow of cooling air must be provided.

Dimension drawings (continued)

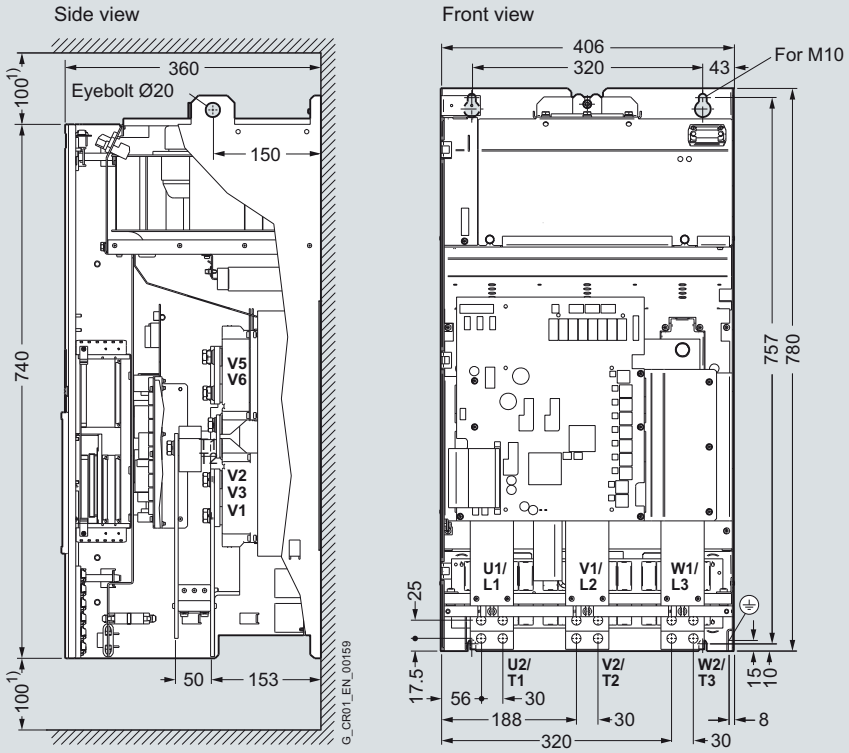
Device type D400 / 525 MRE



1) Minimum spacing for air circulation.
An adequate flow of cooling air must be provided.

Dimension drawings (continued)

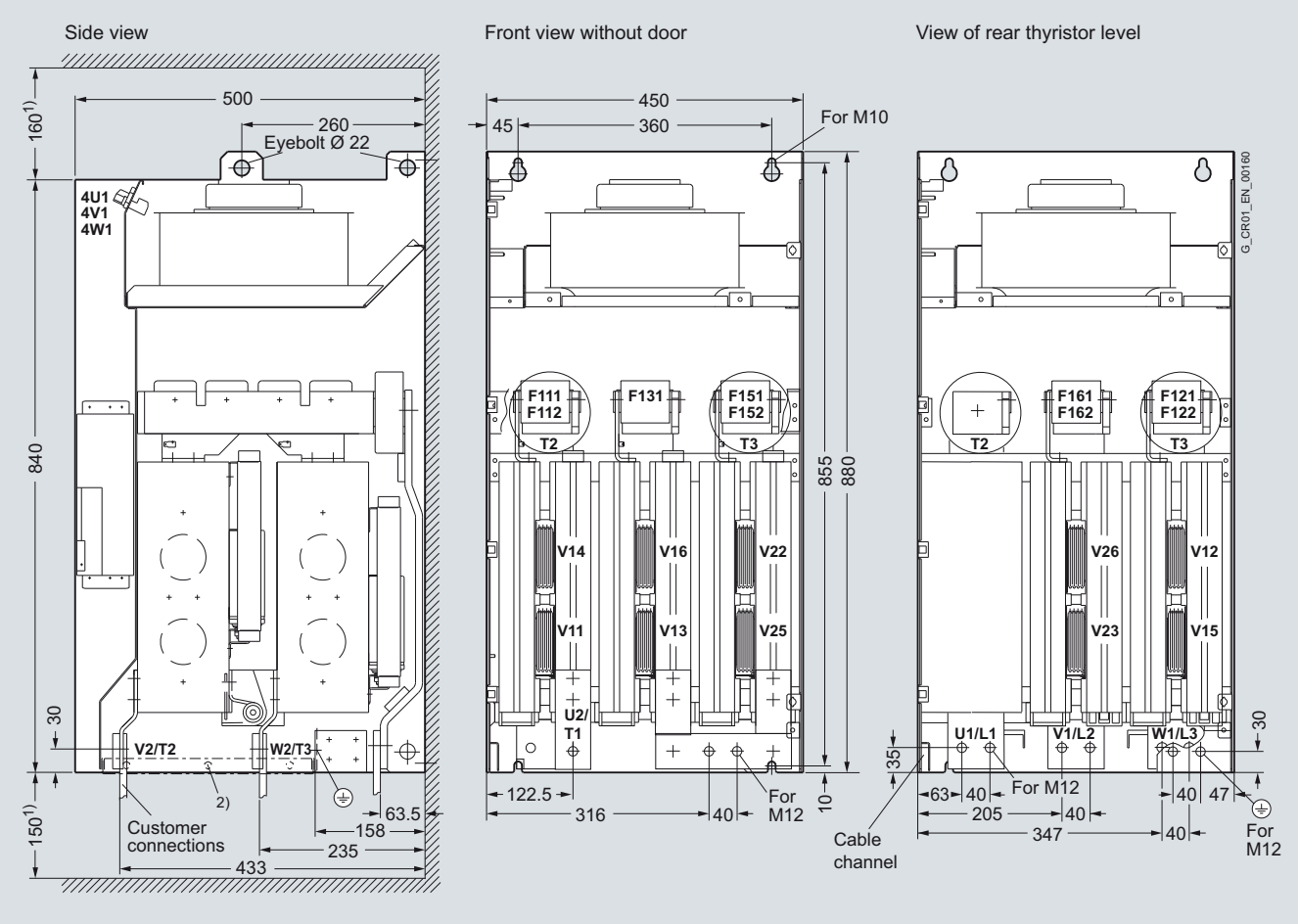
Device type D400 / 680 MRE



1) Minimum spacing for air circulation.
An adequate flow of cooling air must be provided.

Dimension drawings (continued)

Device type D400 / 900 MRE



1) Minimum spacing for air circulation, customer connection and fan replacement. An adequate flow of cooling air must be provided.

2) Remove transport plate before commissioning by removing 6 x M6 hexagon bolts!

Electronics options

Overview

Electronics options are available for SIMOTRAS for expanding the interfaces available as standard. The add-on modules are inserted in the slots of the electronics box.

To install the CBC, CBP2, EB1, EB2, SBP and SLB modules in the SIMOTRAS HD device, the Local Bus Adapter (LBA) and the adapter module (ADB) are also required. The T300 technology modules only need a Local Bus Adapter (LBA). These must be ordered separately.

The add-on modules EB1, EB2 and CBP2 are available under two different order numbers:

- Under the order number of the module, without accessories and connectors, and without brief instructions, as a spare part
- As a retrofit set: Module with connector and short instructions, when the module is ordered as an option.

For installation in the SIMOTRAS HD device, the retrofit kit is necessary as it contains all the connectors required for the equipment wiring as well as the short instructions.

The T300 is only permitted to be used following consultation with the responsible Siemens department.

Selection and ordering data

Add-on modules		Order No. (without accessories)	Order No. (retrofit kit)
CUD2	Module terminal expansion	**6RX1700-0AK00**	
LBA	Local Bus Adapter for the electronics box Prerequisite for installing optional add-on modules	**6SE7090-0XX84-4HA0**	
ADB	Adapter module Prerequisite for installing CBC, CBP2, EB1, EB2, SBP and SLB	**6SE7090-0XX84-0KA0**	
EB1	Terminal expansion module	**6SE7090-0XX84-0KB0**	**6SX7010-0KB00**
EB2	Terminal expansion module	**6SE7090-0XX84-0KC0**	**6SX7010-0KC00**
CBP2	Communication module with interface for SINEC-L2-DP (PROFIBUS)	**6SE7090-0XX84-0FF5**	**6SX7010-0FF05**
T300	Technology module only for use up to an ambient temperature of 50 °C (not with option H78)	**6SE7090-0XX87-4AH0**	
SBP	Pulse encoder evaluation module [1)]	**6SX7010-0FA00**	
SLB	SIMOLINK module	**6SX7010-0FJ00**	
CBC	Communication module with interface for CAN protocol	**6SX7010-0FG00**	

The following accessories are also available for SIMOTRAS HD, such as the OP1S operator panel:

Accessories	Order No.
Device operator panel (OPS1)	**6SE7090-0XX84-2FK0**
Adapter AOP1 for mounting OPS1 in cabinet door, including 5 m connecting cable	**6SX7010-0AA00**
PMU-to-OPS1 connecting cable, 3 m	**6SX7010-0AB03**
PMU-to-OPS1 connecting cable, 5 m	**6SX7010-0AB05**
Drive Monitor PC-to-PMU connecting cable (RS232), 3 m	**9AK1012-1AA00**
Pulse encoder for retrofitting (1024 pulses/revolution, 15 V supply voltage)	**1XP8001-1**
Installation instructions for 1XP8001 pulse encoder, German	**517.307777.30**
SIMOTRAS HD Operating Instructions, German	**6SG7000-0BA00**

[1)] The SIMOTRAS HD is supplied with integral pulse encoder evaluation in the basic unit, the SBP is therefore only necessary when a second pulse encoder has to be evaluated.

3PS3 steel grid resistor units

Overview

3PS3 steel grid resistor units, IP20 degree of protection

The steel grid resistor units are described below. Inquiries and orders for these units as well as wire and cast resistors must be addressed to

GINO GmbH
Elektrotechnische Fabrik
Friedrich-Wöhler-Str. 65
53121 Bonn, Germany

Tel: +49 (0)228-98 98 6-0
Fax: +49 (0)228-98 98 6-34
E-mail: info@gino.de
www.gino.de

Resistor units are used in hoist drives for three-phase slip-ring motors as

- Switchable rotor series resistors
- Permanent slip resistors

Resistor units are also used as regenerative feedback resistors in cranes that are not line fed, such as carriers, in combination with closed-loop controlled drives.

Certain properties must be considered for their implementation and loading.
The steel grid resistor units described below are, in contrast to cast iron resistors, much less sensitive to shock and strong vibration. Unexpected, unusual thermal loads must, however, be avoided.

The following must be noted for drives with slip-ring motors:
The current and relative ON duration determine the loading in terms of the ratio of load duration to cycle duration. The relative ON duration of the resistor unit is generally less than that of the motor, because only the motor is switched on during operation with the resistor short circuited. The rated current for the resistor unit is the current that corresponds to the power consumption of the motor. If the power consumption of the motor causes the steady power to rise due to frequent acceleration of large masses, the rated current of the resistor unit must be selected in accordance with this increased power.

Slip stages should always be implemented for gantries and slewing gear when the driving gear is designed for high velocities and large masses have to be accelerated. It must be noted that fixed slip resistors cause a corresponding reduction in speed and therefore also a reduction in motor output under full load conditions.

Versions

Resistor units in normal packaging

The resistor units in normal packaging have appropriate terminals that can be changed during commissioning.

Resistor units in special packaging

When the resistor unit has to be dimensioned with an optimal volume, a resistor unit in special packaging can be used. In this case, precise information about the resistor structure and connections for the rotor contactors is required.

Function

For dimensioning the resistor units, the frequency of starts per hour and the ratio of starting time and actuating time to the de-energized pause, i.e. the relative ON duration, are important.

In the case of resistor units with a fixed slip stage, this has the same ON duration as the motor.

The starting stages have a shorter ON duration in accordance with their ON time. It must, however, be noted that the cycle duration is specified as 2 minutes for resistor units and 10 minutes for motors, according to the standard. This means that if the cycle duration for the motor is fully utilized, the slip stage of the resistor unit can become too hot, so the slip stage must be dimensioned for a longer ON duration. In the case of hoists, the cycle duration is significantly < 10 minutes, due to the short traversing distance.

The values for cycle duration and ON duration are specified in the selection tables. The permissible loading is indicated on the rating plate. These values must not be exceeded.

Due to the special characteristics of the various hoist circuits and their characteristics, the loading of individual resistor stages can be a fraction or a multiple of the rated current for the motor and the desired ON duration.

The 3PS3 steel grid resistor units are available in five box sizes. For hoist circuits, three-line, standard resistor units in sizes 4, 6 and 8 are normally implemented. The mode of installation is already determined in the case of resistor units with normal packaging.

3PS3 resistor units in combination with a contactor control are used for starting and setting three-phase asynchronous motors with slip-ring rotors, as well as being used as load resistors and series resistors.

3PS3 steel grid resistor units

Function (continued)

Regulations

The resistor units correspond to the "Low-voltage switchgear guidelines" DIN VDE 0660.

This simultaneously declares conformity of the devices with the safety regulations of the EU directive for low-voltage equipment of February 19, 1973.

Climate resistance

The 3PS3 steel grid resistor units can be used under the following climatic conditions:

- "General" climate group according to IEC 721-2-1

Degree of protection

The 3PS3 steel grid resistor units are designed with IP00 degree of protection as standard. If a higher degree of protection is required (up to IP23), 3PX6 kits must be ordered separately (also see "Selection and ordering data").

Design

The 3PS3 steel grid resistor units contain resistor elements made of high-alloyed steel plate which are also scale-resistant at high operating temperatures. The elements are insulated from each other and from the enclosure through ceramic insulating bushings. Crosspieces are welded in to connect the resistor elements. The connecting pieces are welded to the steel grids in such a manner that the wires can be connected with M12 cap screws.

The devices are supplied unpainted. All sheet metal parts are zinc-plated or made from stainless steel.

Arrangement

The resistor units are designed for natural ventilation and must be positioned horizontally with excellent ventilation. When loaded at the values specified on the rating plate, the outlet air temperature does not exceed 200 K.

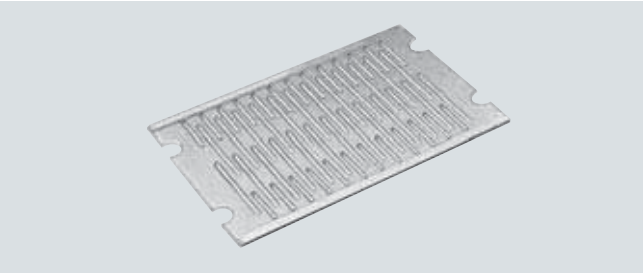
If the air flow is hindered, all components can quickly reach impermissible temperatures.

It must be noted that each device converts the following power into heat:

Type	Power converted to heat for 100 % ON duration kW
3PS3 000	7.4
3PS3 200	10.8
3PS3 400	14.2
3PS3 600	17.5
3PS3 800	20

If a resistor unit comprises several boxes, these will always be supplied individually. The individual boxes must be connected together electrically and mechanically on site.

3PY6 resistor grid



The resistor elements are made of high-alloy steel plate. Short-circuits between elements are prevented by a non-sliding, located retaining rail above and below the resistor grids.

The table below shows the number of resistor grids per device:

Resistor unit Type	Single line Number of elements	Three lines Number of elements per line
3PS3 000	12	4
3PS3 200	16	5
3PS3 400	21	7
3PS3 600	26	8
3PS3 800	30	10

Connecting the cables

The connections for the resistor grids are at the front on all units. When connecting the cables, the radiated heat must be taken into account. The cables should be fed into each box from the side, so that they do not lie in the path of the outgoing hot air and radiated heat.

DIN VDE 0298, Part 3 or 4 must be observed regarding the loading. We recommend that cables for increased conductor temperature (at least 90 °C), e.g. (N)2XH or NSSHÖU, are used. In the case of cables for normal conductor temperature (70 °C), e.g. NYY, whose cable ends lie in the path of radiated heat, the ends subjected to the heat must be covered with heat-resistant tubing.

The connections are accessible after the front covers of the units have been removed. To obtain this accessibility when several boxes are stacked, it is recommended that the wiring loom for each box is fed in from the side and any vertical wiring branches are routed along the front of the boxes. It is not permitted to route these wires between several resistor boxes in the flow of hot air, otherwise this could affect the insulation of the wires.

Technical data

Creepages and clearances according to DIN VDE 0110 - Part 2 01/98 as well as DIN VDE 0660	Overvoltage category III, pollution severity 3
Rated insulation voltage	1000 V AC, 1200 V DC
Test voltage	3.5 kV
Current carrying capacity • Resistor units • Resistor elements	 See Page 6/86 See Page 6/90
Resistor elements • Rated value • Manufacturing tolerance	 ≈ 10 % above the cold value ≈ 15 % below the value at operating temperature ± 10 %
Continuous power per resistor element	up to 675 W
Heat storage capacity	30 ... 90 kJ
Ambient temperature	–25 ... +45 °C
Degree of protection according to DIN 40 050 or IEC 144	IP00; **with kits also IP10, IP13, IP20 and IP23**
Device surface	Unpainted Enclosure components: zinc-plated steel Covers: Stainless steel
Conductor cross-sections for main conductors • Connection for main conductor • Connection for protective conductor (cable entry must be as described under "Connecting the cables", Page 6/84)	 Busbar or max. 2 x 120 mm^2 or 1 x 150 mm^2 M12 (for busbar or conductor connection) M10
Rotor characteristic number $k = \frac{u}{i \cdot \sqrt{3}}$ (u = rotor standstill voltage i = rotor rated current)	For values for Siemens motors, see Chapter 3, "Three-phase slip-ring motors"
Number of box sizes	5
Features	• Resistor grid of stainless steel: Corrosion-resistant, unbreakable, and scale-resistant even at high temperatures • Insensitive to shock and vibration under normal operating conditions • Excellent incrementation possibilities using taps

3PS3 steel grid resistor units

Selection and ordering data [1)]

3PS3 resistor units in normal packaging

The current values listed refer to the arrangement of three boxes on top of each other that is common in hoists. If only two boxes are installed one above the other, these values can be increased by 12 % and in the case of a single box by 21 % (see also Page 6/84, section "Arrangement"). For kits for increasing the degree of protection from IP00 to IP10, IP13, IP20 and IP23, see table "Kits for increasing the degree of protection" on Page 6/89.

	Load current for the resistor units for 120 s cycle duration and relative ON duration of					Installed resistor grids	Total resistance	Installed resistor grids	Total resistance
	15 %	25 %	40 %	60 %	100 %	Per line		Per line	
	A	A	A	A	A	Number x designation	Ω	Number x designation	Ω
Uniform installation	550	435	360	310	260	4 x WG 10	3 x 0.04	5 x WG 10	3 x 0.05
	450	350	295	250	210	4 x WG 15	3 x 0.06	5 x WG 15	3 x 0.075
	370	295	243	210	175	4 x WG 22	3 x 0.088	5 x WG 22	3 x 0.11
	306	244	202	170	145	4 x WG 32	3 x 0.128	5 x WG 32	3 x 0.16
	256	205	168	145	122	4 x WG 46	3 x 0.184	5 x WG 46	3 x 0.23
	210	168	140	120	100	4 x WG 68	3 x 0.272	5 x WG 68	3 x 0.34
	173	138	114	97	82	4 x WG 100	3 x 0.4	5 x WG 100	3 x 0.5
	142	112	93	79	67	4 x WG 150	3 x 0.6	5 x WG 150	3 x 0.75
	117	92	77	65	55	4 x WG 220	3 x 0.88	5 x WG 220	3 x 1.1
	97	77	64	54	46	4 x WG 320	3 x 1.28	5 x WG 320	3 x 1.6
	81	64	53	45	38	4 x WG 460	3 x 1.84	5 x WG 460	3 x 2.3
	66	54	44	38	32	4 x WG 680	3 x 2.72	5 x WG 680	3 x 3.4
	55	44	36	31	26	4 x WG 1000	3 x 4	5 x WG 1000	3 x 5
	45	35	30	25	21	4 x WG 1500	3 x 6	5 x WG 1500	3 x 7.5
	37	30	24	21	18	4 x WG 2200	3 x 8.8	5 x WG 2200	3 x 11
	30	25	20	17	15	4 x WG 3200	3 x 12.8	5 x WG 3200	3 x 16
	Box size					**0**		**2**	
	Connecting diagrams per line:					Connecting diagram No. V 901 846		Connecting diagram No. V 901 846	
						HE-5068		HE-5069	
	Terminal designation per line:					0 1 2 4		0 1 3 5	
	Percentages of the total resistance:					0 25 50 100%		0 20 60 100%	
Mounting partially reinforced with 1.4 times current carrying capacity for resistor stages 0-1 and 1-2 (for box sizes 4 and 6); 0-1, 1-2 and 2-3 (for box size 8)	370	295	243	210	175	–		–	
	306	244	202	170	145				
	256	205	168	145	122				
	210	168	140	120	100				
	173	138	114	97	82				
	142	112	93	79	67				
	117	92	77	65	55				
	97	77	64	54	46				
	81	64	53	45	38				
	66	54	44	38	32				
	55	44	36	31	26				
	45	35	30	25	21				
	37	30	24	21	18				
	30	25	20	17	15				
	Box size					**–**		**–**	
	Connecting diagrams per line:					–		–	
	Terminal designation per line:					–		–	
	Percentages of the total resistance:					–		–	

[1)] Resistor units and accessories must be ordered directly from
GINO GmbH
Elektrotechnische Fabrik
Friedrich-Wöhler-Str. 65
53121 Bonn, Germany
Telephone: +49 (0)228-98 98 6-0
Fax: +49 (0)228-98 98 6-34
E-mail: info@gino.de
www.gino.de

Selection and ordering data for 3PS3 resistor units in normal packaging (continued)

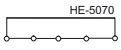
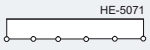
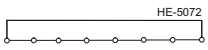
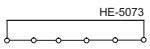
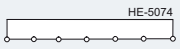
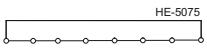
Ordering examples:

Steel grid resistor unit in normal packaging
Three-line version
Box size 8, IP10 degree of protection
Total resistance 3 x 0.46 Ω
Kit for increasing the degree of protection to IP10

Specify when ordering:
Order No.. **3PS3 800-3E**
Order No. **3PX6 223-8A**

Steel grid resistor unit in normal packaging
Three-line version
Partly reinforced installation
Box size 8
IP00 degree of protection
Total resistance 3 x 0.39 Ω

Specify when ordering:
Order No. **3PS3 800-4E**

Installed resistor grids Per line Number x designation	Total resistance Ω	Installed resistor grids Per line Number x designation	Total resistance Ω	Installed resistor grids Per line Number x designation	Total resistance Ω	IP00 degree of protection version 3-line (1 box) Order No.
7 x WG 10	3 x 0.07	8 x WG 10	3 x 0.08	10 x WG 10	3 x 0.1	**3PS3 ■ 00-3A**
7 x WG 15	3 x 0.11	8 x WG 15	3 x 0.12	10 x WG 15	3 x 0.15	**3PS3 ■ 00-3B**
7 x WG 22	3 x 0.154	8 x WG 22	3 x 0.18	10 x WG 22	3 x 0.22	**3PS3 ■ 00-3C**
7 x WG 32	3 x 0.224	8 x WG 32	3 x 0.26	10 x WG 32	3 x 0.32	**3PS3 ■ 00-3D**
7 x WG 46	3 x 0.322	8 x WG 46	3 x 0.37	10 x WG 46	3 x 0.46	**3PS3 ■ 00-3E**
7 x WG 68	3 x 0.48	8 x WG 68	3 x 0.54	10 x WG 68	3 x 0.68	**3PS3 ■ 00-3F**
7 x WG 100	3 x 0.71	8 x WG 100	3 x 0.8	10 x WG 100	3 x 1	**3PS3 ■ 00-3G**
7 x WG 150	3 x 1	8 x WG 150	3 x 1.2	10 x WG 150	3 x 1.5	**3PS3 ■ 00-3H**
7 x WG 220	3 x 1.5	8 x WG 220	3 x 1.8	10 x WG 220	3 x 2.2	**3PS3 ■ 00-3J**
7 x WG 320	3 x 2.2	8 x WG 320	3 x 2.6	10 x WG 320	3 x 3.2	**3PS3 ■ 00-3K**
7 x WG 460	3 x 3.2	8 x WG 460	3 x 3.7	10 x WG 460	3 x 4.6	**3PS3 ■ 00-3L**
7 x WG 680	3 x 4.8	8 x WG 680	3 x 5.4	10 x WG 680	3 x 6.8	**3PS3 ■ 00-3M**
7 x WG 1000	3 x 7	8 x WG 1000	3 x 8	10 x WG 1000	3 x 10	**3PS3 ■ 00-3N**
7 x WG 1500	3 x 10.5	8 x WG 1500	3 x 12	10 x WG 1500	3 x 15	**3PS3 ■ 00-3P**
7 x WG 2200	3 x 15	8 x WG 2200	3 x 17.6	10 x WG 2200	3 x 22	**3PS3 ■ 00-3R**
7 x WG 3200	3 x 22	8 x WG 3200	3 x 25.6	10 x WG 3200	3 x 32	**3PS3 ■ 00-3S**
4		**6**		**8**		
Connecting diagram No. V 901 846		Connecting diagram No. V 901 846		Connecting diagram No. V 901 846		
 0 1 3 5 7 0 14 43 71 100%		 0 1 2 4 6 8 0 12,5 25 50 75 100%		 0 1 2 3 4 6 8 10 0 10 20 30 40 60 80 100%		
2 x WG 10 + 5 x WG 22	3 x 0.14	2 x WG 10 + 6 x WG 22	3 x 0.15	3 x WG 10 + 7 x WG 22	3 x 0.18	**3PS3 ■ 00-4C**
2 x WG 15 + 5 x WG 32	3 x 0.20	2 x WG 15 + 6 x WG 32	3 x 0.22	3 x WG 15 + 7 x WG 32	3 x 0.27	**3PS3 ■ 00-4D**
2 x WG 22 + 5 x WG 46	3 x 0.28	2 x WG 22 + 6 x WG 46	3 x 0.32	3 x WG 22 + 7 x WG 46	3 x 0.39	**3PS3 ■ 00-4E**
2 x WG 32 + 5 x WG 68	3 x 0.41	2 x WG 32 + 6 x WG 68	3 x 0.47	3 x WG 32 + 7 x WG 68	3 x 0.57	**3PS3 ■ 00-4F**
2 x WG 46 + 5 x WG 100	3 x 0.6	2 x WG 46 + 6 x WG 100	3 x 0.69	3 x WG 46 + 7 x WG 100	3 x 0.84	**3PS3 ■ 00-4G**
2 x WG 68 + 5 x WG 150	3 x 0.9	2 x WG 68 + 6 x WG 150	3 x 1	3 x WG 68 + 7 x WG 150	3 x 1.25	**3PS3 ■ 00-4H**
2 x WG 100 + 5 x WG 220	3 x 1.3	2 x WG 100 + 6 x WG 220	3 x 1.5	3 x WG 100 + 7 x WG 220	3 x 1.85	**3PS3 ■ 00-4J**
2 x WG 150 + 5 x WG 320	3 x 1.9	2 x WG 150 + 6 x WG 320	3 x 2.2	3 x WG 150 + 7 x WG 320	3 x 2.7	**3PS3 ■ 00-4K**
2 x WG 220 + 5 x WG 460	3 x 2.7	2 x WG 220 + 6 x WG 460	3 x 3.2	3 x WG 220 + 7 x WG 460	3 x 3.9	**3PS3 ■ 00-4L**
2 x WG 320 + 5 x WG 680	3 x 4	2 x WG 320 + 6 x WG 680	3 x 4.7	3 x WG 320 + 7 x WG 680	3 x 5.7	**3PS3 ■ 00-4M**
2 x WG 460 + 5 x WG 1000	3 x 6	2 x WG 460 + 6 x WG 1000	3 x 6.9	3 x WG 460 + 7 x WG 1000	3 x 8.4	**3PS3 ■ 00-4N**
2 x WG 680 + 5 x WG 1500	3 x 9	2 x WG 680 + 6 x WG 1500	3 x 10.4	3 x WG 680 + 7 x WG 1500	3 x 12.5	**3PS3 ■ 00-4P**
2 x WG 1000 + 5 x WG 2200	3 x 13	2 x WG 1000 + 6 x WG 2200	3 x 15	3 x WG 1000 + 7 x WG 2200	3 x 18.4	**3PS3 ■ 00-4R**
2 x WG 1500 + 5 x WG 3200	3 x 19	2 x WG 1500 + 6 x WG 3200	3 x 22	3 x WG 1500 + 7 x WG 3200	3 x 27	**3PS3 ■ 00-4S**
4		**6**		**8**		
Connecting diagram No. V 901 847		Connecting diagram No. V 901 847		Connecting diagram No. V 901 847		
 0 1 2 3 5 7 0 8,5 17 33,5 67 100%		 0 1 2 3 4 6 8 0 7 14 28,5 43 71 100%		 0 1 2 3 4 6 8 10 0 6 12 18 29 53 77 100%		

6

Selection and ordering data (continued)

3PS3 resistor units in normal packaging

With these devices, the incrementation can be adapted to the on-site operating conditions within certain limits.

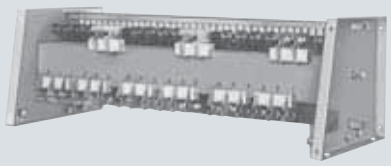
The terminal designations are identical (see Pages 6/86 and 6/87), so the connection diagram is easy to create for a resistor unit that comprises several boxes.

Each resistor unit comprises one or more boxes and contains three identical resistor components (lines). The 3-line configuration is designed for three-phase rotor circuits. If resistor units in normal packaging are used, spare parts inventories are simplified in large plants.

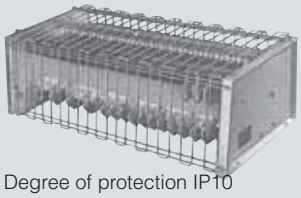
The following are available:

1. Three-line normal resistor units with identical resistor elements.
2. Three-line normal resistor units with partially more rugged installations:
   With these devices, the first two stages (sizes 4 and 6) or the first three stages (size 8) are upgraded and can be loaded with 1.4 times the current specified in the overview table for the respective device.

Accessories



Degree of protection IP00



Degree of protection IP10

Degree of protection IP20

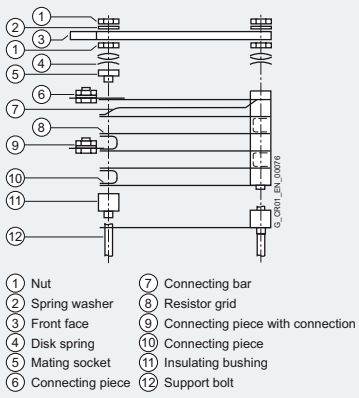
The 3PS3 steel grid resistor units are normally supplied in IP00 degree of protection. Kits are available for increasing the degree of protection to IP10, IP13, IP20 or IP23.

The kits must be selected taking into account the frame size, arrangement (single or one above the other), and the number of boxes.

	You will need the following	Order No.	Quantity
Ordering example: For the resistor unit 3PS3 800-.. comprising 7 boxes, the degree of protection must be increased from IP00 to IP23. 2 x 3 boxes are arranged one above the other and 1 x 1 box is arranged singly.	2 kits for IP23 degree of protection for installing 3 boxes one above the other	**3PX6 225-8C**	2
	1 kit for IP23 degree of protection for stand-alone installation	**3PX6 225-8A**	1

Kits for increasing the degree of protection	Components of the product	**For resistor unit**	**Stand-alone installation**	Weight approx.	**For arranging 2 boxes one above the other**	Weight approx.	**For arranging 3 boxes one above the other**	Weight approx.
		Type	Order No.	kg	Order No.	kg	Order No.	kg
For degree of protection IP10	Protective grid above and at the sides	3PS3 0 3PS3 2 3PS3 4	**3PX6 223 -0A** **-2A** **-4A**	1.2 1.4 1.6	**3PX6 223 -0B** **-2B** **-4B**	1.8 2.1 2.5	**3PX6 223 -0C** **-2C** **-4C**	2.4 2.9 3.4
		3PS3 6 3PS3 8	**3PX6 223 -6A** **-8A**	2.0 2.4	**3PX6 223 -6B** **-8B**	3.0 3.4	**3PX6 223 -6C** **-8C**	4.1 4.6
For degree of protection IP13	Cover and side plates	3PS3 6 3PS3 8	**3PX6 224 -6A** **-8A**	9.6 10.6	**3PX6 224 -6B** **-8B**	13.5 15.3	**3PX6 224 -6C** **-8C**	17.4 25
For degree of protection IP20	Perforated cover plate, side plates, floor plate and bushing	3PS3 0 3PS3 2 3PS3 4	**3PX6 226 -0A** **-2A** **-4A**	2.6 3.3 4.2	**3PX6 226 -0B** **-2B** **-4B**	3.9 4.9 6.3	**3PX6 226 -0C** **-2C** **-4C**	5.0 6.5 8.2
		3PS3 6 3PS3 8	**3PX6 226 -6A** **-8A**	5.0 5.8	**3PX6 226 -6B** **-8B**	7.6 8.5	**3PX6 226 -6C** **-8C**	10.0 11.5
For degree of protection IP23	Termination box, side plates, floor plate and bushing	3PS3 8	**3PX6 225 -8A** [1]	14.6	**3PX6 225 -8B**	19.6	**3PX6 225 -8C**	30

Spare parts



Part No. (see exploded diagram)	Version	Order No.	Weight approx. kg
8	**Resistor grid** WG 10 to WG 3200 with and without connecting bars	See "Resistor grid" table on Page 6/90	
11	**Insulating bushing**	**3PY6 302-0B**	0.037
5	**Mating socket**	**3PY6 302-0D**	0.038
11	At the end of the package, on left of front face **Insulating bushing**	**3PY6 302-0E**	0.045
4	At the end of the package, on right of front face **Disk spring**	**3PY6 303-0A**	0.004
8	**Connecting piece**	**3PY6 304-0F**	0.10
9	**Connecting piece** with connection	**3PY6 304-0G**	0.17
10	**Connecting piece**	**3PY6 305-0K**	0.12
7	**Connecting bar**	**3PY6 305-0L**	0.20

[1] For installation as a single unit, a cover is supplied in place of a terminating box.

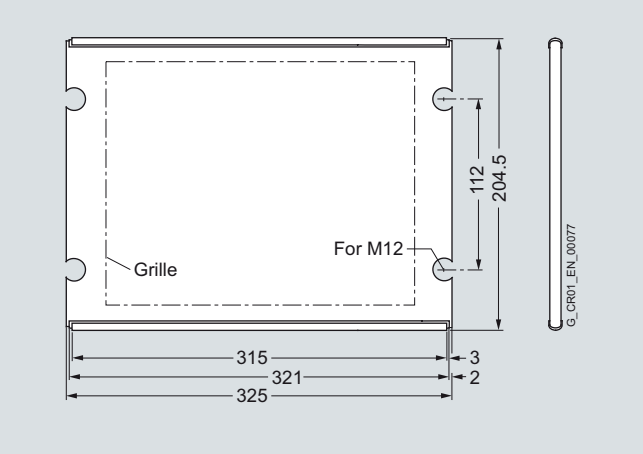
3PS3 steel grid resistor units

Spare parts (continued)

	Permissible load current for 120 s cycle duration and a relative ON duration					Resistor grid				Without connecting bars	Weight approx.	With connecting bars welded on	Weight approx.
						Designation	Rated value	Cold value approx.	Warm value approx.				
	15 %	25 %	40 %	60 %	100 %		± 10 %						
	A	A	A	A	A		Ω	Ω	Ω	Order No.	kg	Order No.	kg
Resistor grid	550	435	360	310	260	WG 10	0.01	0.009	0.0115	**3PY6 301 -3A**	0.65	**3PY6 301 -4A**	1.05
	450	350	295	250	210	WG 15	0.015	0.0135	0.0173	**-3B**	0.65	**-4B**	1.05
	370	295	243	210	175	WG 22	0.022	0.0198	0.0253	**-3C**	0.65	**-4C**	1.05
	306	244	202	170	145	WG 32	0.032	0.0288	0.0363	**3PY6 301 -3D**	0.65	**3PY6 301 -4D**	1.05
	256	205	168	145	122	WG 46	0.046	0.0414	0.0529	**-3E**	0.65	**-4E**	1.05
	210	168	140	120	100	WG 68	0.068	0.0612	0.0782	**-3F**	0.65	**-4F**	1.05
	173	138	114	97	82	WG 100	0.1	0.09	0.115	**3PY6 301 -3G**	0.65	**3PY6 301 -4G**	1.05
	142	112	93	79	67	WG 150	0.15	0.135	0.173	**-3H**	0.65	**-4H**	1.05
	117	92	77	65	55	WG 220	0.22	0.198	0.253	**-3J**	0.60	**-4J**	1.00
	97	77	64	54	46	WG 320	0.32	0.288	0.368	**3PY6 301 -3K**	0.60	**3PY6 301 -4K**	1.00
	81	64	53	45	38	WG 460	0.46	0.414	0.529	**-3L**	0.58	**-4L**	0.98
	66	54	44	38	32	WG 680	0.68	0.612	0.782	**-3M**	0.58	**-4M**	0.98
	55	44	36	31	26	WG 1000	1	0.9	1.15	**3PY6 301 -3N**	0.58	**3PY6 301 -4N**	0.98
	45	35	30	25	21	WG 1500	1.5	1.35	1.73	**-3P**	0.60	**-4P**	1.00
	37	30	24	21	18	WG 2200	2.2	1.98	2.53	**-3R**	0.60	**-4R**	0.98
	30	25	20	17	15	WG 3200	3.2	2.88	3.68	**-3S**	0.58	**-4S**	0.98

Dimension drawings

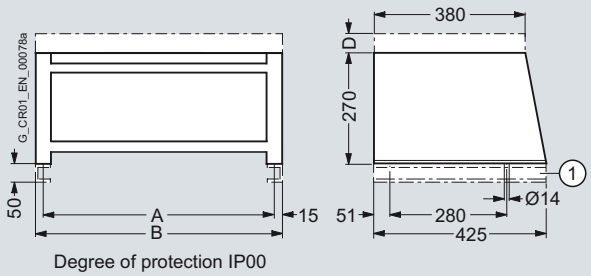
3PY6 301 resistor grid



6

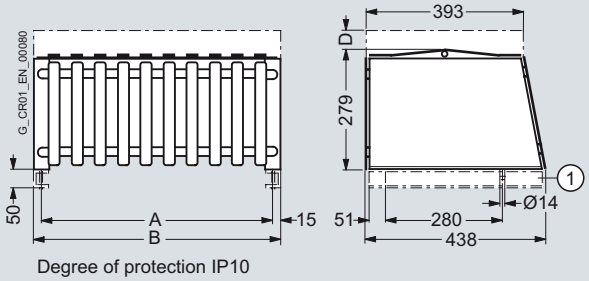
Dimension drawings (continued)

3PS3 steel grid resistor units for stand-alone installation



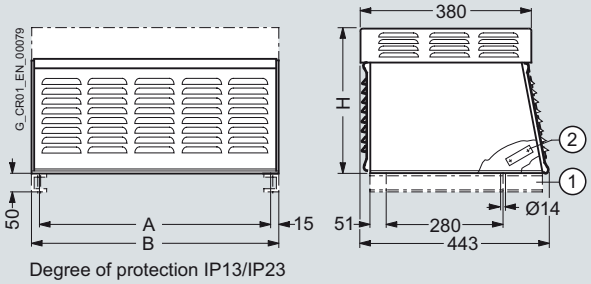
Degree of protection IP00

1 50 mm gap to floor is required



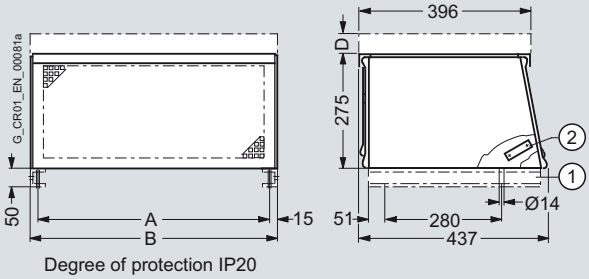
Degree of protection IP10
With guard

1 50 mm gap to floor is required



Degree of protection IP13/IP23
with cover

1 50 mm gap to floor is required
2 Bushing strip for IP20 and IP23 degree of protection.



Degree of protection IP20
With cover

1 50 mm gap to floor is required
2 Bushing strip for IP20 and IP23 degree of protection.

Dimensions listed for all devices presented in the diagrams

Type	A	B
3PS3 0	375	405
3PS3 2	495	525
3PS3 4	615	645
3PS3 6	730	760
3PS3 8	845	875

Height for installation as a single unit

Degree of protection	H
IP13	353
IP23	354

Dimension C for installation one above the other

Degree of protection	Boxes one above the other	
	2	3
IP00	540	810
IP10	549	819
IP13	623	893
IP20	545	815
IP23	812	1082

A maximum of three resistor boxes can be installed one above the other.

Resistor boxes and kits for increasing the degree of protection are supplied separately.

Dimension D = Minimum height of the free space above the top edge of the box with the IP00, IP10, IP20 degrees of protection

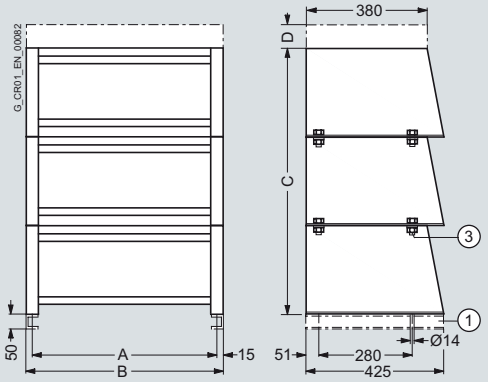
For installation as a single unit	250
For installation one above the other	250

6

3PS3 steel grid resistor units

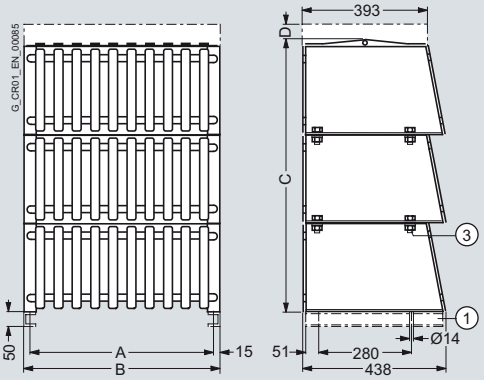
Dimension drawings (continued)

3PS3 steel grid resistor units for installation one above the other



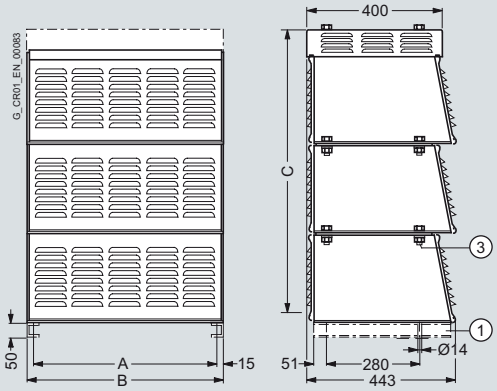
Degree of protection IP00

(1) 50 mm gap to floor is required
(3) The M12 x 25 hexagon bolts, nuts and spring lock washers required for installation must be ordered separately by the customer.



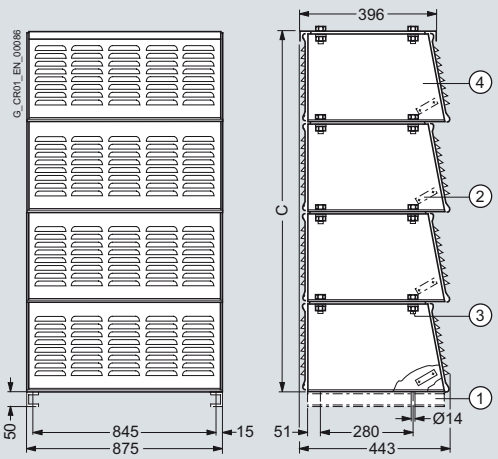
IP10 degree of protection with guard

(1) 50 mm gap to floor is required
(3) The M12 x 25 hexagon bolts, nuts and spring lock washers required for installation must be ordered separately by the customer.



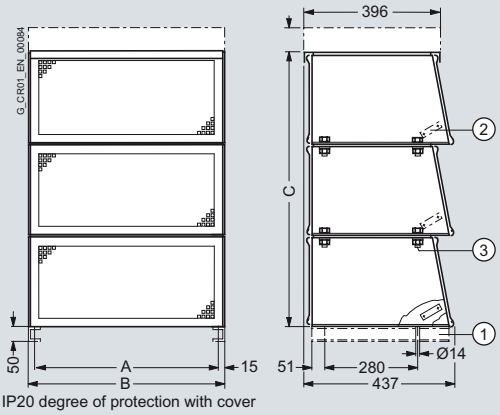
IP13 degree of protection with cover (only for box sizes 6 and 8)

(1) 50 mm gap to floor is required
(3) The M12 x 25 hexagon bolts, nuts and spring lock washers required for installation must be ordered separately by the customer.



IP23 degree of protection with terminal box (for box size 8 only)

(3) 50 mm gap to floor is required
(4) Bushing strip for IP20 and IP23 degree of protection.
(3) The M12 x 25 hexagon bolts, nuts and washers required for installation must be ordered separately by the customer.
(4) Terminal box (without resistor installation).



IP20 degree of protection with cover

(1) 50 mm gap to floor is required
(2) Bushing strip for IP20 and IP23 degree of protection.
(3) The M12 x 25 hexagon bolts, nuts and washers required for installation must be ordered separately by the customer.

Overview

3RT103 contactor

3TF68 contactor

Contactors are used in hoisting gear mainly in contactor control units for various different control tasks. The switching capacity, contact lifetime and lifetime of the switch mechanism (device lifetime) are important when selecting the contactor size.

The lifetime (endurance) of the contact pieces depends on the operating mode, inching percentage, and size of current to be switched.

In the section "Recommended selections", the currents permitted for hoisting gear motors in intermittent duty S3 and the lifetime of the contact pieces when opening the load currents assigned to intermittent duty S3 - 100 % are specified for the 3RT/3TF AC contactors. Delta connection is used for the rotor contactors.

3RT/3TF AC contactors are implemented for main current circuits:

- Rated currents I_e/AC-2 up to 820 A
- For switching on and off three-phase asynchronous motors with slip-ring rotors
- For switching the resistor stages in the rotor circuit

For selection and ordering data, see Catalogs LV 1 and LV 1T.

Applications

The contactors are suitable for switching and controlling motors and circuits of any type in AC and three-phase equipment. Depending on the application, according to IEC 60947-4-1, use of AC contactors is subdivided into various categories. Three-phase motors with slip-ring rotors are frequently used in hoisting operation. Utilization category AC-2 applies to this application. Utilization categories AC-3 and AC-4 apply to the switching of three-phase squirrel-cage motors. AC-2 duty is the typical load on starting and switching off fully loaded slip-ring motors in the starting phase, during counter torque control and in reversing and jog modes. Typical hoisting operation – mixed operation – however represents less load, because this also involves switch-off processes from stationary operation and partial loads.

Service life

The service life of the contact pieces depends, in particular, on the switched current (see the "Characteristics" section). The contactors switch on almost bouncelessly, so the starting current of motors has only a negligible influence on the electrical service life of the contact pieces.

Degree of protection, touch protection

The contactors correspond to IP00 degree of protection, drive system IP20 according to DIN EN 60947-1, Appendix C. The touch protection of the contactors with a cover is safe against finger touch according to DIN EN 50274.

Regulations

The contactors correspond to the Low-Voltage Directive No. 2006/95/EC by providing proof of compliance with standards EN 60947-4-1 and EN 60947-5-1.

Climate resistance

AC contactors are climate-resistant, designed for worldwide use, and well-proven.

- Utilization class according to DIN EN 60 721-3-3 for Siemens low-voltage switchgear ("Stationary use, weather-protected")
- Permissible operating ambient air temperature: –25 °C to +60 °C.
- Permissible relative humidity: 10 % to 100 % (infrequent condensation).

Recommended selections for special operating conditions

Function

In hoisting operation, slip-ring motors are normally used in controlled three-phase drives. We recommend the contactors listed in the table below for this typical hoisting operation. It has been assumed here that, for medium loading of the drive and medium inching mode, adequate service life of the contactor contacts is assured. Under special operating conditions, we recommend that the contactors are selected in accordance with the service life characteristics and the nomogram on Page 6/99 for determining the contact life.

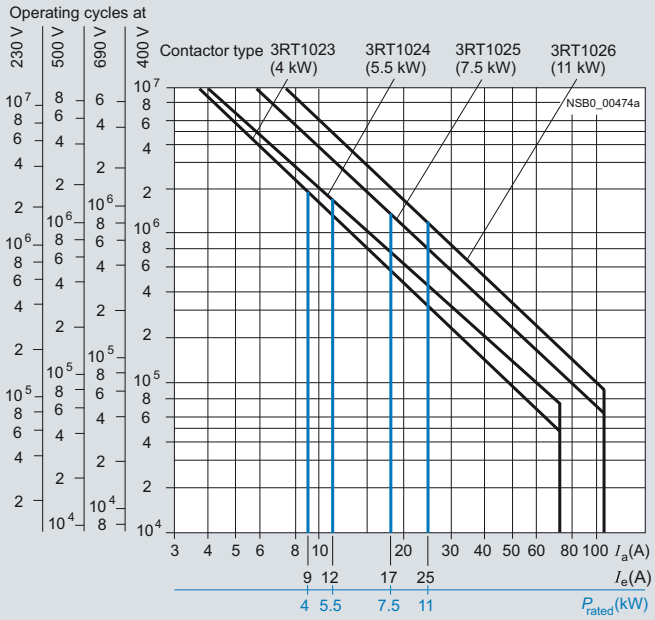
Type	Stator contactor Max. load current for hoisting gear motors for intermittent duty S3-					Rotor contactor Max. load current with contactor in delta connection for hoisting gear motors in intermittent duty S3-					Max. rotor voltage
	15 %	25 %	40 %	60 %	100 %	15 %	25 %	40 %	60 %	100 %	
	A	A	A	A	A	A	A	A	A	A	V
Selection of the contactors in hoisting operation											
3RT1024	12	11	10	10	9	18	17	15	15	14	660
3RT1025	17	15	14	13	12	26	23	21	20	18	660
3RT1026	20	19	18	16	14	30	29	27	24	21	660
3RT1034	32	30	27	24	22	48	45	41	36	33	660
3RT1035	39	37	33	28	26	59	56	50	42	39	660
3RT1036	43	40	37	33	29	65	60	56	50	44	660
3RT1044	56	54	45	40	34	84	81	68	60	51	750
3RT1045	65	62	56	48	41	98	93	84	72	62	750
3RT1046	80	76	67	60	50	120	114	101	90	75	1000
3RT1054	115	100	80	70	65	173	150	120	105	98	1000
3RT1055	150	135	120	95	80	225	203	180	143	120	1000
3RT1056	185	165	140	115	95	278	248	210	173	143	1000
3RT1064	225	205	180	150	115	338	308	270	225	173	1000
3RT1065	265	245	225	175	160	398	368	338	263	240	1000
3RT1066	300	275	250	225	190	450	413	375	338	285	1000
3RT1075	400	370	340	295	250	600	555	510	443	375	1000
3RT1076	500	460	405	340	250	750	690	608	510	375	1000
3TF68	630	575	500	450	400	945	862.5	750	675	600	1000
3TF69	820	730	600	510	400	1230	1095	900	765	600	1000

When three conducting paths are connected in parallel, the maximum load current specified in this table is multiplied by 2.5 and when two conducting paths are connected in parallel, it is multiplied by 1.8.

Function (continued)

Characteristics

Frame size S0



P_{rated} = Rated power of three-phase squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operating current

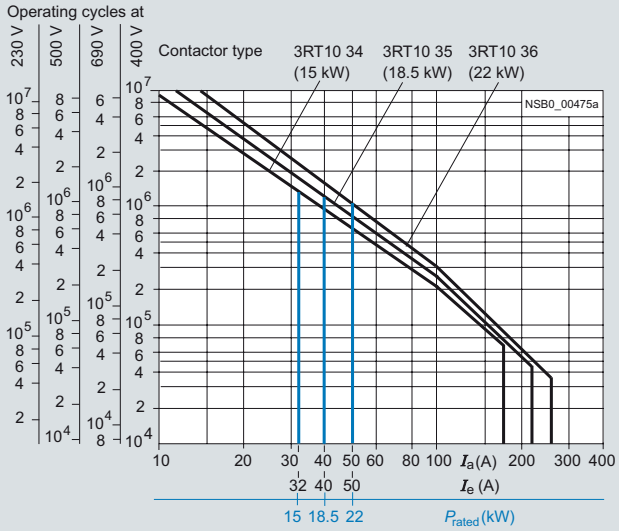
6

Recommended selections for special operating conditions

Function (continued)

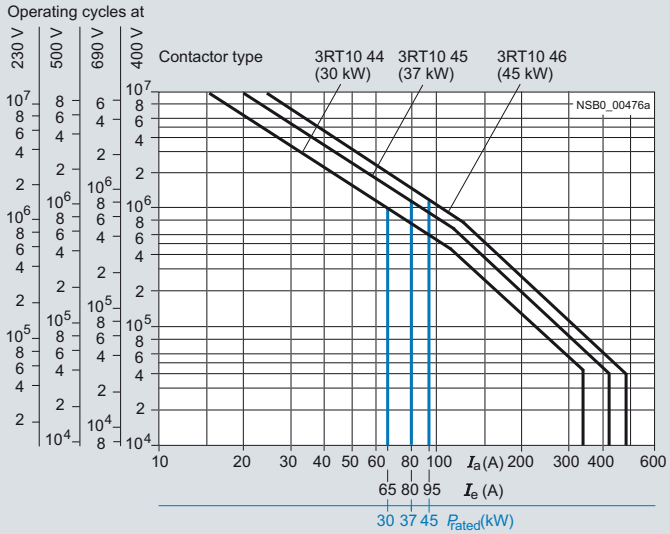
Characteristics

Frame size S2



P_{rated} = Rated power of three-phase squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operating current

Frame size S3

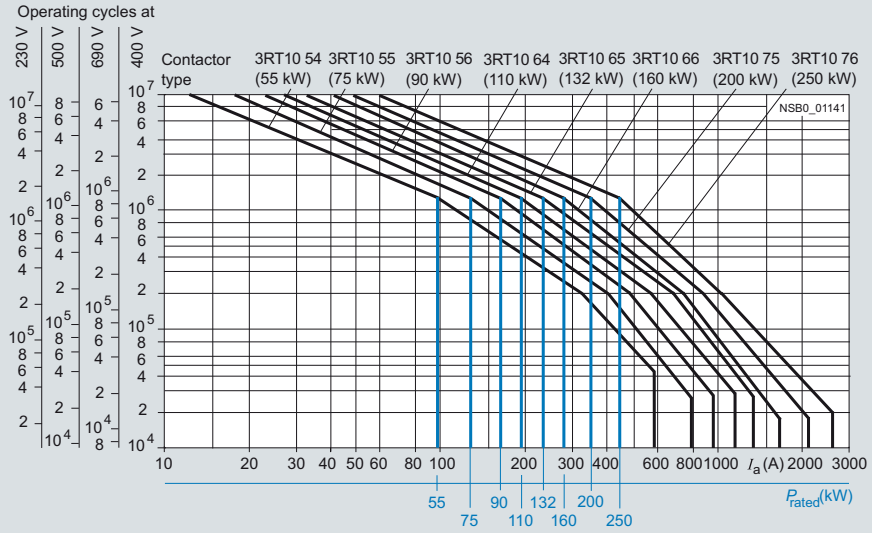


P_{rated} = Rated power of three-phase squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operating current

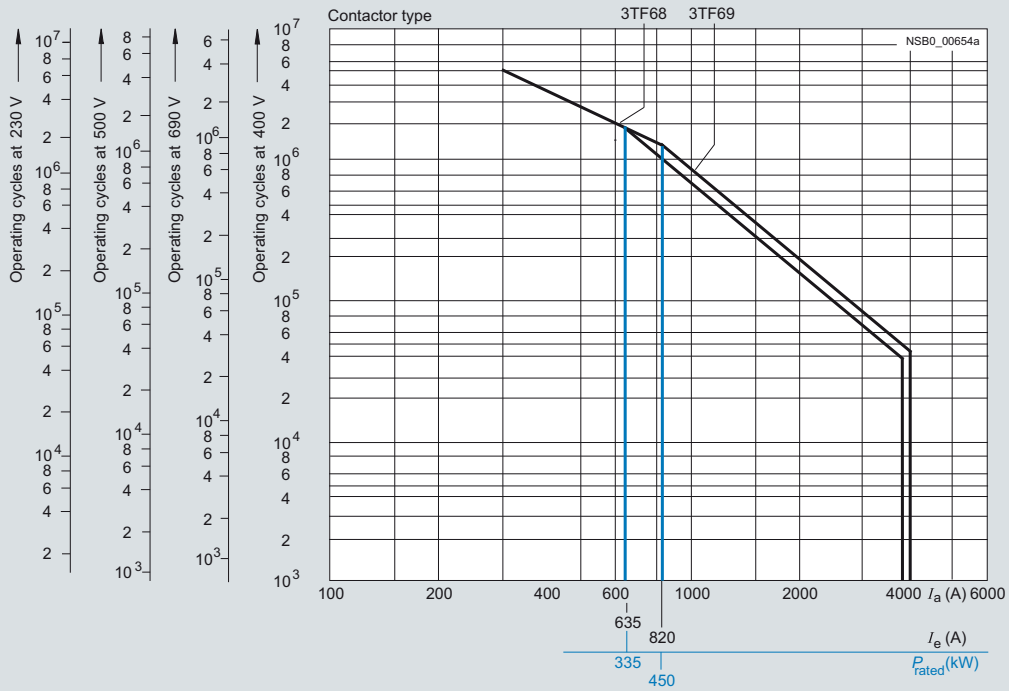
Function (continued)

Characteristics

Frame sizes S6 ... S12



P_{rated} = Rated power of three-phase squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operating current



P_{rated} = Rated power of three-phase squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operating current

6

Recommended selections for special operating conditions

Function (continued)

Selection of the contactors according to lifetime criteria during normal and inching operation

The contact pieces are stressed less when the motors are switched off from a steady speed (normal operation), and they erode quicker during inching operation. The starting current for slip-ring motors can be up to 2.5 times the rated motor current. This means that in inching operation, this current also has to be disconnected; in normal operation, however, at full load only the full rated current and under partial load even less. Calculation of the lifetime of a contact with utilization category AC-2 ($I_c = 2.5 \cdot I_e$) will only produce correct results at 100 % inching operation.

Type	Max. permissible currents and achievable contact lifetime under normal switching of these currents, cos φ 0.65 (2.5 x I_e)		Contact lifetime when disconnecting the load currents listed under S3 – 100 % for the stator contactor $I_c = I_e$ without any inching	
	A	Approx. switching cycles	A	Approx. switching cycles
Selection of the contactors in hoisting operation				
3RT1024	30	320,000	9	2,700,000
3RT1025	42	290,000	12	2,400,000
3RT1026	62	210,000	14	2,400,000
3RT1034	80	230,000	22	2,700,000
3RT1035	100	260,000	26	2,700,000
3RT1036	125	190,000	29	2,700,000
3RT1044	162	180,000	34	2,700,000
3RT1045	200	200,000	41	2,700,000
3RT1046	237	180,000	50	2,600,000
3RT1054	288	230,000	65	1,900,000
3RT1055	375	220,000	80	2,000,000
3RT1056	463	220,000	95	2,200,000
3RT1064	563	210,000	115	2,200,000
3RT1065	663	200,000	160	1,800,000
3RT1066	750	220,000	190	1,900,000
3RT1075	1000	130,000	250	1,800,000
3RT1076	1250	150,000	400	2,300,000
3TF68	1575	280,000	500	2,500,000
3TF69	1575	330,000	500	2,500,000

The maximum permissible currents (e.g. starting currents of motors) must not exceed the values specified in this table in the column "Max. permissible currents and achievable contact lifetime". These values are also not increased by contactor paths connected in parallel.

Function (continued)

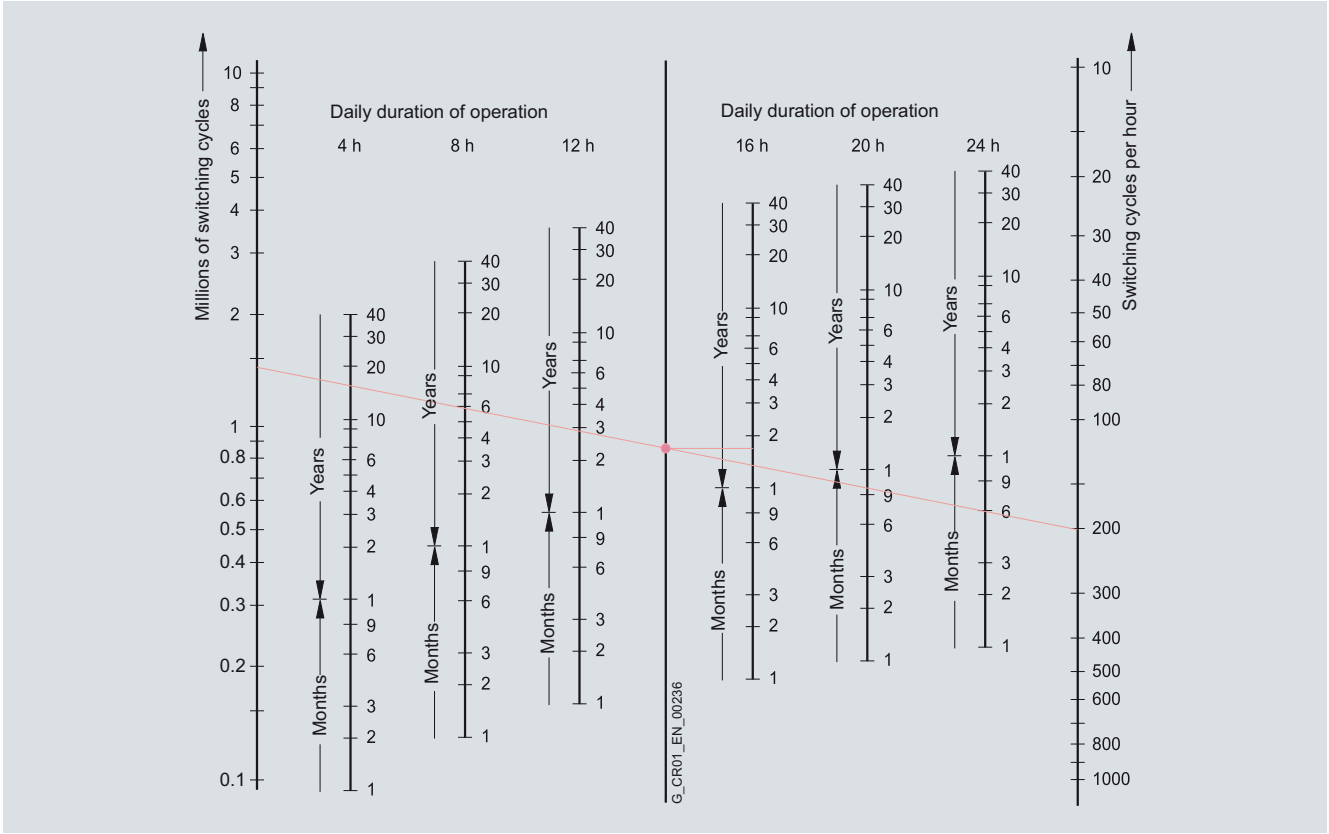
Selection of the contactors according to lifetime criteria in mixed operation

In mixed operation, i.e. when normal switching operation (disconnecting the rated current of the motor) is demanded with temporary inching operation (disconnection of multiples of the rated current of the motor), the lifetime of the contactor pieces can be calculated approximately using the following equation:

$$x = \frac{A}{1 + \frac{C}{100}\left(\frac{A}{B} - 1\right)}$$

The meaning of the symbols used in the formula is as follows:
- x Contact service life for mixed operation, in switching cycles
- A Contact service life for normal operation ($I_a = I_e$) in switching cycles (from the diagram below)
- B Contact service life for inching operation (I_a = multiple of I_e) in switching cycles (from the characteristics from Page 6/95)
- C Proportion of inching operations in the total operations as a percentage

From the characteristics, the contact life can be determined in mixed operation dependent on the rated current of the motor for inching of 10, 20, 50 and 100 %. The values calculated in this manner only apply when operating at rated motor load continuously. The lifetime of the contacts should be even longer in practice.



Nomogram for determining the contact service life in years (of 250 workdays) and months for a daily operation time of 4, 8, 12, 16, 20 and 24 h.

Solution

Connect required number of switching cycles on left-hand scale with required number of switching cycles per hour on right-hand scale, then draw a horizontal line from the point of intersection with the central axis to the left or right as far as the axis with the actual daily working time. Note: If 365 (and not 250) days are worked annually, the total working time derived from the Nomogram must be multiplied by 0.68.

Example:
Operational requirements: 1.4 million switching cycles as lifetime, 200 switching cycles per hour, 12 h operation per day

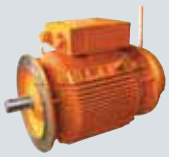
Result: Total operating time approx. 2.5 years.

Notes

Motors

You will also find CAD CREATOR dimension drawings in the dimension drawing generator and 2D/3D CAD generator at:
www.siemens.com/cadcreator

Type overview and rating data

Application	Motor type	Designation/Principle of operation	Degree of protection	Cooling method	Shaft height
	1PH8 	Asynchronous servo motor Three-phase squirrel-cage motor without housing	IP23 IP55	Forced ventilation Forced ventilation	355 355
	1PH7 	Asynchronous servo motor Three-phase squirrel-cage motor without housing	IP55	Forced ventilation	280
	1PL6 	Asynchronous servo motor Three-phase squirrel-cage motor without housing	IP23	Natural cooling	280
	1LP4/6 	Asynchronous standard motor Three-phase squirrel-cage motor	IP55	Forced ventilation	132 S – 280 M
	1LG4/6 	Asynchronous standard motor Three-phase squirrel-cage motor	IP55	Surface cooling with forced ventilation	315 L
	1LT9 	Asynchronous standard motor Three-phase slip-ring motor	IP54	Surface cooling	100 L – 200 L
	1LT8 	Asynchronous standard motor Three-phase slip-ring motor	IP54	Surface cooling	225 M – 315 L
	1LV9 	Asynchronous standard motor Three-phase slip-ring motor	IP54	Surface cooling	100 L – 200 L

Type overview and rating data

Output range in kW	Torque range in Nm	Selection tables as of Page	Drive system
1 10 100 1 000 S1 370 1 340 S1 230 730	10 100 1 000 10 000 S1 4 740 12 415 S1 2 688 6 844	7/16 7/24	SINAMICS S120 
S1 95 385	S1 1 218 2 467	7/38	SINAMICS S120 
S1 235 630	S1 1 981 3 677	7/50	SINAMICS S120 
S3 – 25 % 3 132	S3 – 25 % 30 873	7/70	SINAMICS S120 
S3 – 60 % 113 372	S3 – 60 % 1 124 2 628	7/86	SINAMICS S120 
S3 – 60 % 1.3 25	S3 – 60 % 13 175	7/102	SIMOTRAS HD 
S3 – 60 % 18 280	S3 – 60 % 216 1 938	7/104	SIMOTRAS HD 
S3 – 60 % 1,3 25	S3 – 60 % 13 175	7/136	SIMOTRAS HD 

7

Brief description

Overview

Siemens has for many years been one of the leading manufacturers of crane motors. This catalog covers the current range of three-phase motors for use in cranes. In addition to these motors, 1LG6 and 1LA8/1LL8/1PQ8 motors (Catalog D 81.1) are used as traction motors, winding motors and hoisting motors in converter-fed drives.

This catalog is aimed at crane manufacturers, system integrators, and crane operators. To make it easier to select motors, they are listed by speed and output (continuous and intermittent duty). The tables indicate the rated motor torques and the maximum permissible torques.

The squirrel-cage motors with the DURIGNIT 2000 winding insulation are suitable for use on the SINAMICS S120 drive system. Since the hoisting motors in particular operate in a large field weakening range during converter operation, you must check – alongside the usual design criteria such as thermal load (effective torque) and maximum acceleration torque – whether the motor can still generate the required maximum torque in the field weakening range. A torque-speed diagram can be created to check this.

The requirements of the motors vary depending on the application conditions:

a) Gantry cranes that are used in production halls are not usually directly subjected to climatic influences. The motors do not necessarily need high degrees of protection or special paint.

b) Cranes located in seaports are often exposed to harsh weather, which means that special measures must be taken to protect the motors against corrosion as well as the ingress of dust and water.

c) Cranes in steel works are often subject to very high ambient temperatures. The electrical and mechanical design (e.g. special bearings) must take this into account.

Applications

Siemens hoisting gear motors are particularly suitable for hoisting operations under difficult conditions. These robust motors

- offer a high degree of protection – with the exception of 1PL6 and 1PH8 (IP23) – and are particularly suitable for harsh operating conditions;
- offer torque reserves that can handle high impulse loads;
- are specially optimized for high-inertia drives with high torque.

In conjunction with the fitted spring-operated brakes, the highly compact 1LP4/6 brake motors are ideal for traversing gear in modern converter-fed cranes.

1PH8, 1PH7 and 1PL6 three-phase squirrel-cage motors are compact, forced-ventilated asynchronous motors with squirrel-cage rotors and degrees of protection IP55 (1PH8, 1PH7) and IP23 (1PH8, 1PL6). The motors are ventilated as standard by a radial external fan unit. These motors are particularly suitable for use in power houses. The 1PH8/1PH7 motors can also be installed outdoors with the right options.

The 1LT and 1LV three-phase slip-ring motors:

- Are more strongly magnetized to achieve a greater stalling torque;
- Have reinforced banding to allow for a higher spinning speed;
- Have degree of protection IP54 with open condensate drain holes, which allow condensate inside the motor to drain off.
- Are suitable for use with a stator-circuit phase-angle controller.

[1] Lower outputs available on request.

Technical data

Standards and specifications

The motors comply with the appropriate standards and regulations, especially those listed in the table below.

Title	IEC	DIN/EN	Valid for machine type	
			Squirrel-cage rotor	Slip-ring rotor
General specifications for rotating electrical machines	IEC 60034-1 IEC 60085	DIN EN 60034-1	✓	✓
General-purpose three-phase induction motors having standard dimensions and outputs	IEC 60072 mounting dimensions only	DIN EN 50347	✓	✓
Start-up characteristics for rotating electrical machines	IEC 60034-12	DIN EN 60034-12	✓	✓
Terminal designations and direction of rotation for rotating electrical machines	IEC 60034-8	DIN EN 60034-8	✓	✓
Designation for construction types, installation and terminal box position	IEC 60034-7	DIN EN 60034-7	✓	✓
Entry to terminal box	–	prDIN 42925 (08/99)	✓	✓
Built-in thermal protection	IEC 60034-11	–	✓	✓
Noise limit values for rotating electrical machines	IEC 60034-9	DIN EN 60034-9	✓	✓
IEC standard voltages	IEC 60038	DIN EN 60038	✓	✓
Cooling methods for rotating electrical machines	IEC 60034-6	DIN EN 60034-6	✓	✓
Mechanical vibrations for rotating electrical machines	IEC 60034-14	DIN EN 60034-14	✓	✓
Vibration limits	–	DIN ISO 10816	✓	✓
Degrees of protection of rotating electrical machines	IEC 60034-5	DIN EN 60034-5	✓	✓
Surface-cooled three-phase motors for intermittent duty – mounting dimensions	–	DIN 42681	–	✓
Conical shaft extensions for electrical machines	–	DIN 1448	–	✓

Testing, quality assurance, acceptance inspection

Type testing is carried out for new machines. In series production, each motor is subjected to a routine test.

As part of quality assurance measures, the motors are subjected to in-process inspections.

Type test or routine test certificates can be issued upon request (must be specified in the order).

Inspection of motors by a customer or a customer's agent incurs additional expense because each motor will already have undergone standard testing. The inspection criteria must be specified in the order (fully clarified) as this is then used as a basis for calculating the overhead and billable costs.

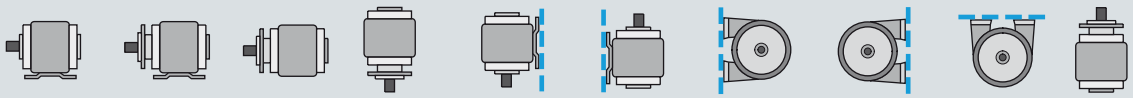
Technical definitions

Technical data (continued)

Types to EN 60034-7/IEC 60034-7

Hoisting gear motors are primarily used in construction types IM B3, IM B5, IM V1, and IM B35, although they can be supplied in other construction types (please enquire).

The individual sections in this catalog provide information about the listed available construction types of the various motor series.



EN 600034-7 Code I	IM B3	IM B35	IM B5	IM V1	IM V5	IM V6	IM B6	IM B7	IM B8	IM V3
EN 600034-7 Code II	IM 1001	IM 2001	IM 3001	IM 3011	IM 1011	IM 1031	IM1051	IM 1061	IM 1071	IM 3031

Insulation

The insulation system protects the winding against aggressive gases, vapors, dust, oil and increased air humidity. It can withstand the vibration stresses and ambient conditions that normally occur in hoisting operations.

Temperature classes

In EN 60034-1, the winding insulation (incl. impregnating material) is classified into temperature classes which are assigned specific overtemperatures.

The motor output specifications are uniformly based on a coolant temperature of 40 °C at an installation altitude of 1000 m above sea level for all insulation classes. The various sections in this catalog provide information about the permissible outputs under other ambient conditions.

Temperature limit in K according to temperature class

B	F	H
80	105	125

Mechanical balance quality

Dynamic balancing

All rotors in hoisting gear motors are dynamically balanced with an inserted half featherkey. This corresponds to vibration severity grade A (normal). EN 60034-14 specifies the factory acceptance vibration test procedures and vibration limits for electrical machines. "Half key balancing" (half featherkey = code H) is specified here based on ISO 8821.

Full-key balanced machines can also be shipped as special versions (please inquire).

Note for 1LP and 1LG three-phase squirrel-cage motors:

Low-vibration version B can be supplied to fulfill stricter requirements on smooth running. For converter-fed operation with frequencies greater than 60 Hz, special balancing is required for compliance with the specified limit values (plain text: maximum supply frequency/speed)

Vibration severity

The vibration severity is the r.m.s. value of the vibration velocity (frequency range from 10 to 1000 Hz).

A motor balanced in accordance with the relevant standard, however, may vibrate more strongly at the operating site.

This can be caused by the following factors:

- Unsuitable foundation
- Interference from the driven machine
- Components with a natural frequency that is almost identical to the frequency of the residual unbalance of the motor.

In cases such as these, each element in the system – not just the motor itself – needs to be checked.

The table below shows the limit values of electrical machines in accordance with EN 60034-14 Sept. 2004.

Limits (rms values) of max. vibration variables of vibration displacement *s*, vibration velocity *v* and acceleration *a* for the shaft height H

Vibration severity grade	Machine installation	Shaft height H in mm								
		56 < H ≤ 132			132 < H ≤ 280			H > 280		
		s_{rms} µm	v_{rms} mm/s	a_{rms} mm/s²	s_{rms} µm	v_{rms} mm/s	a_{rms} mm/s²	s_{rms} µm	v_{rms} mm/s	a_{rms} mm/s²
A	Free suspension	25	1.6	2.5	35	2.2	3.5	45	2.8	4.4
	Rigid clamping	21	1.3	2.0	29	1.8	2.8	37	2.3	3.6
B	Free suspension	11	0.7	1.1	18	1.1	1.7	29	1.8	2.8
	Rigid clamping	–	–	–	14	0.9	1.4	24	1.5	2.4

The balancing type is stamped on the face of the DE [1] shaft extension:

F = Balancing with full featherkey
H = Balancing with half featherkey
N = Balancing without featherkey

[1] DE is the motor's drive end with shaft. NDE is the motor's non-drive end.

Technical data (continued)

Bearings

All motors are equipped with rolling-contact bearings.

Motors equipped with cylindrical roller bearings are shipped with a rotor shipping brace to prevent brinelling in the DE [1] bearings during transportation and storage.

Shaft extensions

The squirrel-cage motors and the slip-ring motors up to and including shaft height 160 have cylindrical shaft extensions, while the slip-ring motors above and including shaft height 180 have a conical shaft extension. The motors are always supplied with a featherkey inserted in the shaft.

Coupling

The standard versions of hoisting gear motors are designed for coupling output. Pinion, chain, and belt outputs generate greater cantilever forces and bearing loads, which must be taken into account.

Motor protection

Hoisting gear motors are operated with a higher load factor in intermittent duty. If there is excessive power consumption, an undervoltage in the supply, an excessive ON duration, or excessive coolant temperatures or if the heat is not being dissipated adequately (speed of naturally cooled machines is too low), this can cause the temperature in the windings to rise and the motors to overheat. Direct and indirect measures can be taken to protect the motors from overheating. An adequate monitoring concept should take into account all the relevant factors.

In intermittent duty, devices that offer indirect protection (e.g. circuit-breakers, overload relays, or I^2t monitors) can only partly detect the causes of overheating.

The most reliable method is to detect excessively high temperatures directly at the point at which they occur (i.e. the machine windings). In this way, the effects of all possible causes can be detected by a single means.

The resistance of the PTC thermistor detectors integrated in the windings increases significantly if the response temperature is exceeded. A tripping unit (Catalog LV1) detects this increase and uses a contact to intervene in the open-loop control. An additional detector loop for emitting a warning signal just below the shutdown temperature can also be used in process-critical production processes to allow working cycles that have already been started to be brought to an end.

It is recommended that KTY 84 temperature sensors be installed in converter-fed drives (the basic versions of 1PL6, 1PH7 and 1PH8 motors are equipped with these sensors as standard). This sensor is embedded in the winding head of the motor in the same manner as a PTC thermistor. The data is evaluated directly in the converter. Warning and shutdown response limits can be set. Since only one sensor can be evaluated in the converter, this motor protection method is only suitable in single-motor drives; PTC thermistors are recommended for drives with more than one motor (e.g crane traversing gears).

[1] DE is the motor's drive end with shaft. NDE is the motor's non-drive end.

Motor dimensioning

Overview

Motor dimensioning

When motors for hoisting gear drives are dimensioned (high-inertia drives), two criteria must be taken into account:

- The required maximum torque (starting torque)
- The rated output (thermal motor capacity).

When you check the torque, you check whether the motor can generate the required maximum torque (e.g. for acceleration). The maximum permissible torque is greater than the rated torque and is often specified as a multiple of the rated torque. An adequate safety margin from the stalling torque must be maintained.

When the output is dimensioned, the rated motor output is adjusted in accordance with the effective power requirements of the drive. The rated motor output depends on the motor temperature which, in turn, is influenced by the operating mode and the thermal behavior of the motor. The rating data of a motor differs for the various operating modes in accordance with DIN EN 60034-1. The data is usually specified for one or more of the following operating modes:

- Continuous duty S1
  (also corresponds to intermittent duty S3 – 100 %)
- Short-time duty S2
- Intermittent duty S3

Intermittent duties S4 and S5 vary to such an extent that accurate data can only be provided when certain additional conditions have been clearly defined.

The operating modes are defined in accordance with EN 60034-1.

Symbols used in formulae:

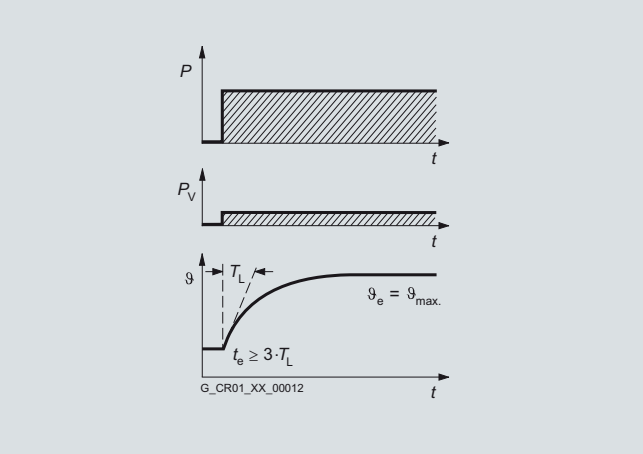
P	Load / specified motor output
P_V	Power loss of the motor
ϑ_e	Final temperature, steady-state temperature
ϑ_{max}	Max. winding temperature in relevant operating mode
ϑ_{mean}	Mean steady-state temperature
t_e	Operating time
t_p	Idle time
t_s	Duty cycle duration
T_L	Thermal time constant of the motor (running)
T_{St}	Thermal time constant of the motor (stationary)

Overview (continued)

Continuous duty (S1)

Definition

Operation with a constant load state, the duration of which is sufficient to attain thermal equilibrium.



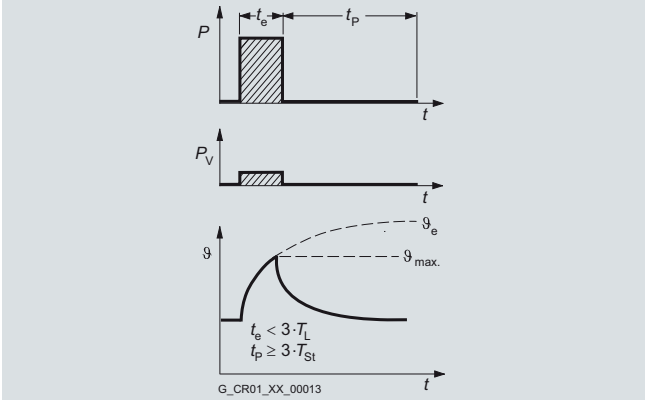
Explanation

The operating time t_e of the motor must be greater than 3 x T_L to ensure that thermal equilibrium is attained. The rated motor output for continuous duty must be designed such that the final temperature ϑ_e matches the permissible winding temperature. Start-up is deliberately discounted under the assumption that a single high-inertia start will not achieve the final temperature. The length of the subsequent idle time is insignificant. Caution is advised, however, when high-inertia starting is carried out on a warm machine or when a machine is started up several times in succession. Certain restrictions may apply or advice from a third party should be sought.

Short-time duty (S2)

Definition

Operation with a constant load state that, however, does not last long enough to attain thermal equilibrium, followed by idle time that lasts until the machine temperature differs from the coolant temperature by no more than 2 K.



Explanation

The operating time t_e must be less than 3 x T_L to ensure that the theoretical final temperature is not reached. The rated motor output and the operating time are harmonized in such a way that the maximum winding temperature ϑ_{max} does not exceed the permissible values. Here, too, start-up is deliberately discounted because it is assumed that the machine starts up cold and the start-up procedure is short with respect to the operating time t_e.

The rated motor output for short-time duty can be higher than for continuous duty, although the permissible operating time must also be specified. The shorter the operating time, the higher the rated output of the machine. Operating times of 10, 30, 60, and 90 min. are recommended (see also "Selection and ordering data" for "1LT9 and 1LT8 three-phase slip-ring motors").

The subsequent idle time must be sufficiently long to ensure that the machine can cool back down to the ambient temperature (i.e. t_P is greater than or equal to 3 x T_{St}) because otherwise the maximum temperature will be exceeded the next time a similar duty cycle is carried out.

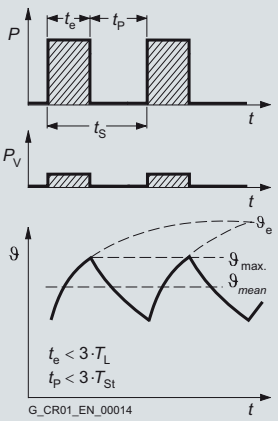
Motor dimensioning

Overview (continued)

Intermittent duty without the effect of the start-up process (S3)

Definition

Operation that involves a sequence of similar duty cycles, each with a constant-load period and idle time, whereby the starting current does not have a noticeable effect on the temperature rise (the duty cycle duration is generally short enough to ensure that thermal equilibrium is not attained).



Explanation

The operating time t_e must be less than 3 x T_L to ensure that the theoretical final temperature ϑ_e is not reached. The subsequent idle time t_p, however, is also less than 3 x T_{St}, which means that the ambient temperature is no longer reached. A mean steady-state value ϑ_{mean} develops around which the temperature varies, but is below the theoretical final temperature ϑ_e.

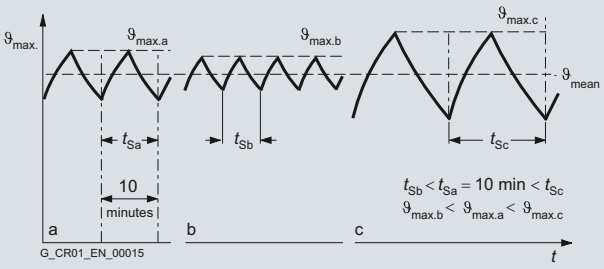
The rated motor output during intermittent duty is greater than during continuous duty. The time constants T_L and T_{St} may be different. This influences the rated output during intermittent duty and is taken into account in the S3 motor tables.

To determine the most suitable motor, therefore, a knowledge of the operating and idle times is required in addition to the required output during the operating time. They are specified by the duty cycle duration (total time) and the relative ON duration in % of the cycle duration. If no data has been provided for the duty cycle duration, 10 minutes apply in accordance with DIN EN 60034-1. The S3 motor tables are based on this. Values of 15, 25, 40, and 60 % are recommended for the cyclic duration factor.

Effect of varying duty cycle durations

The S3 rated output is designed in such a way that the temperature peaks ϑ_{max} match the permissible values with a 10 minute duty cycle duration (see "a" in diagram below). Shorter duty cycle durations are not critical because lower temperature peaks occur at the same mean winding temperature ϑ_{mean} (see "b" in diagram below). Since longer duty cycle durations result in higher temperature peaks (see "c" in diagram below) which, in turn, reduce the service life of the insulation, advice from a third party should be sought in this case.

In S3 duty, the start-up processes are not discounted; the relevant standard assumes that they do not have any significant influence on the temperature rise. Any number of duty cycles can be carried out per hour provided that this standard is fulfilled.



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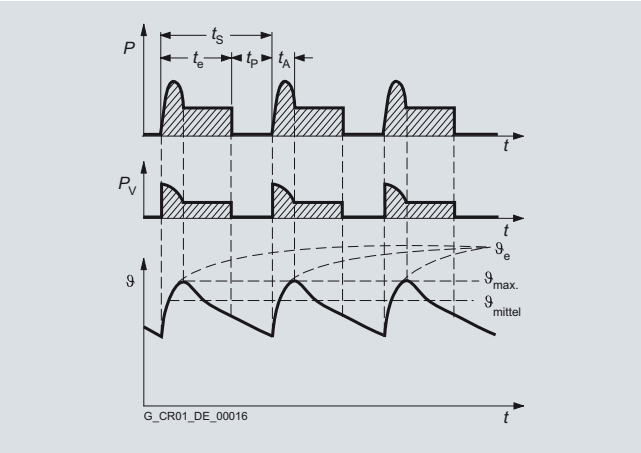
Overview (continued)

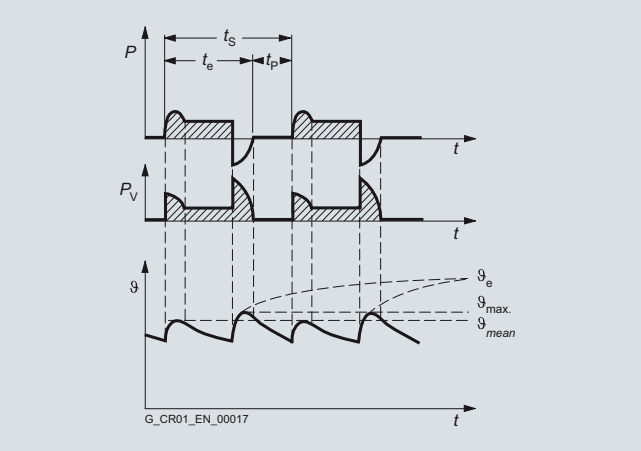
Intermittent duty with effect of the start-up process (S4)
Intermittent duty with effect of the start-up process and electrical braking (S5)

Definition

Operation that involves a sequence of similar duty cycles, each with a noticeable start-up time, a constant-load period, a period of rapid electrical braking (with S5), and idle time.



Intermittent duty S4



Intermittent duty S5

Explanation

These operating modes closely resemble S3 duty, except that the temperature rise caused by start-up and, in some cases, electrical braking are also included. This additional power loss depends on the acceleration torque and the time in which this occurs; in other words, it depends on the linear and rotating masses to be accelerated (kinetic energy). The masses that are moved, therefore, must be known. These are based on the moment of inertia referred to the motor shaft. How often and over what period of time the masses are subject to acceleration and braking procedures must also be known.

The more duty cycles performed by the drives in hoisting gear every hour (e.g. short traveling distances or low hoisting heights), the greater the importance of the acceleration work for motor dimensioning purposes.

To accurately dimension a motor for duty cycles S4 and S5, therefore, the following information is required in addition to the steady-state output:

- Cyclic duration factor (CDF)
- External moment of inertia
- Acceleration or acceleration torque
- Accelerating time
- Number of working cycles per hour.

General performance specifications for motors in S4/S5 duty are not possible because they always vary depending on the specific conditions under which the driven machine is operating (external moment of inertia) and the operating mode (working cycles, ON duration). Hoisting gear drives do not have a constant load across several working cycles but instead have a collective load.

Motor dimensioning

Overview (continued)

Calculating the effective value, ON duration

Actual duty can also be converted to a thermally equivalent S3 mode by means of "effective value calculation", which means that the S3 motor tables can be used again.

A torque diagram (duty cycle diagram) must be available when the calculation is performed (see adjacent diagrams).

The value (assumed to be constant throughout the operating time) that would generate the same temperature rise as the actual torque is defined as the effective torque. The ON duration is the sum of operating times with respect to the total duty cycle duration.

If the individual traveling duty cycles are not the same (e.g. due to different loads or distances), all the different traveling cycles must be included in the effective value and ON duration calculation until they repeat themselves.

Differences in thermal behavior when the motor is running and when it is at a standstill are already taken into account with respect to the ON durations in the S3 tables. For this reason, M_{eff} must be calculated with respect to the operating time t_E and not to the duty cycle duration t_S.

To ensure that the effective value can be defined with sufficient accuracy, however, the operating phases during which the motor is not cooled as efficiently must be taken into account (e.g. during correction runs at low speeds and with naturally cooled motors).

Effects such as these can only be taken into account by the motor manufacturer.

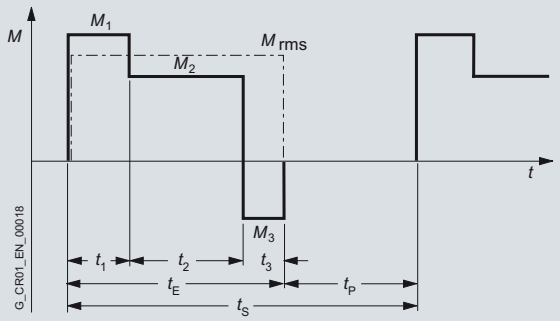
The operating conditions for hoisting and traversing gears also vary enormously:

- The external moment of inertia with respect to the motor moment of inertia is usually greater in traversing gears than in hoisting gears; in other words, the acceleration and braking work are more relevant for traversing gears than for hoisting gears even when the number of duty cycles performed and the ON duration are the same.
- The steady-state torque (load torque) with respect to the rated motor torque is usually greater in hoisting gears than in traversing gears (traveling resistance).
- The torque diagram for traversing gears does not take the direction of travel into account (without wind forces). The effect of the payload is minimal with high traversing gear weights; i.e. with handling cranes, it is repeated after each travel movement (after the second travel movement at the latest).
- The torque diagram for hoisting cranes is largely dependent on the load. The motor torques when the same load is hoisted and lowered are different (efficiency) and, in the case of handling cranes, a traveling duty cycle with a load is usually followed by a traveling duty cycle with empty load tackle (collective loading; see also FEM, Section I, Calculation Principles for Cranes); i.e. the cycle required for calculating the effective value is repeated after the fourth travel movement at the earliest.

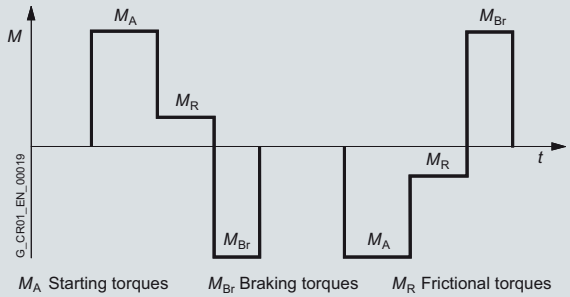
$$M_{eff} = \sqrt{\frac{\Sigma M^2 \cdot t}{t_E}}$$

ED ON duration $\frac{t_E \cdot 100}{t_S}$ %

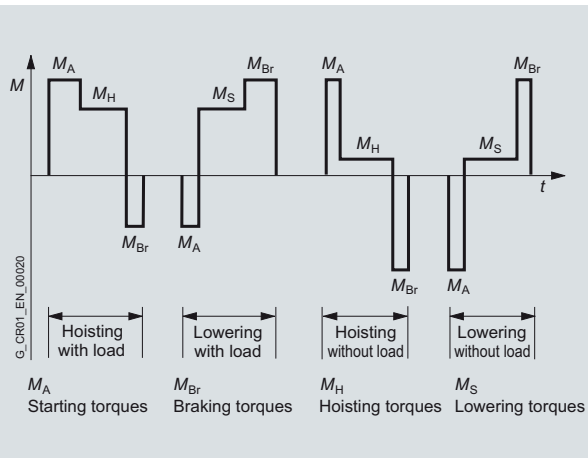
M_1, M_2, M_3 Torques in travel diagram
t_1, t_2, t_3 Operating times of torques M_1, M_2, M_3
t_P Idle time
t_E Operating time of motor = $t_1 + t_2 + t_3$
t_S Duty cycle duration = $t_E + t_P$



Torque diagram



Typical torque diagram for a gantry across one conveying cycle



Typical torque diagram for hoisting gear across one conveying cycle

Overview

1PH8 three-phase motor

The innovations in the field of modern crane installations place higher and higher demands on compact asynchronous motors.

The compact asynchronous motor 1PH8 of shaft height 355 covers the increased performance requirements, e.g. for intermittent duty S3 – 40 % with up to 1.97 MW.

This motor series is a converter solution which has been specially developed for use in conjunction with the SINAMICS S120 drive system.

The 1PH8 asynchronous motors have the following features:

- Forced ventilated asynchronous motors with squirrel-cage rotor with IP55 degree of protection. The motors are ventilated as standard by a radial, externally mounted fan unit. With the "enhanced corrosion protection" option, the motors can also be installed outdoors.
- Forced ventilated asynchronous motors with squirrel-cage rotor with IP23 degree of protection. These motors are also ventilated as standard by a radial, externally mounted fan unit. These motors are particularly suitable for installation in power houses.

Benefits

- High power density with small motor dimensions
- Wide speed control ranges
- Speed down to zero without reducing the torque (constant torque characteristic)
- High rotational accuracy, even at the lowest speeds
- Fitted as standard with regreasing unit and insulated NDE bearing
- Optimized for converter operation on SINAMICS
- Large selection of options

Further information

All the electrical data for intermittent duty S3 is provided on the following pages.

1PH8 motors, shaft height 355

Technical data

Stator winding insulation to EN 60034-1 (IEC 60034-1)	Utilization to temperature class 155 (F) for a coolant temperature of up to 40 °C
Cooling to EN 60034-6 (IEC 60034-6)	Radial fan NDE top mounted (intake from NDE)
Temperature monitoring	KTY84 temperature sensor in the stator winding additional KTY 84 as spare
Motor supply voltage (for technical data, see the ventilation data and sound pressure level)	400 V 3 AC, 50/60 Hz 480 V 3 AC, 60 Hz
Type to EN 60034-7 (IEC 60034-7)	IM B3
Degree of protection to EN 60034-5 (IEC 60034-5)	IP 23 or IP 55
Shaft extension on the drive end in accordance with DIN 748-3 (IEC 60072-1)	Featherkey full or half-key balancing
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) [1]	Tolerance N (normal) Tolerance R (reduced)
Vibration magnitudes in accordance with Siemens / EN 60034-14 (IEC 60034-14)	Level A (normal) Level R / A (reduced)
Sound pressure level in accordance with EN ISO 1680 tolerance +3 dB	Sound pressure level 85 dB(A)
Maximum speeds	2800 rpm
External encoder systems	Incremental encoder HTL 1024 pulses/revolution POG 10 (Baumer-Hübner) Incremental encoder HTL 1024 pulses/revolution HOG 28 (Baumer-Hübner)
Connection	Terminal box NDE right or DE top
Paint finish	Standard paint finish, anthracite, RAL 7016
Options	Refer to Options and Selection and ordering data

S/R = signals/revolution

Notes

The rated motor data is specified in the selection and ordering data for a nominal pulse frequency of 2.5 kHz.

[1] Rotational accuracy of shaft extension, concentricity of spigot and shaft and perpendicularity of mounting face of flange to shaft.

Technical data (continued)

Ventilation data and sound pressure level

Motor version Forced ventilation (see 8th and 11th positions in the Order No.)	Fan motor: Current consumption at 400 V / 50 Hz (±10 %)	400 V / 60 Hz (±10 %)	460 V / 60 Hz (±10 %)	Direction of air flow	Sound pressure level L_{pA} (1m) Motor + external fan, rated load, tolerance +3 dB, nominal pulse frequency 2.5 kHz	Volume of air min.
	A	A	A		dB	m^3/s
1PH8 motors, shaft height 355						
1PH835.-7..1 (asynchronous version, external fan with noise level of 85 dB(A), IP55 degree of protection)	8.2	7.9	7.9	NDE --> DE DE --> NDE	85	1
1PH835.-7..4 (asynchronous version, external fan with noise level of 85 dB(A), IP23 degree of protection)	8.2	13.2 [2]	10.9 [1]	NDE --> DE DE --> NDE	85	1.3

Important note:
For 1PH8 / SH355 / IP23 / 85 dB(A) motors, a special fan motor must be ordered using option R60/R61R60/R61 for operating the external fan on a supply voltage of 60 Hz (see Selection and ordering data/Order No. suffixes)

Terminal box, max. connectable conductor cross-sections

Terminal box type (see selection and ordering data for details)	Cable entry (power)	Cable entry (external signals)	Max. outer cable diameter [3]	Number of main terminals	Max. cross-section per terminal	Max. current per terminal [4]
			mm		mm^2	A
1PH8 motors, shaft height 355						
1XB7712-P01 [7]	3 x M63 x 1.5	1 x M20 x 1.5 [5] 1 x M25 x 1.5 [6]	53	Phases: 3 x 4 M16 Grounding: 4 x M16	3 x 95	450
1XB7712-P03 [7]	4 x M75 x 1.5	1 x M20 x 1.5 [5] 1 x M25 x 1.5 [6]	68	Phases: 3 x 4 M16 Grounding: 4 x M16	4 x 185	1150
1XB7820-P00	Not drilled	1 x M20 x 1.5 [5] 1 x M25 x 1.5 [6]	–	Phases: 2 x 3 x 4 M16 Grounding: 8 x M16	8 x 240	2100

[1] Special fan for operation at 460 V/60 Hz (±10 %), option: R60 (see Selection and ordering data / Order No. suffixes)

[2] Special fan for operation at 400 V/60 Hz (±10 %), option: R61 (see Selection and ordering data / Order No. suffixes)

[3] Dependent on the design of the metric cable gland

[4] Current carrying capacity based on IEC 60364-5-52, routing type C

[5] Mounted on left side of terminal box (viewed towards cable entries)

[6] Mounted on right side of terminal box (viewed toward cable entries)

[7] For terminal box type 1XB7712-P.., depending on the standard, other cable entries (power) can be ordered using P options (see Selection and ordering data / Order No. suffixes)

1PH8 motors, shaft height 355

Selection and ordering data

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 600 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
600	30.4	545	8675	755 (at 500 V)	12640	1310	1100	4840	2260	1320	870	14.74	**1PH8 350-7■B4 0-■■■0**	2235	1XB7712-P03
	30.5	610	9709	850 (at 500 V)	12500	1280	1100	4810	2260	1320	870	14.74	**1PH8 351-7■B4 0-■■■0**	2235	1XB7712-P03
	30.5	735	11699	1010 (at 500 V)	15040	1490	1000	5770	2700	1570	1040	17.40	**1PH8 352-7■B4 0-■■■0**	2560	1XB7712-P03
	30.5	865	13768	1175 (at 500 V)	17050	1630	1000	6550	3070	1790	1180	20.66	**1PH8 354-7■B4 0-■■■0**	2889	1XB7712-P03
	30.5	1015	16155	1360 (at 500 V)	20690	1950	900	7930	3710	2160	1420	24.22	**1PH8 356-7■B4 0-■■■0**	3256	1XB7712-P03
	30.5	1145	18225	1535 (at 500 V)	23650	2200	900	9070	4240	2470	1630	27.79	**1PH8 358-7■B4 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
600	30.4	455	7242	640 (at 500 V)	12640	1310	1100	4840	2260	1320	870	14.74	**1PH8 350-7■B4 0-■■■0**	2235	1XB7712-P03
	30.5	510	8118	720 (at 500 V)	12500	1280	1100	4810	2260	1320	870	14.74	**1PH8 351-7■B4 0-■■■0**	2235	1XB7712-P03
	30.5	615	9789	855 (at 500 V)	15040	1490	1000	5770	2700	1570	1040	17.40	**1PH8 352-7■B4 0-■■■0**	2560	1XB7712-P03
	30.5	725	11540	990 (at 500 V)	17050	1630	1000	6550	3070	1790	1180	20.66	**1PH8 354-7■B4 0-■■■0**	2889	1XB7712-P03
	30.5	850	13529	1145 (at 500 V)	20690	1950	900	7930	3710	2160	1420	24.22	**1PH8 356-7■B4 0-■■■0**	3256	1XB7712-P03
	30.5	960	15280	1295 (at 500 V)	23650	2200	900	9070	4240	2470	1630	27.79	**1PH8 358-7■B4 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
600	30.4	370	5889	530 (at 500 V)	12640	1310	1100	4840	2260	1320	870	14.74	**1PH8 350-7■B4 0-■■■0**	2235	1XB7712-P03
	30.5	415	6605	590 (at 500 V)	12500	1280	1100	4810	2260	1320	870	14.74	**1PH8 351-7■B4 0-■■■0**	2235	1XB7712-P03
	30.5	500	7958	700 (at 500 V)	15040	1490	1000	5770	2700	1570	1040	17.40	**1PH8 352-7■B4 0-■■■0**	2560	1XB7712-P03
	30.5	590	9391	810 (at 500 V)	17050	1630	1000	6550	3070	1790	1180	20.66	**1PH8 354-7■B4 0-■■■0**	2889	1XB7712-P03
	30.5	690	10983	940 (at 500 V)	20690	1950	900	7930	3710	2160	1420	24.22	**1PH8 356-7■B4 0-■■■0**	3256	1XB7712-P03
	30.5	780	12415	1060 (at 500 V)	23650	2200	900	9070	4240	2470	1630	27.79	**1PH8 358-7■B4 0-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 600 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
600	30.5	545	8675	545 (at 690 V)	12620	950	1100	4830	2250	1310	860	14.74	**1PH8 350-7■H4 0-■■■0**	2235	1XB7712-P01
	30.5	610	9709	620 (at 690 V)	12490	930	1100	4810	2250	1310	870	14.74	**1PH8 351-7■H4 0-■■■0**	2235	1XB7712-P01
	30.5	735	11699	740 (at 690 V)	14450	1040	1000	5570	2610	1530	1010	17.40	**1PH8 352-7■H4 0-■■■0**	2560	1XB7712-P03
	30.5	865	13768	855 (at 690 V)	17320	1200	1000	6650	3110	1810	1190	20.66	**1PH8 354-7■H4 0-■■■0**	2889	1XB7712-P03
	30.5	1015	16155	980 (at 690 V)	20800	1420	900	7980	3730	2170	1430	24.22	**1PH8 356-7■H4 0-■■■0**	3256	1XB7712-P03
	30.4	1145	18225	1110 (at 690 V)	24270	1630	900	9320	4360	2540	1670	27.79	**1PH8 358-7■H4 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
600	30.5	455	7242	460 (at 690 V)	12620	950	1100	4830	2250	1310	860	14.74	**1PH8 350-7■H4 0-■■■0**	2235	1XB7712-P01
	30.5	510	8118	525 (at 690 V)	12490	930	1100	4810	2250	1310	870	14.74	**1PH8 351-7■H4 0-■■■0**	2235	1XB7712-P01
	30.5	615	9789	625 (at 690 V)	14450	1040	1000	5570	2610	1530	1010	17.40	**1PH8 352-7■H4 0-■■■0**	2560	1XB7712-P03
	30.5	725	11540	720 (at 690 V)	17320	1200	1000	6650	3110	1810	1190	20.66	**1PH8 354-7■H4 0-■■■0**	2889	1XB7712-P03
	30.5	850	13529	830 (at 690 V)	20800	1420	900	7980	3730	2170	1430	24.22	**1PH8 356-7■H4 0-■■■0**	3256	1XB7712-P03
	30.4	960	15280	940 (at 690 V)	24270	1630	900	9320	4360	2540	1670	27.79	**1PH8 358-7■H4 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
600	30.5	370	5889	380 (at 690 V)	12620	950	1100	4830	2250	1310	860	14.74	**1PH8 350-7■H4 0-■■■0**	2235	1XB7712-P01
	30.5	415	6605	430 (at 690 V)	12490	930	1100	4810	2250	1310	870	14.74	**1PH8 351-7■H4 0-■■■0**	2235	1XB7712-P01
	30.5	500	7958	510 (at 690 V)	14450	1040	1000	5570	2610	1530	1010	17.40	**1PH8 352-7■H4 0-■■■0**	2560	1XB7712-P03
	30.5	590	9391	590 (at 690 V)	17320	1200	1000	6650	3110	1810	1190	20.66	**1PH8 354-7■H4 0-■■■0**	2889	1XB7712-P03
	30.5	690	10983	680 (at 690 V)	20800	1420	900	7980	3730	2170	1430	24.22	**1PH8 356-7■H4 0-■■■0**	3256	1XB7712-P03
	30.4	780	12415	770 (at 690 V)	24270	1630	900	9320	4360	2540	1670	27.79	**1PH8 358-7■H4 0-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH8 asynchronous motor Shaft height 355**	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 800 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
800	40.4	705	8416	975 (at 500 V)	12910	1850	1400	8430	3890	2250	1470	14.74	**1PH8 350-7■Q4 0-■■■0**	2235	1XB7712-P03
	40.5	780	9311	1080 (at 500 V)	12830	1810	1400	8390	3880	2250	1470	14.74	**1PH8 351-7■Q4 0-■■■0**	2235	1XB7712-P03
	40.5	925	11042	1255 (at 500 V)	15280	2050	1300	9990	4610	2660	1740	17.40	**1PH8 352-7■Q4 0-■■■0**	2560	1XB7712-P03
	40.4	1105	13191	1500 (at 500 V)	19170	2480	1300	12520	5770	3330	2170	20.66	**1PH8 354-7■Q4 0-■■■0**	2889	1XB7712-P03
	40.4	1265	15101	1700 (at 500 V)	22380	2830	1200	14610	6730	3890	2540	24.22	**1PH8 356-7■Q4 0-■■■0**	3256	1XB7820-P00
	40.5	1410	16832	1885 (at 500 V)	23090	2860	1200	15090	6980	4030	2640	27.79	**1PH8 358-7■Q4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 – 60 %															
800	40.4	590	7043	825 (at 500 V)	12910	1850	1400	8430	3890	2250	1470	14.74	**1PH8 350-7■Q4 0-■■■0**	2235	1XB7712-P03
	40.5	650	7759	915 (at 500 V)	12830	1810	1400	8390	3880	2250	1470	14.74	**1PH8 351-7■Q4 0-■■■0**	2235	1XB7712-P03
	40.5	775	9252	1060 (at 500 V)	15280	2050	1300	9990	4610	2660	1740	17.40	**1PH8 352-7■Q4 0-■■■0**	2560	1XB7712-P03
	40.4	925	11042	1265 (at 500 V)	19170	2480	1300	12520	5770	3330	2170	20.66	**1PH8 354-7■Q4 0-■■■0**	2889	1XB7712-P03
	40.4	1060	12654	1435 (at 500 V)	22380	2830	1200	14610	6730	3890	2540	24.22	**1PH8 356-7■Q4 0-■■■0**	3256	1XB7820-P00
	40.5	1180	14086	1590 (at 500 V)	23090	2860	1200	15090	6980	4030	2640	27.79	**1PH8 358-7■Q4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 - 100 % (S1)															
800	40.4	480	5730	680 (at 500 V)	12910	1850	1400	8430	3890	2250	1470	14.74	**1PH8 350-7■Q4 0-■■■0**	2235	1XB7712-P03
	40.5	530	6327	750 (at 500 V)	12830	1810	1400	8390	3880	2250	1470	14.74	**1PH8 351-7■Q4 0-■■■0**	2235	1XB7712-P03
	40.5	630	7521	870 (at 500 V)	15280	2050	1300	9990	4610	2660	1740	17.40	**1PH8 352-7■Q4 0-■■■0**	2560	1XB7712-P03
	40.4	750	8953	1040 (at 500 V)	19170	2480	1300	12520	5770	3330	2170	20.66	**1PH8 354-7■Q4 0-■■■0**	2889	1XB7712-P03
	40.4	860	10266	1180 (at 500 V)	22380	2830	1200	14610	6730	3890	2540	24.22	**1PH8 356-7■Q4 0-■■■0**	3256	1XB7820-P00
	40.5	960	11460	1300 (at 500 V)	23090	2860	1200	15090	6980	4030	2640	27.79	**1PH8 358-7■Q4 0-■■■0**	3629	1XB7820-P00

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 800 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
800	40.5	705	8416	705 (at 690 V)	12600	1330	1400	8240	3810	2200	1440	14.74	**1PH8 350-7■K4 0-■■■0**	2235	1XB7712-P03
	40.5	780	9311	780 (at 690 V)	12530	1300	1400	8200	3800	2200	1440	14.74	**1PH8 351-7■K4 0-■■■0**	2235	1XB7712-P03
	40.4	925	11042	920 (at 690 V)	15760	1520	1300	10300	4750	2740	1790	17.40	**1PH8 352-7■K4 0-■■■0**	2560	1XB7712-P03
	40.5	1105	13191	1070 (at 690 V)	18080	1710	1300	11820	5460	3160	2060	20.66	**1PH8 354-7■K4 0-■■■0**	2889	1XB7712-P03
	40.4	1265	15101	1215 (at 690 V)	21500	1990	1200	14040	6470	3730	2440	24.22	**1PH8 356-7■K4 0-■■■0**	3256	1XB7712-P03
	40.4	1410	16832	1360 (at 690 V)	23550	2110	1200	15410	7130	4120	2700	27.79	**1PH8 358-7■K4 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
800	40.5	590	7043	595 (at 690 V)	12600	1330	1400	8240	3810	2200	1440	14.74	**1PH8 350-7■K4 0-■■■0**	2235	1XB7712-P03
	40.5	650	7759	660 (at 690 V)	12530	1300	1400	8200	3800	2200	1440	14.74	**1PH8 351-7■K4 0-■■■0**	2235	1XB7712-P03
	40.4	775	9252	780 (at 690 V)	15760	1520	1300	10300	4750	2740	1790	17.40	**1PH8 352-7■K4 0-■■■0**	2560	1XB7712-P03
	40.5	925	11042	905 (at 690 V)	18080	1710	1300	11820	5460	3160	2060	20.66	**1PH8 354-7■K4 0-■■■0**	2889	1XB7712-P03
	40.4	1060	12654	1025 (at 690 V)	21500	1990	1200	14040	6470	3730	2440	24.22	**1PH8 356-7■K4 0-■■■0**	3256	1XB7712-P03
	40.4	1180	14086	1150 (at 690 V)	23550	2110	1200	15410	7130	4120	2700	27.79	**1PH8 358-7■K4 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
800	40.5	480	5730	490 (at 690 V)	12600	1330	1400	8240	3810	2200	1440	14.74	**1PH8 350-7■K4 0-■■■0**	2235	1XB7712-P03
	40.5	530	6327	540 (at 690 V)	12530	1300	1400	8200	3800	2200	1440	14.74	**1PH8 351-7■K4 0-■■■0**	2235	1XB7712-P03
	40.4	630	7521	640 (at 690 V)	15760	1520	1300	10300	4750	2740	1790	17.40	**1PH8 352-7■K4 0-■■■0**	2560	1XB7712-P03
	40.5	750	8953	740 (at 690 V)	18080	1710	1300	11820	5460	3160	2060	20.66	**1PH8 354-7■K4 0-■■■0**	2889	1XB7712-P03
	40.4	860	10266	840 (at 690 V)	21500	1990	1200	14040	6470	3730	2440	24.22	**1PH8 356-7■K4 0-■■■0**	3256	1XB7712-P03
	40.4	960	11460	940 (at 690 V)	23550	2110	1200	15410	7130	4120	2700	27.79	**1PH8 358-7■K4 0-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	**1PH8 asynchronous motor Shaft height 355**	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 1000 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1000	50.4	880	8404	1205 (at 500 V)	13470	2490	1500	6160	3540	2300	1850	14.74	**1PH8 350-7■C4 0-■■■0**	2235	1XB7712-P03
	50.5	985	9407	1355 (at 500 V)	13380	2470	1500	6140	3540	2300	1850	14.74	**1PH8 351-7■C4 0-■■■0**	2235	1XB7712-P03
	50.5	1145	10935	1565 (at 500 V)	14980	2540	1400	6870	3950	2570	2070	17.40	**1PH8 352-7■C4 0-■■■0**	2560	1XB7712-P03
	50.5	1325	12654	1770 (at 500 V)	17230	2790	1300	7910	4550	2970	2390	20.66	**1PH8 354-7■C4 0-■■■0**	2889	1XB7820-P00
	50.4	1530	14612	2025 (at 500 V)	21370	3380	1200	9810	5640	3670	2960	24.22	**1PH8 356-7■C4 0-■■■0**	3256	1XB7820-P00
	50.4	1765	16856	2445 (at 480 V)	27150	4400	1200	12430	7140	4650	3730	27.79	**1PH8 358-7■C4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 – 60 %															
1000	50.4	740	7067	1020 (at 500 V)	13470	2490	1500	6160	3540	2300	1850	14.74	**1PH8 350-7■C4 0-■■■0**	2235	1XB7712-P03
	50.5	825	7879	1145 (at 500 V)	13380	2470	1500	6140	3540	2300	1850	14.74	**1PH8 351-7■C4 0-■■■0**	2235	1XB7712-P03
	50.5	960	9168	1320 (at 500 V)	14980	2540	1400	6870	3950	2570	2070	17.40	**1PH8 352-7■C4 0-■■■0**	2560	1XB7712-P03
	50.5	1105	10553	1495 (at 500 V)	17230	2790	1300	7910	4550	2970	2390	20.66	**1PH8 354-7■C4 0-■■■0**	2889	1XB7820-P00
	50.4	1280	12224	1710 (at 500 V)	21370	3380	1200	9810	5640	3670	2960	24.22	**1PH8 356-7■C4 0-■■■0**	3256	1XB7820-P00
	50.4	1475	14086	2070 (at 480 V)	27150	4400	1200	12430	7140	4650	3730	27.79	**1PH8 358-7■C4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 - 100 % (S1)															
1000	50.4	600	5730	840 (at 500 V)	13470	2490	1500	6160	3540	2300	1850	14.74	**1PH8 350-7■C4 0-■■■0**	2235	1XB7712-P03
	50.5	670	6399	940 (at 500 V)	13380	2470	1500	6140	3540	2300	1850	14.74	**1PH8 351-7■C4 0-■■■0**	2235	1XB7712-P03
	50.5	780	7449	1080 (at 500 V)	14980	2540	1400	6870	3950	2570	2070	17.40	**1PH8 352-7■C4 0-■■■0**	2560	1XB7712-P03
	50.5	900	8595	1220 (at 500 V)	17230	2790	1300	7910	4550	2970	2390	20.66	**1PH8 354-7■C4 0-■■■0**	2889	1XB7820-P00
	50.4	1040	9932	1400 (at 500 V)	21370	3380	1200	9810	5640	3670	2960	24.22	**1PH8 356-7■C4 0-■■■0**	3256	1XB7820-P00
	50.4	1200	11460	1700 (at 480 V)	27150	4400	1200	12430	7140	4650	3730	27.79	**1PH8 358-7■C4 0-■■■0**	3629	1XB7820-P00

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For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 1000 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1000	50.5	880	8404	875 (at 690 V)	13570	1810	1500	6200	3550	2310	1850	14.74	**1PH8 350-7■U4 0-■■■0**	2235	1XB7712-P03
	50.5	985	9407	980 (at 690 V)	13480	1800	1500	6180	3550	2310	1860	14.74	**1PH8 351-7■U4 0-■■■0**	2235	1XB7712-P03
	50.5	1145	10935	1130 (at 690 V)	15390	1870	1400	7050	4050	2640	2120	17.40	**1PH8 352-7■U4 0-■■■0**	2560	1XB7712-P03
	50.4	1325	12654	1285 (at 690 V)	18240	2110	1300	8360	4810	3130	2520	20.66	**1PH8 354-7■U4 0-■■■0**	2889	1XB7712-P03
	50.5	1530	14612	1480 (at 690 V)	20940	2420	1200	9590	5510	3580	2880	24.22	**1PH8 356-7■U4 0-■■■0**	3256	1XB7712-P03
	50.4	1765	16856	1680 (at 690 V)	24680	2770	1200	11330	6530	4250	3420	27.79	**1PH8 358-7■U4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 – 60 %															
1000	50.5	740	7067	740 (at 690 V)	13570	1810	1500	6200	3550	2310	1850	14.74	**1PH8 350-7■U4 0-■■■0**	2235	1XB7712-P03
	50.5	825	7879	830 (at 690 V)	13480	1800	1500	6180	3550	2310	1860	14.74	**1PH8 351-7■U4 0-■■■0**	2235	1XB7712-P03
	50.5	960	9168	955 (at 690 V)	15390	1870	1400	7050	4050	2640	2120	17.40	**1PH8 352-7■U4 0-■■■0**	2560	1XB7712-P03
	50.4	1105	10553	1085 (at 690 V)	18240	2110	1300	8360	4810	3130	2520	20.66	**1PH8 354-7■U4 0-■■■0**	2889	1XB7712-P03
	50.5	1280	12224	1250 (at 690 V)	20940	2420	1200	9590	5510	3580	2880	24.22	**1PH8 356-7■U4 0-■■■0**	3256	1XB7712-P03
	50.4	1475	14086	1415 (at 690 V)	24680	2770	1200	11330	6530	4250	3420	27.79	**1PH8 358-7■U4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 - 100 % (S1)															
1000	50.5	600	5730	610 (at 690 V)	13570	1810	1500	6200	3550	2310	1850	14.74	**1PH8 350-7■U4 0-■■■0**	2235	1XB7712-P03
	50.5	670	6399	680 (at 690 V)	13480	1800	1500	6180	3550	2310	1860	14.74	**1PH8 351-7■U4 0-■■■0**	2235	1XB7712-P03
	50.5	780	7449	780 (at 690 V)	15390	1870	1400	7050	4050	2640	2120	17.40	**1PH8 352-7■U4 0-■■■0**	2560	1XB7712-P03
	50.4	900	8595	890 (at 690 V)	18240	2110	1300	8360	4810	3130	2520	20.66	**1PH8 354-7■U4 0-■■■0**	2889	1XB7712-P03
	50.5	1040	9932	1020 (at 690 V)	20940	2420	1200	9590	5510	3580	2880	24.22	**1PH8 356-7■U4 0-■■■0**	3256	1XB7712-P03
	50.4	1200	11460	1160 (at 690 V)	24680	2770	1200	11330	6530	4250	3420	27.79	**1PH8 358-7■U4 0-■■■0**	3629	1XB7820-P00

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For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 1350 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1350	68.0	985	6968	1340 (at 500 V)	9990	2450	1700	8150	4670	3030	2430	14.74	**1PH8 350-7■D4 0-■■■0**	2235	1XB7712-P03
	68.1	1105	7817	1520 (at 500 V)	9950	2400	1700	8120	4660	3030	2430	14.74	**1PH8 351-7■D4 0-■■■0**	2235	1XB7712-P03
	68.0	1340	9479	1800 (at 500 V)	13910	3310	1700	11350	6500	4220	3390	17.40	**1PH8 352-7■D4 0-■■■0**	2560	1XB7820-P00
	68.0	1530	10823	2045 (at 500 V)	14180	3160	1400	11570	6640	4320	3470	20.66	**1PH8 354-7■D4 0-■■■0**	2889	1XB7820-P00
	67.9	1765	12486	2325 (at 500 V)	19150	4130	1400	15630	8960	5820	4680	24.22	**1PH8 356-7■D4 0-■■■0**	3256	1XB7820-P00
	67.9	1970	13936	2585 (at 500 V)	21870	4620	1400	17840	10250	6660	5350	27.79	**1PH8 358-7■D4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 – 60 %															
1350	68.0	825	5836	1130 (at 500 V)	9990	2450	1700	8150	4670	3030	2430	14.74	**1PH8 350-7■D4 0-■■■0**	2235	1XB7712-P03
	68.1	925	6544	1280 (at 500 V)	9950	2400	1700	8120	4660	3030	2430	14.74	**1PH8 351-7■D4 0-■■■0**	2235	1XB7712-P03
	68.0	1120	7923	1520 (at 500 V)	13910	3310	1700	11350	6500	4220	3390	17.40	**1PH8 352-7■D4 0-■■■0**	2560	1XB7820-P00
	68.0	1280	9055	1720 (at 500 V)	14180	3160	1400	11570	6640	4320	3470	20.66	**1PH8 354-7■D4 0-■■■0**	2889	1XB7820-P00
	67.9	1475	10434	1960 (at 500 V)	19150	4130	1400	15630	8960	5820	4680	24.22	**1PH8 356-7■D4 0-■■■0**	3256	1XB7820-P00
	67.9	1650	11672	2180 (at 500 V)	21870	4620	1400	17840	10250	6660	5350	27.79	**1PH8 358-7■D4 0-■■■0**	3629	1XB7820-P00
Intermittent duty S3 - 100 % (S1)															
1350	68.0	670	4740	920 (at 500 V)	9990	2450	1700	8150	4670	3030	2430	14.74	**1PH8 350-7■D4 0-■■■0**	2235	1XB7712-P03
	68.1	750	5306	1040 (at 500 V)	9950	2400	1700	8120	4660	3030	2430	14.74	**1PH8 351-7■D4 0-■■■0**	2235	1XB7712-P03
	68.0	910	6437	1240 (at 500 V)	13910	3310	1700	11350	6500	4220	3390	17.40	**1PH8 352-7■D4 0-■■■0**	2560	1XB7820-P00
	68.0	1040	7357	1400 (at 500 V)	14180	3160	1400	11570	6640	4320	3470	20.66	**1PH8 354-7■D4 0-■■■0**	2889	1XB7820-P00
	67.9	1200	8489	1600 (at 500 V)	19150	4130	1400	15630	8960	5820	4680	24.22	**1PH8 356-7■D4 0-■■■0**	3256	1XB7820-P00
	67.9	1340	9479	1780 (at 500 V)	21870	4620	1400	17840	10250	6660	5350	27.79	**1PH8 358-7■D4 0-■■■0**	3629	1XB7820-P00

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For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP23 degree of protection, noise level 85 dB(A), operating speed 1350 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1350	68.1	985	6968	975 (at 690 V)	10260	1810	1700	8360	4790	3100	2490	14.74	**1PH8 350-7■V40-■■■0**	2235	1XB7712-P03
	68.1	1105	7817	1095 (at 690 V)	10230	1840	1700	8340	4780	3100	2490	14.74	**1PH8 351-7■V40-■■■0**	2235	1XB7712-P03
	68.0	1340	9479	1315 (at 690 V)	12720	2310	1700	10400	6000	3920	3150	17.40	**1PH8 352-7■V40-■■■0**	2560	1XB7712-P03
	68.1	1530	10823	1495 (at 690 V)	13890	2270	1400	11330	6490	4220	3390	20.66	**1PH8 354-7■V40-■■■0**	2889	1XB7712-P03
	67.9	1765	12486	1685 (at 690 V)	19270	3010	1400	15730	9020	5870	4710	24.22	**1PH8 356-7■V40-■■■0**	3256	1XB7820-P00
	68.0	1970	13936	1865 (at 690 V)	20360	3120	1400	16620	9540	6200	4990	27.79	**1PH8 358-7■V40-■■■0**	3629	1XB7820-P00
Intermittent duty S3 – 60 %															
1350	68.1	825	5836	820 (at 690 V)	10260	1810	1700	8360	4790	3100	2490	14.74	**1PH8 350-7■V40-■■■0**	2235	1XB7712-P03
	68.1	925	6544	920 (at 690 V)	10230	1840	1700	8340	4780	3100	2490	14.74	**1PH8 351-7■V40-■■■0**	2235	1XB7712-P03
	68.0	1120	7923	1105 (at 690 V)	12720	2310	1700	10400	6000	3920	3150	17.40	**1PH8 352-7■V40-■■■0**	2560	1XB7712-P03
	68.1	1280	9055	1255 (at 690 V)	13890	2270	1400	11330	6490	4220	3390	20.66	**1PH8 354-7■V40-■■■0**	2889	1XB7712-P03
	67.9	1475	10434	1420 (at 690 V)	19270	3010	1400	15730	9020	5870	4710	24.22	**1PH8 356-7■V40-■■■0**	3256	1XB7820-P00
	68.0	1650	11672	1570 (at 690 V)	20360	3120	1400	16620	9540	6200	4990	27.79	**1PH8 358-7■V40-■■■0**	3629	1XB7820-P00
Intermittent duty S3 - 100 % (S1)															
1350	68.1	670	4740	670 (at 690 V)	10260	1810	1700	8360	4790	3100	2490	14.74	**1PH8 350-7■V40-■■■0**	2235	1XB7712-P03
	68.1	750	5306	750 (at 690 V)	10230	1840	1700	8340	4780	3100	2490	14.74	**1PH8 351-7■V40-■■■0**	2235	1XB7712-P03
	68.0	910	6437	900 (at 690 V)	12720	2310	1700	10400	6000	3920	3150	17.40	**1PH8 352-7■V40-■■■0**	2560	1XB7712-P03
	68.1	1040	7357	1020 (at 690 V)	13890	2270	1400	11330	6490	4220	3390	20.66	**1PH8 354-7■V40-■■■0**	2889	1XB7712-P03
	67.9	1200	8489	1160 (at 690 V)	19270	3010	1400	15730	9020	5870	4710	24.22	**1PH8 356-7■V40-■■■0**	3256	1XB7820-P00
	68.0	1340	9479	1280 (at 690 V)	20360	3120	1400	16620	9540	6200	4990	27.79	**1PH8 358-7■V40-■■■0**	3629	1XB7820-P00

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For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 600 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
600	30.3	340	5412	475 (at 500 V)	12120	1260	1400	4710	2220	1310	860	14.74	**1PH8 350-7■B1 0-■■■0**	2235	1XB7712-P01
	30.3	405	6446	555 (at 500 V)	14570	1440	1400	5640	2660	1560	1030	17.40	**1PH8 352-7■B1 0-■■■0**	2560	1XB7712-P01
	30.3	480	7640	655 (at 500 V)	16670	1590	1400	6450	3030	1780	1170	20.66	**1PH8 354-7■B1 0-■■■0**	2889	1XB7712-P03
	30.3	560	8913	755 (at 500 V)	20320	1920	1400	7840	3680	2150	1420	24.22	**1PH8 356-7■B1 0-■■■0**	3256	1XB7712-P03
	30.2	630	10028	850 (at 500 V)	23390	2180	1400	8990	4210	2460	1620	27.79	**1PH8 358-7■B1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
600	30.3	285	4536	410 (at 500 V)	12120	1260	1400	4710	2220	1310	860	14.74	**1PH8 350-7■B1 0-■■■0**	2235	1XB7712-P01
	30.3	340	5412	480 (at 500 V)	14570	1440	1400	5640	2660	1560	1030	17.40	**1PH8 352-7■B1 0-■■■0**	2560	1XB7712-P01
	30.3	400	6367	565 (at 500 V)	16670	1590	1400	6450	3030	1780	1170	20.66	**1PH8 354-7■B1 0-■■■0**	2889	1XB7712-P03
	30.3	465	7401	650 (at 500 V)	20320	1920	1400	7840	3680	2150	1420	24.22	**1PH8 356-7■B1 0-■■■0**	3256	1XB7712-P03
	30.2	530	8436	735 (at 500 V)	23390	2180	1400	8990	4210	2460	1620	27.79	**1PH8 358-7■B1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
600	30.3	230	3661	350 (at 500 V)	12120	1260	1400	4710	2220	1310	860	14.74	**1PH8 350-7■B1 0-■■■0**	2235	1XB7712-P01
	30.3	275	4377	410 (at 500 V)	14570	1440	1400	5640	2660	1560	1030	17.40	**1PH8 352-7■B1 0-■■■0**	2560	1XB7712-P01
	30.3	325	5173	475 (at 500 V)	16670	1590	1400	6450	3030	1780	1170	20.66	**1PH8 354-7■B1 0-■■■0**	2889	1XB7712-P03
	30.3	380	6048	550 (at 500 V)	20320	1920	1400	7840	3680	2150	1420	24.22	**1PH8 356-7■B1 0-■■■0**	3256	1XB7712-P03
	30.2	430	6844	620 (at 500 V)	23390	2180	1400	8990	4210	2460	1620	27.79	**1PH8 358-7■B1 0-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 600 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
600	30.3	340	5412	345 (at 690 V)	12090	910	1400	4690	2210	1300	860	14.74	**1PH8 350-7■H1 0-■■■0**	2235	1XB7712-P01
	30.3	405	6446	405 (at 690 V)	13880	1000	1400	5390	2550	1500	990	17.40	**1PH8 352-7■H1 0-■■■0**	2560	1XB7712-P01
	30.3	480	7640	475 (at 690 V)	16940	1170	1400	6550	3080	1810	1190	20.66	**1PH8 354-7■H1 0-■■■0**	2889	1XB7712-P01
	30.3	560	8913	550 (at 690 V)	20480	1400	1400	7890	3700	2160	1430	24.22	**1PH8 356-7■H1 0-■■■0**	3256	1XB7712-P01
	30.2	630	10028	620 (at 690 V)	24230	1630	1400	9310	4350	2540	1670	27.79	**1PH8 358-7■H1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
600	30.3	285	4536	300 (at 690 V)	12090	910	1400	4690	2210	1300	860	14.74	**1PH8 350-7■H1 0-■■■0**	2235	1XB7712-P01
	30.3	340	5412	350 (at 690 V)	13880	1000	1400	5390	2550	1500	990	17.40	**1PH8 352-7■H1 0-■■■0**	2560	1XB7712-P01
	30.3	400	6367	410 (at 690 V)	16940	1170	1400	6550	3080	1810	1190	20.66	**1PH8 354-7■H1 0-■■■0**	2889	1XB7712-P01
	30.3	465	7401	470 (at 690 V)	20480	1400	1400	7890	3700	2160	1430	24.22	**1PH8 356-7■H1 0-■■■0**	3256	1XB7712-P01
	30.2	530	8436	535 (at 690 V)	24230	1630	1400	9310	4350	2540	1670	27.79	**1PH8 358-7■H1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
600	30.3	230	3661	255 (at 690 V)	12090	910	1400	4690	2210	1300	860	14.74	**1PH8 350-7■H1 0-■■■0**	2235	1XB7712-P01
	30.3	275	4377	295 (at 690 V)	13880	1000	1400	5390	2550	1500	990	17.40	**1PH8 352-7■H1 0-■■■0**	2560	1XB7712-P01
	30.3	325	5173	345 (at 690 V)	16940	1170	1400	6550	3080	1810	1190	20.66	**1PH8 354-7■H1 0-■■■0**	2889	1XB7712-P01
	30.3	380	6048	400 (at 690 V)	20480	1400	1400	7890	3700	2160	1430	24.22	**1PH8 356-7■H1 0-■■■0**	3256	1XB7712-P01
	30.2	430	6844	455 (at 690 V)	24230	1630	1400	9310	4350	2540	1670	27.79	**1PH8 358-7■H1 0-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 800 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
800	40.3	440	5253	615 (at 500 V)	12500	1790	1400	8210	3830	2230	1460	14.74	**1PH8 350-7■Q1 0 -■■■0**	2235	1XB7712-P03
	40.3	530	6327	730 (at 500 V)	14870	1990	1400	9750	4540	2640	1730	17.40	**1PH8 352-7■Q1 0 -■■■0**	2560	1XB7712-P03
	40.3	615	7342	845 (at 500 V)	19960	2580	1400	12960	5910	3390	2200	20.66	**1PH8 354-7■Q1 0 -■■■0**	2889	1XB7712-P03
	40.2	720	8595	985 (at 500 V)	22050	2790	1400	14420	6670	3860	2520	24.22	**1PH8 356-7■Q1 0 -■■■0**	3256	1XB7712-P03
	40.3	830	9908	1105 (at 500 V)	22770	2820	1400	14930	6930	4020	2640	27.79	**1PH8 358-7■Q1 0 -■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
800	40.3	370	4417	530 (at 500 V)	12500	1790	1400	8210	3830	2230	1460	14.74	**1PH8 350-7■Q1 0 -■■■0**	2235	1XB7712-P03
	40.3	445	5312	630 (at 500 V)	14870	1990	1400	9750	4540	2640	1730	17.40	**1PH8 352-7■Q1 0 -■■■0**	2560	1XB7712-P03
	40.3	515	6148	730 (at 500 V)	19960	2580	1400	12960	5910	3390	2200	20.66	**1PH8 354-7■Q1 0 -■■■0**	2889	1XB7712-P03
	40.2	605	7222	850 (at 500 V)	22050	2790	1400	14420	6670	3860	2520	24.22	**1PH8 356-7■Q1 0 -■■■0**	3256	1XB7712-P03
	40.3	695	8297	945 (at 500 V)	22770	2820	1400	14930	6930	4020	2640	27.79	**1PH8 358-7■Q1 0 -■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
800	40.3	300	3581	450 (at 500 V)	12500	1790	1400	8210	3830	2230	1460	14.74	**1PH8 350-7■Q1 0 -■■■0**	2235	1XB7712-P03
	40.3	360	4298	530 (at 500 V)	14870	1990	1400	9750	4540	2640	1730	17.40	**1PH8 352-7■Q1 0 -■■■0**	2560	1XB7712-P03
	40.3	420	5014	620 (at 500 V)	19960	2580	1400	12960	5910	3390	2200	20.66	**1PH8 354-7■Q1 0 -■■■0**	2889	1XB7712-P03
	40.2	490	5849	720 (at 500 V)	22050	2790	1400	14420	6670	3860	2520	24.22	**1PH8 356-7■Q1 0 -■■■0**	3256	1XB7712-P03
	40.3	565	6745	790 (at 500 V)	22770	2820	1400	14930	6930	4020	2640	27.79	**1PH8 358-7■Q1 0 -■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 800 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
800	40.3	440	5253	440 (at 690 V)	12180	1290	1400	8010	3740	2180	1430	14.74	**1PH8 350-7■K10-■■■0**	2235	1XB7712-P01
	40.3	530	6327	530 (at 690 V)	15360	1480	1400	10070	4670	2710	1780	17.40	**1PH8 352-7■K10-■■■0**	2560	1XB7712-P01
	40.3	615	7342	610 (at 690 V)	17590	1660	1400	11560	5390	3140	2060	20.66	**1PH8 354-7■K10-■■■0**	2889	1XB7712-P03
	40.3	720	8595	705 (at 690 V)	20960	1940	1400	13760	6400	3720	2440	24.22	**1PH8 356-7■K10-■■■0**	3256	1XB7712-P03
	40.3	830	9908	805 (at 690 V)	23360	2090	1400	15290	7080	4100	2680	27.79	**1PH8 358-7■K10-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
800	40.3	370	4417	380 (at 690 V)	12180	1290	1400	8010	3740	2180	1430	14.74	**1PH8 350-7■K10-■■■0**	2235	1XB7712-P01
	40.3	445	5312	460 (at 690 V)	15360	1480	1400	10070	4670	2710	1780	17.40	**1PH8 352-7■K10-■■■0**	2560	1XB7712-P01
	40.3	515	6148	525 (at 690 V)	17590	1660	1400	11560	5390	3140	2060	20.66	**1PH8 354-7■K10-■■■0**	2889	1XB7712-P03
	40.3	605	7222	605 (at 690 V)	20960	1940	1400	13760	6400	3720	2440	24.22	**1PH8 356-7■K10-■■■0**	3256	1XB7712-P03
	40.3	695	8297	690 (at 690 V)	23360	2090	1400	15290	7080	4100	2680	27.79	**1PH8 358-7■K10-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
800	40.3	300	3581	320 (at 690 V)	12180	1290	1400	8010	3740	2180	1430	14.74	**1PH8 350-7■K10-■■■0**	2235	1XB7712-P01
	40.3	360	4298	390 (at 690 V)	15360	1480	1400	10070	4670	2710	1780	17.40	**1PH8 352-7■K10-■■■0**	2560	1XB7712-P01
	40.3	420	5014	440 (at 690 V)	17590	1660	1400	11560	5390	3140	2060	20.66	**1PH8 354-7■K10-■■■0**	2889	1XB7712-P03
	40.3	490	5849	510 (at 690 V)	20960	1940	1400	13760	6400	3720	2440	24.22	**1PH8 356-7■K10-■■■0**	3256	1XB7712-P03
	40.3	565	6745	580 (at 690 V)	23360	2090	1400	15290	7080	4100	2680	27.79	**1PH8 358-7■K10-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 1000 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1000	50.3	530	5062	735 (at 500 V)	13150	2430	1500	6070	3510	2290	1850	14.74	**1PH8 350-7■C1 0-■■■0**	2235	1XB7712-P03
	50.3	630	6017	860 (at 500 V)	14700	2490	1500	6780	3910	2550	2060	17.40	**1PH8 352-7■C1 0-■■■0**	2560	1XB7712-P03
	50.3	740	7067	1005 (at 500 V)	16970	2750	1500	7830	4530	2960	2380	20.66	**1PH8 354-7■C1 0-■■■0**	2889	1XB7712-P03
	50.3	855	8165	1145 (at 500 V)	21120	3340	1600	9730	5610	3660	2950	24.22	**1PH8 356-7■C1 0-■■■0**	3256	1XB7712-P03
	50.2	985	9407	1415 (at 480 V)	26910	4360	1600	12360	7120	4640	3730	27.79	**1PH8 358-7■C1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
1000	50.3	445	4250	635 (at 500 V)	13150	2430	1500	6070	3510	2290	1850	14.74	**1PH8 350-7■C1 0-■■■0**	2235	1XB7712-P03
	50.3	530	5062	735 (at 500 V)	14700	2490	1500	6780	3910	2550	2060	17.40	**1PH8 352-7■C1 0-■■■0**	2560	1XB7712-P03
	50.3	620	5921	860 (at 500 V)	16970	2750	1500	7830	4530	2960	2380	20.66	**1PH8 354-7■C1 0-■■■0**	2889	1XB7712-P03
	50.3	715	6828	985 (at 500 V)	21120	3340	1600	9730	5610	3660	2950	24.22	**1PH8 356-7■C1 0-■■■0**	3256	1XB7712-P03
	50.2	825	7879	1225 (at 480 V)	26910	4360	1600	12360	7120	4640	3730	27.79	**1PH8 358-7■C1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
1000	50.3	360	3438	540 (at 500 V)	13150	2430	1500	6070	3510	2290	1850	14.74	**1PH8 350-7■C1 0-■■■0**	2235	1XB7712-P03
	50.3	430	4107	620 (at 500 V)	14700	2490	1500	6780	3910	2550	2060	17.40	**1PH8 352-7■C1 0-■■■0**	2560	1XB7712-P03
	50.3	505	4823	720 (at 500 V)	16970	2750	1500	7830	4530	2960	2380	20.66	**1PH8 354-7■C1 0-■■■0**	2889	1XB7712-P03
	50.3	580	5539	830 (at 500 V)	21120	3340	1600	9730	5610	3660	2950	24.22	**1PH8 356-7■C1 0-■■■0**	3256	1XB7712-P03
	50.2	670	6399	1040 (at 480 V)	26910	4360	1600	12360	7120	4640	3730	27.79	**1PH8 358-7■C1 0-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	**1PH8 asynchronous motor Shaft height 355**	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 1000 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1000	50.3	530	5062	535 (at 690 V)	13240	1770	1500	6110	3530	2310	1860	14.74	**1PH8 350-7■U1 0 -■■■0**	2235	1XB7712-P01
	50.3	630	6017	625 (at 690 V)	15110	1840	1500	6960	4010	2620	2110	17.40	**1PH8 352-7■U1 0 -■■■0**	2560	1XB7712-P01
	50.3	740	7067	730 (at 690 V)	18280	2110	1500	8430	4860	3180	2560	20.66	**1PH8 354-7■U1 0 -■■■0**	2889	1XB7712-P03
	50.3	855	8165	835 (at 690 V)	20510	2370	1600	9450	5450	3560	2860	24.22	**1PH8 356-7■U1 0 -■■■0**	3256	1XB7712-P03
	50.2	985	9407	955 (at 690 V)	24570	2760	1600	11310	6520	4250	3420	27.79	**1PH8 358-7■U1 0 -■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
1000	50.3	445	4250	465 (at 690 V)	13240	1770	1500	6110	3530	2310	1860	14.74	**1PH8 350-7■U1 0 -■■■0**	2235	1XB7712-P01
	50.3	530	5062	540 (at 690 V)	15110	1840	1500	6960	4010	2620	2110	17.40	**1PH8 352-7■U1 0 -■■■0**	2560	1XB7712-P01
	50.3	620	5921	630 (at 690 V)	18280	2110	1500	8430	4860	3180	2560	20.66	**1PH8 354-7■U1 0 -■■■0**	2889	1XB7712-P03
	50.3	715	6828	715 (at 690 V)	20510	2370	1600	9450	5450	3560	2860	24.22	**1PH8 356-7■U1 0 -■■■0**	3256	1XB7712-P03
	50.2	825	7879	820 (at 690 V)	24570	2760	1600	11310	6520	4250	3420	27.79	**1PH8 358-7■U1 0 -■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
1000	50.3	360	3438	395 (at 690 V)	13240	1770	1500	6110	3530	2310	1860	14.74	**1PH8 350-7■U1 0 -■■■0**	2235	1XB7712-P01
	50.3	430	4107	455 (at 690 V)	15110	1840	1500	6960	4010	2620	2110	17.40	**1PH8 352-7■U1 0 -■■■0**	2560	1XB7712-P01
	50.3	505	4823	530 (at 690 V)	18280	2110	1500	8430	4860	3180	2560	20.66	**1PH8 354-7■U1 0 -■■■0**	2889	1XB7712-P03
	50.3	580	5539	600 (at 690 V)	20510	2370	1600	9450	5450	3560	2860	24.22	**1PH8 356-7■U1 0 -■■■0**	3256	1XB7712-P03
	50.2	670	6399	690 (at 690 V)	24570	2760	1600	11310	6520	4250	3420	27.79	**1PH8 358-7■U1 0 -■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	1PH8 asynchronous motor Shaft height 355	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 1350 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1350	67.8	560	3961	760 (at 500 V)	9840	2410	1800	8040	4620	3010	2420	14.74	**1PH8 350-7■D1 0-■■■0**	2235	1XB7712-P03
	67.7	675	4775	925 (at 500 V)	13690	3260	1800	11180	6430	4190	3370	17.40	**1PH8 352-7■D1 0-■■■0**	2560	1XB7712-P03
	67.8	810	5730	1075 (at 500 V)	14050	3130	1700	11480	6620	4310	3470	20.66	**1PH8 354-7■D1 0-■■■0**	2889	1XB7712-P03
	67.7	925	6544	1250 (at 500 V)	18980	4090	1700	15500	8910	5800	4660	24.22	**1PH8 356-7■D1 0-■■■0**	3256	1XB7712-P03
	67.7	1075	7605	1445 (at 500 V)	21720	4590	1700	17740	10220	6660	5360	27.79	**1PH8 358-7■D1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
1350	67.8	465	3289	650 (at 500 V)	9840	2410	1800	8040	4620	3010	2420	14.74	**1PH8 350-7■D1 0-■■■0**	2235	1XB7712-P03
	67.7	565	3997	795 (at 500 V)	13690	3260	1800	11180	6430	4190	3370	17.40	**1PH8 352-7■D1 0-■■■0**	2560	1XB7712-P03
	67.8	675	4775	915 (at 500 V)	14050	3130	1700	11480	6620	4310	3470	20.66	**1PH8 354-7■D1 0-■■■0**	2889	1XB7712-P03
	67.7	775	5482	1070 (at 500 V)	18980	4090	1700	15500	8910	5800	4660	24.22	**1PH8 356-7■D1 0-■■■0**	3256	1XB7712-P03
	67.7	900	6367	1240 (at 500 V)	21720	4590	1700	17740	10220	6660	5360	27.79	**1PH8 358-7■D1 0-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
1350	67.8	380	2688	540 (at 500 V)	9840	2410	1800	8040	4620	3010	2420	14.74	**1PH8 350-7■D1 0-■■■0**	2235	1XB7712-P03
	67.7	460	3254	670 (at 500 V)	13690	3260	1800	11180	6430	4190	3370	17.40	**1PH8 352-7■D1 0-■■■0**	2560	1XB7712-P03
	67.8	550	3891	760 (at 500 V)	14050	3130	1700	11480	6620	4310	3470	20.66	**1PH8 354-7■D1 0-■■■0**	2889	1XB7712-P03
	67.7	630	4457	900 (at 500 V)	18980	4090	1700	15500	8910	5800	4660	24.22	**1PH8 356-7■D1 0-■■■0**	3256	1XB7712-P03
	67.7	730	5164	1040 (at 500 V)	21720	4590	1700	17740	10220	6660	5360	27.79	**1PH8 358-7■D1 0-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Maximum speed at constant output (field weakening) [2] n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	2800 rpm	Moment of inertia J	**1PH8 asynchronous motor Shaft height 355**	Weight, approx.	Terminal box
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg	Type
1PH8 35. asynchronous motors, IP55 degree of protection, noise level 85 dB(A), operating speed 1350 rpm Supply voltage 690 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control															
Intermittent duty S3 – 40 %															
1350	67.8	560	3961	550 (at 690 V)	10200	1800	1800	8320	4780	3110	2500	14.74	**1PH8 350-7■V10-■■■0**	2235	1XB7712-P01
	67.8	675	4775	660 (at 690 V)	12290	2230	1800	10040	5780	3760	3030	17.40	**1PH8 352-7■V10-■■■0**	2560	1XB7712-P03
	67.8	810	5730	780 (at 690 V)	13660	2230	1700	11160	6420	4180	3360	20.66	**1PH8 354-7■V10-■■■0**	2889	1XB7712-P03
	67.7	925	6544	900 (at 690 V)	19140	2990	1700	15630	8980	5840	4700	24.22	**1PH8 356-7■V10-■■■0**	3256	1XB7712-P03
	67.7	1075	7605	1040 (at 690 V)	20270	3110	1700	16550	9510	6190	4970	27.79	**1PH8 358-7■V10-■■■0**	3629	1XB7712-P03
Intermittent duty S3 – 60 %															
1350	67.8	465	3289	475 (at 690 V)	10200	1800	1800	8320	4780	3110	2500	14.74	**1PH8 350-7■V10-■■■0**	2235	1XB7712-P01
	67.8	565	3997	565 (at 690 V)	12290	2230	1800	10040	5780	3760	3030	17.40	**1PH8 352-7■V10-■■■0**	2560	1XB7712-P03
	67.8	675	4775	665 (at 690 V)	13660	2230	1700	11160	6420	4180	3360	20.66	**1PH8 354-7■V10-■■■0**	2889	1XB7712-P03
	67.7	775	5482	775 (at 690 V)	19140	2990	1700	15630	8980	5840	4700	24.22	**1PH8 356-7■V10-■■■0**	3256	1XB7712-P03
	67.7	900	6367	890 (at 690 V)	20270	3110	1700	16550	9510	6190	4970	27.79	**1PH8 358-7■V10-■■■0**	3629	1XB7712-P03
Intermittent duty S3 - 100 % (S1)															
1350	67.8	380	2688	395 (at 690 V)	10200	1800	1800	8320	4780	3110	2500	14.74	**1PH8 350-7■V10-■■■0**	2235	1XB7712-P01
	67.8	460	3254	470 (at 690 V)	12290	2230	1800	10040	5780	3760	3030	17.40	**1PH8 352-7■V10-■■■0**	2560	1XB7712-P03
	67.8	550	3891	550 (at 690 V)	13660	2230	1700	11160	6420	4180	3360	20.66	**1PH8 354-7■V10-■■■0**	2889	1XB7712-P03
	67.7	630	4457	650 (at 690 V)	19140	2990	1700	15630	8980	5840	4700	24.22	**1PH8 356-7■V10-■■■0**	3256	1XB7712-P03
	67.7	730	5164	740 (at 690 V)	20270	3110	1700	16550	9510	6190	4970	27.79	**1PH8 358-7■V10-■■■0**	3629	1XB7712-P03

For order number suffixes and options, see Page 7/32

For ordering example, see Page 7/33.

For more operating characteristics and engineering data, please contact your local Siemens representative. Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 2.5 kHz.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

1PH8 motors, shaft height 355

Selection and ordering data (continued)

Order No. supplement

Position in the order number	1	2	3	4	5	6	7		8	9	10	11	12		13	14	15	16	Order codes [1]
1PH8 shaft height 355	**1**	**P**	**H**	**8**	**3**	**5**	**.**	**–**	**7**	■	**.**	■	■	**–**	■	■	■	**0**	**–** **Z**
External encoder systems																			
Without encoder										**A**									
Incremental encoder HTL 1024 pulses/revolution POG 10 (Baumer-Hübner), prepared for mounting										**K**									
Incremental encoder HTL 1024 pulses/revolution HOG 28 (Baumer-Hübner), prepared for mounting										**G**									
Cooling																			
Forced ventilation (IP55 degree of protection)												**1**							
Forced ventilation (open-circuit ventilation to IP23 degree of protection)												**4**							
Type																			
IM B3													**0**						
Shaft extens. (DE) **Balancing**																			
Featherkey Full-key															**1**				
Featherkey Half-key															**2**				
Bearings **Vibration quality to Siemens/EN 60034-14** **Shaft and flange accuracy**																			
Standard A N																**A**			
Standard R/A R																**B**			
Terminal box **Cable infeed** **External fan unit**																			
NDE right bottom																	**U**		
NDE at top, air inlet from NDE, air-flow direction NDE --> DE																			**–**
NDE on left, air inlet from NDE, air-flow direction NDE --> DE																			**G00**
NDE left bottom																	**V**		
NDE at top, air inlet from NDE, air-flow direction NDE --> DE																			**–**
NDE on right, air inlet from NDE, air-flow direction NDE --> DE																			**G02**
NDE at top Right																	**W**		
NDE on left, air inlet from NDE, air-flow direction NDE --> DE																			**G00**
NDE on right, air inlet from NDE, air-flow direction NDE --> DE																			**G02**
DE at top Right																	**X**		
NDE at top, air inlet from NDE, air-flow direction NDE > DE **(only for terminal boxes 1XB7712-P...)**																			**–**
NDE on left, air inlet from NDE, air-flow direction NDE --> DE																			**G00**
NDE on right, air inlet from NDE, air-flow direction NDE --> DE																			**G02**
Options																			
Air flow monitoring 24 V DC																			**A08**
Motor temperature monitoring through switch																			**A31**
Motor protection through 3 x PT100																			**A60**
Bearing temperature monitoring with PT100																			**A72**
With air filter																			**G14**
Mounting of a supplied pulse encoder with POG 10 mounting flange (possible if 9th position = "K")																			**G80**
Mounting of a standard encoder POG 10 DN 1024I (encoder HTL1024 pulses/revolution), (possible if 9th position = "K")																			**H56**
Mounting of a supplied hollow shaft encoder with HOG28 interface (possible if 9th position = "G")																			**H75**
Additional PTC thermistor chain for alarm and tripping																			**K12**
Second shaft extension 120 mm x 210 mm (d x l), (possible if 9th position = "A" or "G")																			**K16**
230 V standstill heating																			**K45**
110 V standstill heating																			**K46**
Terminal box rotated by +90 degrees (possible if 15th position = "V" or "W")																			**K83**
Terminal box rotated by –90 degrees (possible if 15th position = "U" or "W")																			**K84**
Terminal box rotated through +180 degrees																			**K85**
Terminal box 1XB7820 (cable entry plate undrilled) instead of terminal box 1XB7712																			**L00**
Condensation water drain hole provided unsealed																			**L12**
Enhanced corrosion protection (possible if 11th position = "1")																			**L29**
Adapter base for mounting a fan																			**L50**
Cable entry plate undrilled (with terminal box 1XB7712 only)																			**P00**
Cable entry plate 3 x M63 x 1.5 (only with terminal box 1XB7712)																			**P01**
Cable entry plate 3 x M75 x 1.5 (only with terminal box 1XB7712)																			**P02**
Cable entry plate 4 x M75 x 1.5 (only with terminal box 1XB7712)																			**P03**
Cable entry plate 4 x M63 x 1.5 (only with terminal box 1XB7712)																			**P04**
Cable entry plate 6 x M63 x 1.5 + 2 x M20 (only with terminal box 1XB7820)																			**P12**
Cable entry plate 7 x M50 x 1.5 + 2 x M20 + 1 x M25 (only with terminal box 1XB7820)																			**P13**
Cable entry plate 6 x M63 x 1.5 + 1 x M20 + 1 x M25 (only with terminal box 1XB7820)																			**P14**
Cable entry plate 9 x M63 x 1.5 + 1 x M20 + 1 x M25 (only with terminal box 1XB7820)																			**P15**
Cable entry plate 12 x M63 x 1.5 + 1 x M20 + 1 x M25 (only with terminal box 1XB7820)																			**P16**
Increased number of ground terminals in the terminal box (12 x M6 for 1XB771, 24 M6 for 1XB7280)																			**Q00**
Special fan for operation at 460 V / 60 Hz (±10 %)																			**R60**
Special fan for operation at 400 V / 60 Hz (±10 %)																			**R61**
Customer-specific information on rating plate (maximum 30 characters) [2]																			**Y84**
Colors (standard paint is anthracite RAL 7016):																			
Standard finish in RAL 9005 (black)																			**X01**
Primer																			**K24**
Special paint finish worldwide (anthracite RAL 7016)																			**K23**
Special paint finish worldwide in another color X.. (on request)																			**K23+X..**

[1] Order No. supplement "**-Z**" with order code and plain text, if required.

[2] Specify plain text when ordering.

Selection and ordering data (continued)

Ordering example 1PH835.

Selection criteria		Order No.	Order codes
Motor type	Asynchronous motor, shaft height 355, IP55 degree of protection, type IM B3, noise level 85 dB (A), operating speed 800 rpm, supply voltage 690 V 3 AC intermittent operation S3 –60 % rated output 445 kW rated torque 5312 Nm, rated current 460 A, terminal box type 1XB7712-P01	**1PH8352-7■K10-■■■0**	
Encoder systems	Incremental encoder HTL 1024 pulses/revolution POG 10 (Baumer-Hübner), prepared for mounting	1PH8352-7**K**K10-■■■0	
Shaft extension (DE)/ balancing	Featherkey + full-key balancing	1PH8352-7KK10-**1**■■0	
Bearings	Standard (A/N)	1PH8352-7KK10-1**A**■0	
Terminal box	DE top, cable entry right	1PH8352-7KK10-1A**X**0	
Special version			
	Mounting of a supplied pulse encoder with POG 10 mounting flange	1PH8352-7KK10-1AX0-**Z**	**G80**
	230 V standstill heating	1PH8352-7KK10-1AX0-**Z**	G80+**K45**
	Cable entry plate 4 x M 75 x 1.5	1PH8352-7KK10-1AX0-**Z**	G80+K45+**P03**
Complete identification codes for required version of motor		**1PH8352-7KK10-1AX0-Z G80 K45 P03**	

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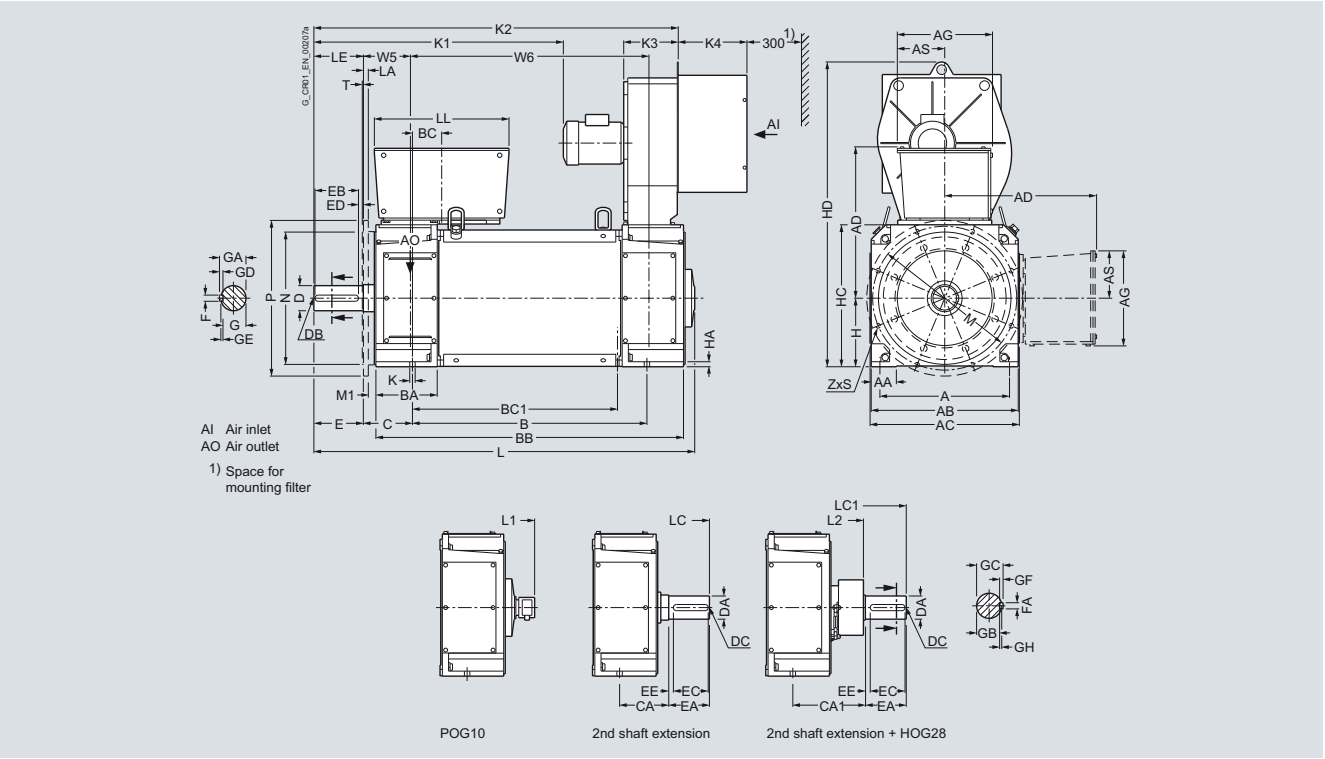
1PH8 motors, shaft height 355

Dimension drawings



Shaft height	Dimensions to IEC																					
1PH8...	A	AA	AB	AC	B	BA	BB	C	CA	CA1	W5	W6	D	DA	DB	DC	E	EA	EB	EC	ED	EE
350/351	670	130	760	781	772	317	1150	254	254	375	243	795	Ø130	Ø120	M24	M24	250	210	220	180	25	25
352	670	130	760	781	862	317	1240	254	254	375	243	885	Ø130	Ø120	M24	M24	250	210	220	180	25	25
354	670	130	760	781	972	317	1350	254	254	375	243	995	Ø130	Ø120	M24	M24	250	210	220	180	25	25
356	670	130	760	781	1092	317	1470	254	254	375	243	1115	Ø130	Ø120	M24	M24	250	210	220	180	25	25
358	670	130	760	781	1212	317	1590	254	254	375	243	1235	Ø130	Ø120	M24	M24	250	210	220	180	25	25

Shaft height	Dimensions to IEC																	
1PH8...	F	FA	G	GA	GB	GC	GD	GE	GF	GH	H	HA	HC	K	L	L1	L2	LC	LC1
350/351	32	32	119	137	114	127	18	11	18	11	355	26	735	Ø28	1523	1625	1644	1740	1861
352	32	32	119	137	114	127	18	11	18	11	355	26	735	Ø28	1613	1715	1734	1830	1951
354	32	32	119	137	114	127	18	11	18	11	355	26	735	Ø28	1723	1825	1844	1940	2061
356	32	32	119	137	114	127	18	11	18	11	355	26	735	Ø28	1843	1945	1964	2060	2181
358	32	32	119	137	114	127	18	11	18	11	355	26	735	Ø28	1963	2065	2084	2180	2301

Shaft height	Terminal box						Fan					Flange							
1PH8...	AD	AG	DE	BC	BC1	LL	K1	K2	K3	K4	HD	LA	LE	M	M1	N	P	S	T	Z
	1 XB7 820						**85 dB (A)**													
350/351	784	492	245	151	861	696	844	1438	282	355	1578	25	250	Ø740	40	Ø680	Ø800	Ø24	6	8
352	784	492	245	151	951	696	934	1528	282	355	1578	25	250	Ø740	40	Ø680	Ø800	Ø24	6	8
354	784	492	245	151	1061	696	1044	1638	282	355	1578	25	250	Ø740	40	Ø680	Ø800	Ø24	6	8
356	784	492	245	151	1181	696	1164	1758	282	355	1578	25	250	Ø740	40	Ø680	Ø800	Ø24	6	8
358	784	492	245	151	1301	696	1284	1878	282	355	1578	25	250	Ø740	40	Ø680	Ø800	Ø24	6	8
	1 XB7 712						**R60/R61 fan 60 Hz**													
350/351	640	377	201	–12	784	370	802	1438	282	355	1578									
352	640	377	201	–12	874	370	892	1528	282	355	1578									
354	640	377	201	–12	984	370	1002	1638	282	355	1578									
356	640	377	201	–12	1104	370	1122	1758	282	355	1578									
358	640	377	201	–12	1224	370	1242	1878	282	355	1578									

Overview

1PH7 and 1PL6 three-phase motors (shaft height 280)

The 1PH7 and 1PL6 asynchronous motors (shaft height 280) can be used as hoisting motors in hoisting gear, for example. This range of compact motors has been designed to fulfill the special requirements of motors for lifting gear.

The 1PH7 and PL6 asynchronous motors have the following features:

- 1PH7 motors are compact, externally ventilated asynchronous motors with a squirrel-cage rotor and a degree of protection of IP55. They are ventilated with a radial external fan unit, which is installed as standard. With the "enhanced corrosion protection" option, the motors can also be installed outdoors.
- 1PL6 motors are compact, externally ventilated asynchronous motors with a squirrel-cage rotor and a degree of protection of IP23. They are also ventilated with a radial external fan unit, which is installed as standard. These motors are particularly suitable for installation in power houses.

Benefits

This motor series has been designed specifically for use in conjunction with the SINAMICS S120 drive system. The motors are characterized by their high power density within compact dimensions and can be operated at zero speed with no reduction in the torque.

- 1PL6 motors are also available in shaft height 225 for hoisting gear with a lower output. For the technical specifications, see Catalog PM 21.
- 1PH7 and 1PL6 motors can also be fitted with brakes on the non-drive end. For more information, please contact your local Siemens representative.

Further information

All the electrical data for intermittent duty S3 is provided on the following pages.

1PH7, 1PL6 motors, shaft height 280

Technical data

Stator winding insulation according to EN 60034-1 (IEC 60034-1)	Utilization to temperature class 155 (F) for a coolant temperature of up to 40 °C
Cooling to EN 60034-6 (IEC 60034-6)	Radial fan NDE top mounted (intake from NDE)
Temperature monitoring	KTY84 temperature sensor in the stator winding additional KTY 84 as spare
Motor supply voltage (for technical data, see the ventilation data and sound pressure level)	400 V 3 AC, 50/60 Hz 480 V 3 AC, 60 Hz
Type to EN 60034-7 (IEC 60034-7)	IM B3, IM B35
Degree of protection to EN 60034-5 (IEC 60034-5)	IP 23 or IP 55
Shaft extension on the drive end in accordance with DIN 748-3 (IEC 60072-1)	Featherkey full or half-key balancing
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) [1)]	Tolerance N (normal) Tolerance R (reduced)
Vibration magnitudes in accordance with Siemens / EN 60034-14 (IEC 60034-14)	Level A (normal) Level R / A (reduced)
Sound pressure level in accordance with EN ISO 1680 tolerance +3 dB	Sound pressure level 74 dB(A)
Maximum speeds	3300 rpm
External encoder systems	Incremental encoder HTL 1024 pulses/revolution POG 10 (Baumer-Hübner)
Connection	Terminal box NDE right or DE top
Paint finish	Standard paint finish, anthracite, RAL 7016
Options	Refer to Options and Selection and ordering data

S/R = signals/revolution

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Notes

The rated motor data is specified in the selection and ordering data for a nominal pulse frequency of 2.5 kHz.

[1)] Rotational accuracy of shaft extension, concentricity of spigot and shaft and perpendicularity of mounting face of flange to shaft.

Technical data (continued)

Ventilation data and sound pressure level

Motor type	Fan motor: Current consumption at 400 V / 50 Hz (±10 %)	400 V / 60 Hz (±10 %)	480 V / 60 Hz (+5 %, –10 %)	Direction of air flow	Sound pressure level L_{pA} (1m) Motor + external fan, rated load, tolerance +3 dB, nominal pulse frequency 2.5 kHz	Volume of air min.
	A	A	A		dB	m^3/s
1PH7 motors, shaft height 280						
	2.55	2.6	2.6	NDE --> DE DE --> NDE	74	0.42
1PL6 motors, shaft height 280						
	2.55	2.6	2.6	NDE --> DE DE --> NDE	74 [1]	0.52

Terminal box assignment, max. connectable conductor cross-sections

Motor type	Terminal box type	Cable entry (power)	Max. outer cable diameter [2]	Number of main terminals	Max. cross-section per terminal	Max. current per terminal [3]
			mm		mm^2	A
1PH7 motors, shaft height 280						
1PH728 . - . . B	1XB7712	3 x M63 x 1.5	53	(3 + 1) [4] x 3 x M16	3 x 95	450
1PH7284- . . C						
1PH7284- . . D						
1PH7286- . . C	1XB7712	3 x M75 x 1.5	68	(3 + 1) [4] x 3 x M16	3 x 185	710
1PH7286- . . D						
1PH7288- . . C						
1PH7288- . . D						
1PH728 . - . . F						
1PL6 motors, shaft height 280						
1PL628 .	1XB7712	4 x M75 x 1.5	68	(3 + 1) [4] x 4 x M16	4 x 185	925

[1] Speed range 0 to 2000 rpm

[2] Dependent on the design of the metric cable gland.

[3] Current-carrying capacity based on EN 60204-1 and IEC 60364-5-52, routing type C.

[4] Including ground terminal.

1PH7 motors, shaft height 280

Selection and ordering data

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 400 V	Max. torque M_{max} [1]	Max. current I_{max} [1]	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 500 rpm Supply voltage 400 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control														
Intermittent duty S3 – 40 %														
500	17	118	2254	206	3010	290	1000	1110	550	320	250	4.2	**1PH7 284-■AB■■-0■■■**	1300
	17	147	2808	256	3990	380	1150	1570	770	420	340	5.2	**1PH7 286-■AB■■-0■■■**	1500
	17	191	3648	332	5080	480	1150	2050	1010	550	440	6.3	**1PH7 288-■AB■■-0■■■**	1700
Intermittent duty S3 – 60 %														
500	17	98	1872	173	3010	290	1200	1110	550	320	250	4.2	**1PH7 284-■AB■■-0■■■**	1300
	17	123	2349	216	3990	380	1500	1570	770	420	340	5.2	**1PH7 286-■AB■■-0■■■**	1500
	17	160	3056	280	5080	480	1500	2050	1010	550	440	6.3	**1PH7 288-■AB■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)														
500	17	80	1529	144	3010	290	1650	1110	550	320	250	4.2	**1PH7 284-■AB■■-0■■■**	1300
	17	100	1909	180	3990	380	1950	1570	770	420	340	5.2	**1PH7 286-■AB■■-0■■■**	1500
	17	130	2481	233	5080	480	1950	2050	1010	550	440	6.3	**1PH7 288-■AB■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

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[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 800 rpm Supply voltage 400 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control														
Intermittent duty S3 – 40 %														
800	27	184	2197	313 (at 400 V)	3940	610	2000	3200	1480	880	610	4.2	**1PH7 284-■AC■■-0■■■**	1300
	27	228	2722	401 (at 385 V)	5510	885	2200	4450	2030	1200	790	5.2	**1PH7 286-■AC■■-0■■■**	1500
	27	279	3331	514 (at 370 V)	7010	1160	2200	5610	2610	1300	1010	6.3	**1PH7 288-■AC■■-0■■■**	1700
Intermittent duty S3 – 60 %														
800	27	154	1838	264 (at 400 V)	3940	610	2200	3200	1480	880	610	4.2	**1PH7 284-■AC■■-0■■■**	1300
	27	191	2280	340 (at 385 V)	5510	885	2200	4450	2030	1200	790	5.2	**1PH7 286-■AC■■-0■■■**	1500
	27	234	2793	436 (at 370 V)	7010	1160	2200	5610	2610	1300	1010	6.3	**1PH7 288-■AC■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)														
800	27	125	1492	220 (at 400 V)	3940	610	2200	3200	1480	880	610	4.2	**1PH7 284-■AC■■-0■■■**	1300
	27	155	1850	285 (at 385 V)	5510	885	2200	4450	2030	1200	790	5.2	**1PH7 286-■AC■■-0■■■**	1500
	27	190	2268	365 (at 370 V)	7010	1160	2200	5610	2610	1300	1010	6.3	**1PH7 288-■AC■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

1PH7 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PH7 asynchronous motor, shaft height 280	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 1150 rpm Supply voltage 400 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1150	38.6	250	2076	438 (at 400 V)	5300	1200	2200	3500	2020	1380	4.2	**1PH7 284-■AD■■-0■■■**	1300
	38.6	309	2566	573 (at 380 V)	7150	1700	2200	4450	2540	1700	5.2	**1PH7 286-■AD■■-0■■■**	1500
	38.6	382	3172	692 (at 385 V)	8980	2110	2200	5200	3140	1900	6.3	**1PH7 288-■AD■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1150	38.6	209	1736	372 (at 400 V)	5300	1200	2200	3500	2020	1380	4.2	**1PH7 284-■AD■■-0■■■**	1300
	38.6	258	2143	489 (at 380 V)	7150	1700	2200	4450	2540	1700	5.2	**1PH7 286-■AD■■-0■■■**	1500
	38.6	320	2657	589 (at 385 V)	8980	2110	2200	5200	3140	1900	6.3	**1PH7 288-■AD■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1150	38.6	170	1414	314 (at 400 V)	5300	1200	2200	3500	2020	1380	4.2	**1PH7 284-■AD■■-0■■■**	1300
	38.6	210	1745	514 (at 380 V)	7150	1700	2200	4450	2540	1700	5.2	**1PH7 286-■AD■■-0■■■**	1500
	38.6	260	2160	497 (at 385 V)	8980	2110	2200	5200	3140	1900	6.3	**1PH7 288-■AD■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 400 V	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 2000 rpm	2500 rpm	3000 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 1750 rpm Supply voltage 400 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1750	58.7	331	1806	561	4660	1600	2200	3770	2420	1650	4.2	**1PH7 284-■AF■■-0■■■**	1300
	58.7	397	2166	669	5550	1895	2200	4500	2890	1980	5.2	**1PH7 286-■AF■■-0■■■**	1500
	58.7	500	2729	840	7410	2560	2200	5800	3750	2600	6.3	**1PH7 288-■AF■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1750	58.7	277	1512	473	4660	1600	2200	3770	2420	1650	4.2	**1PH7 284-■AF■■-0■■■**	1300
	58.7	332	1812	562	5550	1895	2200	4500	2890	1980	5.2	**1PH7 286-■AF■■-0■■■**	1500
	58.7	418	2281	707	7410	2560	2200	5800	3750	2600	6.3	**1PH7 288-■AF■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1750	58.7	225	1228	393	4660	1600	2200	3770	2420	1650	4.2	**1PH7 284-■AF■■-0■■■**	1300
	58.7	270	1474	466	5550	1895	2200	4500	2890	1980	5.2	**1PH7 286-■AF■■-0■■■**	1500
	58.7	340	1856	586	7410	2560	2200	5800	3750	2600	6.3	**1PH7 288-■AF■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

1PH7 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 480 V	Max. torque M_{max} [1]	Max. current I_{max} [1]	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 600 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control														
Intermittent duty S3 – 40 %														
600	20.3	140	2228	205	3230	310	1400	1620	900	500	300	4.2	**1PH7 284-■AB■■-0■■■**	1300
	20.3	176	2801	255	4580	435	1500	2130	1110	670	450	5.2	**1PH7 286-■AB■■-0■■■**	1500
	20.3	228	3629	331	6190	590	1600	2830	1500	860	570	6.3	**1PH7 288-■AB■■-0■■■**	1700
Intermittent duty S3 – 60 %														
600	20.3	117	1862	173	3230	310	1700	1620	900	500	300	4.2	**1PH7 284-■AB■■-0■■■**	1300
	20.3	148	2356	216	4580	435	1800	2130	1110	670	450	5.2	**1PH7 286-■AB■■-0■■■**	1500
	20.3	191	3040	279	6190	590	1900	2830	1500	860	570	6.3	**1PH7 288-■AB■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)														
600	20.3	95	1512	144	3230	310	2200	1620	900	500	300	4.2	**1PH7 284-■AB■■-0■■■**	1300
	20.3	120	1910	180	4580	435	2200	2130	1110	670	450	5.2	**1PH7 286-■AB■■-0■■■**	1500
	20.3	155	2467	233	6190	590	2200	2830	1500	860	570	6.3	**1PH7 288-■AB■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

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[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 1000 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1000	34	221	2111	315 (at 480 V)	4160	680	2200	2150	1270	840	4.2	**1PH7 284-■AC■■-0■■■**	1300
	34	272	2598	401 (at 480 V)	6250	1020	2200	3170	1900	1240	5.2	**1PH7 286-■AC■■-0■■■**	1500
	34	338	3228	514 (at 460 V)	7760	1295	2200	4010	2430	1570	6.3	**1PH7 288-■AC■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1000	34	185	1767	265 (at 480 V)	4160	680	2200	2150	1270	840	4.2	**1PH7 284-■AC■■-0■■■**	1300
	34	228	2177	340 (at 480 V)	6250	1020	2200	3170	1900	1240	5.2	**1PH7 286-■AC■■-0■■■**	1500
	34	283	2703	436 (at 460 V)	7760	1295	2200	4010	2430	1570	6.3	**1PH7 288-■AC■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1000	34	150	1433	220 (at 480 V)	4160	680	2200	2150	1270	840	4.2	**1PH7 284-■AC■■-0■■■**	1300
	34	185	1767	285 (at 480 V)	6250	1020	2200	3170	1900	1240	5.2	**1PH7 286-■AC■■-0■■■**	1500
	34	230	2197	365 (at 460 V)	7760	1295	2200	4010	2430	1570	6.3	**1PH7 288-■AC■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

1PH7 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} [1] at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 1350 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1350	45.3	294	2080	437 (at 470 V)	5580	1255	2200	4710	2800	1900	4.2	**1PH7 284-■AD■■-0■■■**	1300
	45.3	360	2547	573 (at 445 V)	7490	1780	2200	5730	3440	2290	5.2	**1PH7 286-■AD■■-0■■■**	1500
	45.3	448	3169	693 (at 450 V)	9350	2210	2210	7640	4260	2850	6.3	**1PH7 288-■AD■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1350	45.3	246	1740	372 (at 470 V)	5580	1255	2200	4710	2800	1900	4.2	**1PH7 284-■AD■■-0■■■**	1300
	45.3	301	2129	489 (at 445 V)	7490	1780	2200	5730	3440	2290	5.2	**1PH7 286-■AD■■-0■■■**	1500
	45.3	375	2653	589 (at 450 V)	9350	2210	2200	7640	4260	2850	6.3	**1PH7 288-■AD■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1350	45.3	200	1416	314 (at 470 V)	5580	1255	2200	4710	2800	1900	4.2	**1PH7 284-■AD■■-0■■■**	1300
	45.3	245	1733	414 (at 445 V)	7490	1780	2200	5730	3440	2290	5.2	**1PH7 286-■AD■■-0■■■**	1500
	45.3	305	2158	497 (at 450 V)	9350	2210	2200	7640	4260	2850	6.3	**1PH7 288-■AD■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 455 V	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 2000 rpm	2500 rpm	3000 rpm	Moment of inertia J	1PH7 asynchronous motor, shaft height 280	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 2000 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
2000	67	375	1791	562	4780	1655	2200	4780	2900	1950	4.2	**1PH7 284-■AF■■-0■■■**	1300
	67	456	2177	669	5740	1980	2200	5740	3460	2300	5.2	**1PH7 286-■AF■■-0■■■**	1500
	67	566	2703	841	7560	2625	2200	7560	4880	3300	6.3	**1PH7 288-■AF■■-0■■■**	1700
Intermittent duty S3 – 60 %													
2000	67	314	1499	473	4780	1655	2200	4780	2900	1950	4.2	**1PH7 284-■AF■■-0■■■**	1300
	67	381	1819	563	5740	1980	2200	5740	3460	2300	5.2	**1PH7 286-■AF■■-0■■■**	1500
	67	474	2263	707	7560	2625	2200	7560	4880	3300	6.3	**1PH7 288-■AF■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
2000	67	255	1218	393	4780	1655	2200	4780	2900	1950	4.2	**1PH7 284-■AF■■-0■■■**	1300
	67	310	1480	466	5740	1980	2200	5740	3460	2300	5.2	**1PH7 286-■AF■■-0■■■**	1500
	67	385	1838	586	7560	2625	2200	7560	4880	3300	6.3	**1PH7 288-■AF■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

1PH7 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 690 V	Max. torque M_{max} [1]	Max. current I_{max} [1]	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No. [2]	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 500 rpm Supply voltage 690 V 3 AC [2] for SINAMICS S120 converters, Active Line Module, Vector Control														
Intermittent duty S3 – 40 %														
500	17	113	2158	114	3010	170	1050	1110	550	320	250	4.2	**1PH7 284-■AB■■-0■■■**	1300
	17	141	2693	143	3990	225	1250	1570	770	420	340	5.2	**1PH7 286-■AB■■-0■■■**	1500
	17	184	3514	185	5080	278	1150	2070	1010	550	440	6.3	**1PH7 288-■AB■■-0■■■**	1700
Intermittent duty S3 – 60 %														
500	17	95	1815	96	3010	170	1300	1110	550	320	250	4.2	**1PH7 284-■AB■■-0■■■**	1300
	17	118	2254	121	3990	225	1550	1570	770	420	340	5.2	**1PH7 286-■AB■■-0■■■**	1500
	17	154	2941	156	5080	278	1500	2070	1010	550	440	6.3	**1PH7 288-■AB■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)														
500	17	77	1471	80	3010	170	1700	1110	550	320	250	4.2	**1PH7 284-■AB■■-0■■■**	1300
	17	96	1834	101	3990	225	1950	1570	770	420	340	5.2	**1PH7 286-■AB■■-0■■■**	1500
	17	125	2388	130	5080	278	1950	2070	1010	550	440	6.3	**1PH7 288-■AB■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

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[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] With a line voltage of 690 V, the motors must be ordered with option **C30**.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm²	Order No. [2]	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 800 rpm Supply voltage 690 V 3 AC [2] for SINAMICS S120 converters, Active Line Module, Vector Control														
Intermittent duty S3 – 40 %														
800	27	169	2017	169 (at 690 V)	3940	355	2200	3200	1480	880	610	4.2	**1PH7 284-■AC■■-0■■■**	1300
	27	213	2543	223 (at 665 V)	5510	515	2200	4450	2030	1200	790	5.2	**1PH7 286-■AC■■-0■■■**	1500
	27	272	3247	295 (at 640 V)	7010	675	2200	5610	2610	1300	1010	6.3	**1PH7 288-■AC■■-0■■■**	1700
Intermittent duty S3 – 60 %														
800	27	141	1683	143 (at 690 V)	3940	355	2200	3200	1480	880	610	4.2	**1PH7 284-■AC■■-0■■■**	1300
	27	178	2125	190 (at 665 V)	5510	515	2200	4450	2030	1200	790	5.2	**1PH7 286-■AC■■-0■■■**	1500
	27	228	2722	250 (at 640 V)	7010	675	2200	5610	2610	1300	1010	6.3	**1PH7 288-■AC■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)														
800	27	115	1373	120 (at 690 V)	3940	355	2200	3200	1480	880	610	4.2	**1PH7 284-■AC■■-0■■■**	1300
	27	145	1731	160 (at 665 V)	5510	515	2200	4450	2030	1200	790	5.2	**1PH7 286-■AC■■-0■■■**	1500
	27	185	2208	210 (at 640 V)	7010	675	2200	5610	2610	1300	1010	6.3	**1PH7 288-■AC■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

[2] With a line voltage of 690 V, the motors must be ordered with option **C30**.

1PH7 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PH7 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No. 2)	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 1150 rpm Supply voltage 690 V 3 AC 2) for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1150	38.6	241	2001	244 (at 690 V)	5300	700	2200	3500	2020	1380	4.2	**1PH7 284-■AD■■-0■■■**	1300
	38.6	298	2475	321 (at 655 V)	7150	990	2200	4450	2540	1700	5.2	**1PH7 286-■AD■■-0■■■**	1500
	38.6	369	3064	388 (at 665 V)	8980	1230	2200	5200	3140	1900	6.3	**1PH7 288-■AD■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1150	38.6	202	1677	208 (at 690 V)	5300	700	2200	3500	2020	1380	4.2	**1PH7 284-■AD■■-0■■■**	1300
	38.6	250	2076	274 (at 655 V)	7150	990	2200	4450	2540	1700	5.2	**1PH7 286-■AD■■-0■■■**	1500
	38.6	309	2566	331 (at 665 V)	8980	1230	2200	5200	3140	1900	6.3	**1PH7 288-■AD■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1150	38.6	164	1362	176 (at 690 V)	5300	700	2200	3500	2020	1380	4.2	**1PH7 284-■AD■■-0■■■**	1300
	38.6	203	1686	233 (at 655 V)	7150	990	2200	4450	2540	1700	5.2	**1PH7 286-■AD■■-0■■■**	1500
	38.6	251	2084	280 (at 665 V)	8980	1230	2200	5200	3140	1900	6.3	**1PH7 288-■AD■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

2) With a line voltage of 690 V, the motors must be ordered with option **C30**.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 690 V	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 2000 rpm	2500 rpm	3000 rpm	Moment of inertia J	1PH7 asynchronous motor, shaft height 280	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No. 2)	kg
1PH7 28. asynchronous motors, IP55 degree of protection, operating speed 1750 rpm Supply voltage 690 V 3 AC 2) for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1750	58.7	319	1741	315	4660	935	2200	3770	2420	1650	4.2	**1PH7 284-■AF■■-0■■■**	1300
	58.7	384	2096	376	5550	1110	2200	4500	2890	1980	5.2	**1PH7 286-■AF■■-0■■■**	1500
	58.7	484	2641	472	7410	1495	2200	5800	3750	2600	6.3	**1PH7 288-■AF■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1750	58.7	267	1457	265	4660	935	2200	3770	2420	1650	4.2	**1PH7 284-■AF■■-0■■■**	1300
	58.7	321	1757	316	5550	1110	2200	4500	2890	1980	5.2	**1PH7 286-■AF■■-0■■■**	1500
	58.7	405	2210	398	7410	1495	2200	5800	3750	2600	6.3	**1PH7 288-■AF■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1750	58.7	217	1184	221	4660	935	2200	3770	2420	1650	4.2	**1PH7 284-■AF■■-0■■■**	1300
	58.7	261	1424	262	5550	1110	2200	4500	2890	1980	5.2	**1PH7 286-■AF■■-0■■■**	1500
	58.7	329	1795	330	7410	1495	2200	5800	3750	2600	6.3	**1PH7 288-■AF■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

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1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

2) With a line voltage of 690 V, the motors must be ordered with option **C30**.

1PL6 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} [1]	Max. current I_{max} [1]	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} [1] at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PL6 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 800 rpm Supply voltage 400 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control														
Intermittent duty S3 – 40 %														
800	27.3	263	3140	491 (at 400 V)	3940	610	1200	2860	1480	880	610	4.2	**1PL6 284-■AC■■-0■■■**	1300
	27.3	359	4285	643 (at 385 V)	5510	885	1400	4450	2030	1200	790	5.2	**1PL6 286-■AC■■-0■■■**	1500
	27.3	456	5443	834 (at 370 V)	7010	1160	1450	5610	2610	1300	1010	6.3	**1PL6 288-■AC■■-0■■■**	1700
Intermittent duty S3 – 60 %														
800	27.3	240	2865	410 (at 400 V)	3940	610	1400	2860	1480	880	610	4.2	**1PL6 284-■AC■■-0■■■**	1300
	27.3	308	3677	537 (at 385 V)	5510	885	1600	4450	2030	1200	790	5.2	**1PL6 286-■AC■■-0■■■**	1500
	27.3	381	4548	696 (at 370 V)	7010	1160	1700	5610	2610	1300	1010	6.3	**1PL6 288-■AC■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)														
800	27.3	195	2328	335 (at 400 V)	3940	610	1700	2860	1480	880	610	4.2	**1PL6 284-■AC■■-0■■■**	1300
	27.3	250	2984	440 (at 385 V)	5510	885	1900	4450	2030	1200	790	5.2	**1PL6 286-■AC■■-0■■■**	1500
	27.3	310	3701	570 (at 370 V)	7010	1160	2100	5610	2610	1300	1010	6.3	**1PL6 288-■AC■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

[1] Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	1PL6 asynchronous motor, shaft height 280	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 1150 rpm Supply voltage 400 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1150	38.9	412	3421	696 (at 400 V)	5300	1200	2000	3500	2020	1380	4.2	**1PL6 284-■AD■■-0■■■**	1300
	38.9	522	4335	926 (at 380 V)	7150	1700	2000	4450	2540	1700	5.2	**1PL6 286-■AD■■-0■■■**	1500
	38.9	639	5306	1114 (at 385 V)	8980	2110	2100	5200	3140	1900	6.3	**1PL6 288-■AD■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1150	38.9	344	2857	582 (at 400 V)	5300	1200	2200	3500	2020	1380	4.2	**1PL6 284-■AD■■-0■■■**	1300
	38.9	437	3629	775 (at 380 V)	7150	1700	2200	4450	2540	1700	5.2	**1PL6 286-■AD■■-0■■■**	1500
	38.9	535	4443	931 (at 385 V)	8980	2110	2200	5200	3140	1900	6.3	**1PL6 288-■AD■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1150	38.9	280	2325	478 (at 400 V)	5300	1200	2200	3500	2020	1380	4.2	**1PL6 284-■AD■■-0■■■**	1300
	38.9	355	2944	637 (at 380 V)	7150	1700	2200	4450	2540	1700	5.2	**1PL6 286-■AD■■-0■■■**	1500
	38.9	435	3607	765 (at 385 V)	8980	2110	2200	5200	3140	1900	6.3	**1PL6 288-■AD■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

1PL6 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 400 V	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 2000 rpm	2500 rpm	3000 rpm	Moment of inertia J	**1PL6 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 1750 rpm Supply voltage 400 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1750	59	544	2969	906	4660	1600	2200	3770	2420	1650	4.2	**1PL6 284-■AF■■-0■■■**	1300
	59	654	3569	1085	5550	1895	2200	4500	2890	1980	5.2	**1PL6 286-■AF■■-0■■■**	1500
	59	823	4491	1362	7410	2560	2200	5800	3750	2600	6.3	**1PL6 288-■AF■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1750	59	455	2483	755	4660	1600	2200	3770	2420	1650	4.2	**1PL6 284-■AF■■-0■■■**	1300
	59	547	2985	903	5550	1895	2200	4500	2890	1980	5.2	**1PL6 286-■AF■■-0■■■**	1500
	59	689	3760	1133	7410	2560	2200	5800	3750	2600	6.3	**1PL6 288-■AF■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1750	59	370	2019	616	4660	1600	2200	3770	2420	1650	4.2	**1PL6 284-■AF■■-0■■■**	1300
	59	445	2429	736	5550	1895	2200	4500	2890	1980	5.2	**1PL6 286-■AF■■-0■■■**	1500
	59	560	3055	924	7410	2560	2200	5800	3750	2600	6.3	**1PL6 288-■AF■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

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1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PL6 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 1000 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1000	34	345	3295	492 (at 480 V)	4160	680	1400	2150	1270	840	4.2	**1PL6 284-■AC■■-0■■■**	1300
	34	456	4355	643 (at 480 V)	6250	1020	1700	3170	1900	1240	5.2	**1PL6 286-■AC■■-0■■■**	1500
	34	566	5405	834 (at 460 V)	7760	1295	1700	4010	2430	1570	6.3	**1PL6 288-■AC■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1000	34	289	2760	410 (at 480 V)	4160	680	1700	2150	1270	840	4.2	**1PL6 284-■AC■■-0■■■**	1300
	34	381	3639	537 (at 480 V)	6250	1020	2100	3170	1900	1240	5.2	**1PL6 286-■AC■■-0■■■**	1500
	34	474	4572	696 (at 460 V)	7760	1295	2200	4010	2430	1570	6.3	**1PL6 288-■AC■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1000	34	235	2244	335 (at 480 V)	4160	680	2200	2150	1270	840	4.2	**1PL6 284-■AC■■-0■■■**	1300
	34	310	2961	440 (at 480 V)	6250	1020	2200	3170	1900	1240	5.2	**1PL6 286-■AC■■-0■■■**	1500
	34	385	3677	570 (at 460 V)	7760	1295	2200	4010	2430	1570	6.3	**1PL6 288-■AC■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

1PL6 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PL6 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 1350 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1350	45.5	478	3381	696 (at 470 V)	5580	1255	2200	4710	2800	1900	4.2	**1PL6 284-■AD■■-0■■■**	1300
	45.5	603	4266	925 (at 445 V)	7490	1780	2200	5730	3440	2290	5.2	**1PL6 286-■AD■■-0■■■**	1500
	45.5	742	5249	1114 (at 450 V)	9350	2210	2200	7640	4260	2850	6.3	**1PL6 288-■AD■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1350	45.5	400	2830	582 (at 470 V)	5580	1255	2200	4710	2800	1900	4.2	**1PL6 284-■AD■■-0■■■**	1300
	45.5	504	3565	774 (at 445 V)	7490	1780	2200	5730	3440	2290	5.2	**1PL6 286-■AD■■-0■■■**	1500
	45.5	621	4393	931 (at 450 V)	9350	2210	2200	7640	4260	2850	6.3	**1PL6 288-■AD■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1350	45.5	325	2299	478 (at 470 V)	5580	1255	2200	4710	2800	1900	4.2	**1PL6 284-■AD■■-0■■■**	1300
	45.5	410	2901	637 (at 445 V)	7490	1780	2200	5730	3440	2290	5.2	**1PL6 286-■AD■■-0■■■**	1500
	45.5	505	3573	765 (at 450 V)	9350	2210	2200	7640	4260	2850	6.3	**1PL6 288-■AD■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 455 V	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 2000 rpm	2500 rpm	3000 rpm	Moment of inertia J	1PL6 asynchronous motor, shaft height 280	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No.	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 2000 rpm Supply voltage 480 V 3 AC for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
2000	67.3	610	2913	907	4780	1655	2200	4780	2900	1950	4.2	**1PL6 284-■AF■■-0■■■**	1300
	67.3	735	3510	1085	5740	1980	2200	5740	3460	2300	5.2	**1PL6 286-■AF■■-0■■■**	1500
	67.3	926	4422	1362	7560	2625	2200	7540	4880	3300	6.3	**1PL6 288-■AF■■-0■■■**	1700
Intermittent duty S3 – 60 %													
2000	67.3	510	2435	755	4780	1655	2200	4780	2900	1950	4.2	**1PL6 284-■AF■■-0■■■**	1300
	67.3	615	2937	903	5740	1980	2200	5740	3460	2300	5.2	**1PL6 286-■AF■■-0■■■**	1500
	67.3	775	3701	1133	7560	2625	2200	7540	4880	3300	6.3	**1PL6 288-■AF■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
2000	67.3	415	1981	616	4780	1655	2200	4780	2900	1950	4.2	**1PL6 284-■AF■■-0■■■**	1300
	67.3	500	2387	736	5740	1980	2200	5740	3460	2300	5.2	**1PL6 286-■AF■■-0■■■**	1500
	67.3	630	3009	924	7560	2625	2200	7540	4880	3300	6.3	**1PL6 288-■AF■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

1PL6 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1000 rpm	1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PL6 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	Nm	kgm^2	Order No. 2)	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 800 rpm Supply voltage 690 V 3 AC 2) for SINAMICS S120 converters, Active Line Module, Vector Control														
Intermittent duty S3 – 40 %														
800	27	261	3115	271 (at 690 V)	3940	355	1200	3200	1480	880	610	4.2	**1PL6 284-■AC■■-0■■■**	1300
	27	353	4214	364 (at 665 V)	5510	515	1250	4450	2030	1200	790	5.2	**1PL6 286-■AC■■-0■■■**	1500
	27	441	5264	467 (at 640 V)	7010	675	1250	5610	2610	1300	1010	6.3	**1PL6 288-■AC■■-0■■■**	1700
Intermittent duty S3 – 60 %														
800	27	228	2722	226 (at 690 V)	3940	355	1500	3200	1480	880	610	4.2	**1PL6 284-■AC■■-0■■■**	1300
	27	295	3522	305 (at 665 V)	5510	515	1700	4450	2030	1200	790	5.2	**1PH7 286-■AC■■-0■■■**	1500
	27	369	4405	390 (at 640 V)	7010	675	1700	5610	2610	1300	1010	6.3	**1PL6 288-■AC■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)														
800	27	185	2208	185 (at 690 V)	3940	355	2000	3200	1480	880	610	4.2	**1PL6 284-■AC■■-0■■■**	1300
	27	240	2865	250 (at 665 V)	5510	515	2100	4450	2030	1200	790	5.2	**1PL6 286-■AC■■-0■■■**	1500
	27	300	3581	320 (at 640 V)	7010	675	2200	5610	2610	1300	1010	6.3	**1PL6 288-■AC■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

2) With a line voltage of 690 V, the motors must be ordered with option **C30**.

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated}	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 1500 rpm	2000 rpm	2500 rpm	Moment of inertia J	**1PL6 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No. 2)	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 1150 rpm Supply voltage 690 V 3 AC 2) for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1150	38.9	399	3313	393 (at 690 V)	5300	700	2100	3500	2020	1380	4.2	**1PL6 284-** ■**AD**■■**-0**■■■	1300
	38.9	506	4202	521 (at 655 V)	7150	990	2100	4450	2540	1700	5.2	**1PL6 286-** ■**AD**■■**-0**■■■	1500
	38.9	620	5149	627 (at 665 V)	8980	1230	2200	5200	3140	1900	6.3	**1PL6 288-** ■**AD**■■**-0**■■■	1700
Intermittent duty S3 – 60 %													
1150	38.9	334	2774	329 (at 690 V)	5300	700	2200	3500	2020	1380	4.2	**1PL6 284-** ■**AD**■■**-0**■■■	1300
	38.9	424	3521	436 (at 655 V)	7150	990	2200	4450	2540	1700	5.2	**1PL6 286-** ■**AD**■■**-0**■■■	1500
	38.9	519	4310	524 (at 665 V)	8980	1230	2200	5200	3140	1900	6.3	**1PL6 288-** ■**AD**■■**-0**■■■	1700
Intermittent duty S3 - 100 % (S1)													
1150	38.9	272	2259	270 (at 690 V)	5300	700	2200	3500	2020	1380	4.2	**1PL6 284-** ■**AD**■■**-0**■■■	1300
	38.9	344	2857	359 (at 655 V)	7150	990	2200	4450	2540	1700	5.2	**1PL6 286-** ■**AD**■■**-0**■■■	1500
	38.9	422	3504	431 (at 665 V)	8980	1230	2200	5200	3140	1900	6.3	**1PL6 288-** ■**AD**■■**-0**■■■	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

2) With a line voltage of 690 V, the motors must be ordered with option **C30**.

1PL6 motors, shaft height 280

Selection and ordering data (continued)

Rated speed n_{rated}	Rated frequency f_{rated}	Rated output P_{rated}	Rated torque M_{rated}	Rated current I_{rated} at 690 V	Max. torque M_{max} 1)	Max. current I_{max} 1)	Max. speed at constant output (field weakening) n_2	Maximum torque M_{max} 1) at 2000 rpm	2500 rpm	3000 rpm	Moment of inertia J	**1PL6 asynchronous motor, shaft height 280**	Weight, approx.
rpm	Hz	kW	Nm	A	Nm	A	rpm	Nm	Nm	Nm	kgm^2	Order No. 2)	kg
1PL6 28. asynchronous motors, IP23 degree of protection, operating speed 1750 rpm Supply voltage 690 V 3 AC 2) for SINAMICS S120 converters, Active Line Module, Vector Control													
Intermittent duty S3 – 40 %													
1750	59	528	2881	510	4660	935	2200	3770	2420	1650	4.2	**1PL6 284-■AF■■-0■■■**	1300
	59	635	3465	611	5550	1110	2200	4500	2890	1980	5.2	**1PL6 286-■AF■■-0■■■**	1500
	59	799	4360	766	7410	1495	2200	5800	3750	2600	6.3	**1PL6 288-■AF■■-0■■■**	1700
Intermittent duty S3 – 60 %													
1750	59	441	2407	425	4660	935	2200	3770	2420	1650	4.2	**1PL6 284-■AF■■-0■■■**	1300
	59	531	2898	509	5550	1110	2200	4500	2890	1980	5.2	**1PL6 286-■AF■■-0■■■**	1500
	59	668	3645	638	7410	1495	2200	5800	3750	2600	6.3	**1PL6 288-■AF■■-0■■■**	1700
Intermittent duty S3 - 100 % (S1)													
1750	59	359	1959	347	4660	935	2200	3770	2420	1650	4.2	**1PL6 284-■AF■■-0■■■**	1300
	59	432	2357	415	5550	1110	2200	4500	2890	1980	5.2	**1PL6 286-■AF■■-0■■■**	1500
	59	543	2963	520	7410	1495	2200	5800	3750	2600	6.3	**1PL6 288-■AF■■-0■■■**	1700

For order number suffixes, see Page 7/59; for options, see Page 7/60

For more operating characteristics and engineering data, see the configuration manual for 1PH7 asynchronous motors.

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1) Maximum torque/current that is briefly available for dynamic operations (e.g. accelerating). Please refer to the planning documents for the values for thyristor or diode infeeds (e.g. Basic Line Module).

2) With a line voltage of 690 V, the motors must be ordered with option **C30**.

Selection and ordering data (continued)

Order No. supplement

Position in the order number	1	2	3	4	5	6	7		8	9	10	11	12		13	14	15	16		
	1	**P**	**.**	**.**	**2**	**8**	**.**	**–**	■	**A**	**.**	■	■	**–**	**0**	■	■	■	**–**	**Z**

External fan and terminal box with type IM B3/IM B35
When the external fan is mounted at the NDE, the direction of air flow is NDE > DE; when the external fan is mounted at the DE, the direction of air flow is DE > NDE.

External fan unit	Terminal box	
• NDE at top		**0**
	NDE right	**0**
	NDE left	**1**
	NDE at top	**–**
	DE at top (not IM B35)	**5**
• NDE right		**1**
	NDE right	**–**
	NDE left	**1**
	NDE at top	**2**
	DE at top (not IM B35)	**5**
• NDE left		**2**
	NDE right	**0**
	NDE left	**–**
	NDE at top	**2**
	DE at top (not IM B35)	**5**
• DE at top		**3**
	NDE right	**–**
	NDE left	**–**
	NDE at top	**2**
	DE at top (not IM B35)	**–**
• DE right		**4**
	NDE right	**–**
	NDE left	**–**
	NDE at top	**2**
	DE at top (not IM B35)	**–**
• DE left		**5**
	NDE right	**–**
	NDE left	**–**
	NDE at top	**2**
	DE at top (not IM B35)	**–**

Type

• IM B3	**0**
• IM B35	**3**

Drive type and vibration severity grade

Drive type	Vibration severity grade	
• Coupling	A	**A**
• Coupling	R/A	**B**

Shaft extension, balancing

• Half-key balancing	**A**
• Full-key balancing	**C**

Paint finish

• Primed	**0**
• Standard finish, anthracite, RAL 7016	**3**
• Special finish, anthracite RAL 7016	**6**

Special version [1]	**Z**

[1] Order No. supplement "**-Z**" only if ordering with order code and plain text, if required. Specify special versions with order code, see table on Page 7/60.

Selection and ordering data (continued)

Options

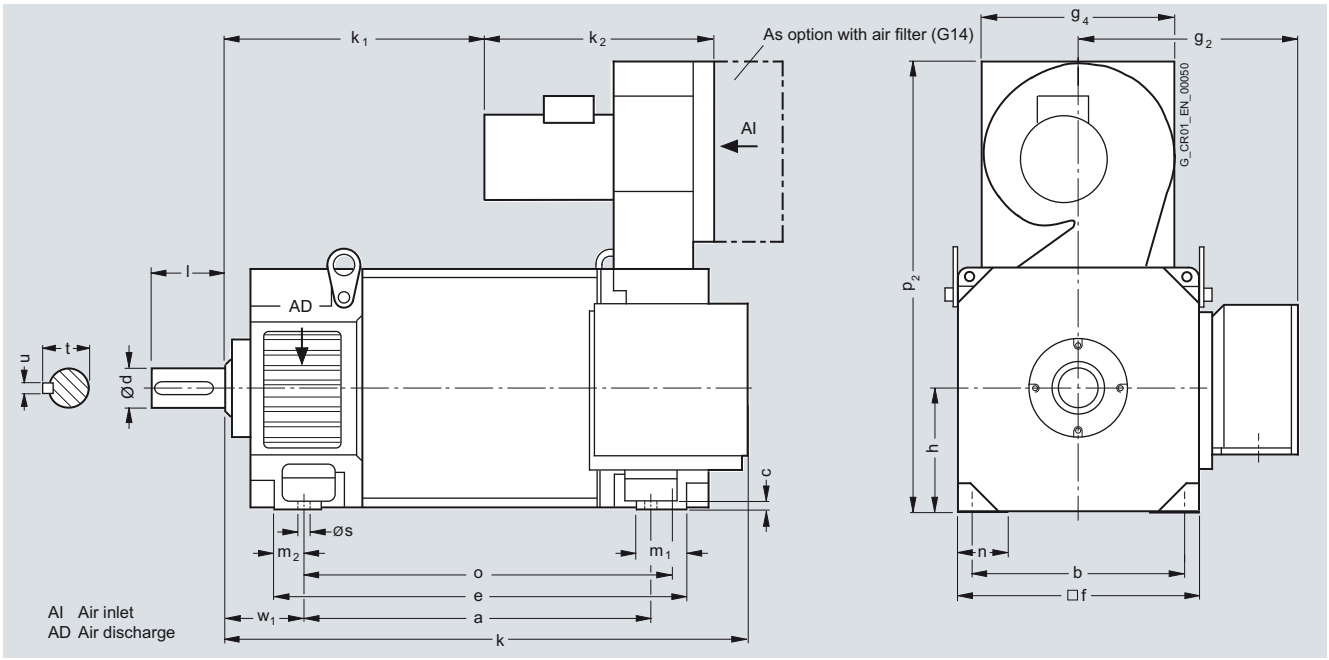
Additional ordering information for special 1PH7 and 1PL6 motor versions

Version	Order No. supplement "**-Z**" with order code and plain text, if required
Winding version 690 V	**C30**
Fan unit with filter	**G14**
Pulse encoder POG10 or POG10 with centrifugal switch (specify in the order; the built-on devices must be supplied to the factory)	**G80**
Second rating plate	**K31**
Standstill heating 230 V, 200 W	**K45**
Cable entry plate, terminal box, customer-specific (plain text is required)	**K55**
Terminal box rotated through +90 degrees	**K83**
Terminal box rotated through –90 degrees	**K84**
Terminal box rotated through 180 degrees	**K85**
Condensation water drain hole provided (not sealed) (only required for 1PH7)	**L12**
Enhanced corrosion protection if device is installed in industrial areas or exposed to sea air (only possible for 1PH7 motors)	**L29**
Additional back-off thread on motor feet (for ease of installation)	**M83**
Special paint finish RAL...	**R2Y**
Customized rating plate data	**Y80**

The KTY 84 sensor for monitoring the motor temperature is installed as standard and does not need to be ordered separately. (A second KTY 84 sensor is also installed for backup.)

For further options, see Catalog PM 21.

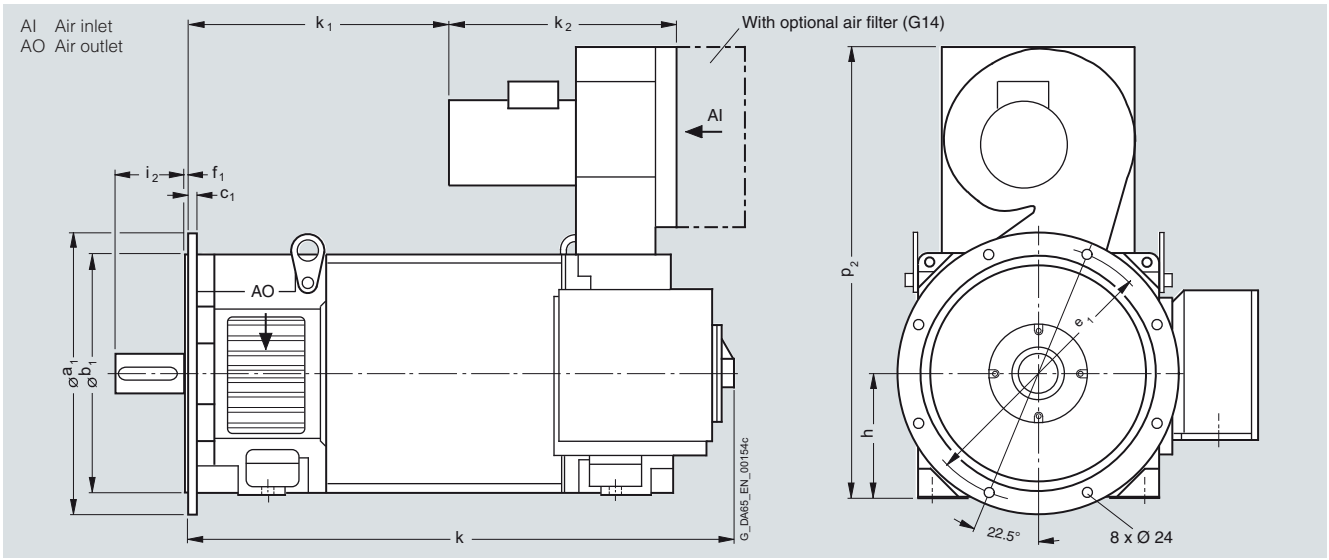
Dimension drawings



If encoder POG 10 (without centrifugal switch) is mounted, this increases the length k of the motor by 80 mm.

Type IM B3

For motor Shaft height	Type	DIN IEC	Dimensions in mm a B	b A	c HA	e BB	f AB	g_2 AD	g_4 –	h H	k LB	k_1 –	k_2 –	m_1 –	m_2 –	n AA	o –	p_2 –	s K	Shaft extension DE w_1 C	d D	l E	t GA	u FA
280	1P.. 284		684	457	22	840	560	518	449	280	1146	489	546	108	78	100	731	1042	24	190	95	170	100	25
	1P.. 286		794			950					1256	599					841							
	1P.. 288		924			1080					1386	729					971							



If encoder POG 10 (without centrifugal switch) is mounted, this increases the length k of the motor by 80 mm.

Type IM B35

For motor Shaft height	Type	DIN IEC	Dimensions in mm a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	i_2 –	k LB	k_1 –	k_2 –	p_2 –
280	1P..284		660	550	24	600	6	280	170	1146	489	546	1042
	1P..286									1256	599		
	1P..288									1386	729		

For dimensions for foot mounting, shaft and terminal box, see dimension drawing of 1P..28 motors, type of construction IM B3.

1LP4, 1LP6 motors, shaft heights 132 to 280
Brake motors with fitted spring-operated brakes

Overview

Three-phase squirrel-cage motor 1LP with fitted DC-excited spring-operated brake

The naturally cooled hoisting gear motors of type 1LP4 and 1LP6 form a compact drive unit when combined with the fitted spring-operated brake and are ideal for application as traversing motors. The DC-operated brake is designed as a holding brake, but is also capable of emergency shutdown braking operations at maximum motor speed. In the case of power failure, the brake is applied automatically by its spring force and brings the drive to a standstill.

Product range

The product range includes shaft heights 132 S to 280 M in the 5.5 kW to 132 kW power range for 4-pole motors, or in the 3 kW to 90 kW power range for 6-pole motors, for duty type S3 – 25 % in each case.
As the table below shows, more than one type of brake can be fitted to a motor; this flexibility allows the user to tailor the drive unit – comprising the motor and brake – to the exact requirements of the crane manufacturer.

The motors can also be ordered without a brake. The same order numbers apply, but the brake options are excluded.

Motor shaft height	Brake type							
	KFB 10 100 Nm	KFB 16 160 Nm	KFB 25 250 Nm	KFB 30 300 Nm	KFB 40 400 Nm	KFB 63 630 Nm	KFB 100 1000 Nm	KFB 160 1600 Nm
132	✓							
160	✓	✓						
180	✓	✓	✓	✓	✓			
200		✓	✓	✓	✓			
225			✓	✓	✓	✓		
250			✓	✓	✓	✓	✓	✓
280					✓	✓	✓	✓

Technical data

Electrical design

Operating voltage

The hoisting gear brake motors are available for the following rated voltages:

- 400 V 3 AC, 50 Hz
- 460 V 3 AC, 50 Hz
- 500 V 3 AC, 50 Hz
- 690 V 3 AC, 50 Hz

The specifications change as follows for motors operating on a rated frequency of 60 Hz:

Rated speed +20 %
Rated power +15 %.

The standard model of brake coil is supplied for connection to 207 V DC (see also technical data for brakes).

Motor protection

The following protective equipment can be installed (see also Options):

- 3 PTC thermistors for tripping
- 3 PTC thermistors for tripping and 3 PTC thermistors for alarm
- 1 KTY 84-130 temperature sensor for evaluation in the converter
- 3 bimetallic switches (Klixon) for tripping

Standstill heating

The motors can be fitted with a standstill heater. The heat outputs are as follows:

Motor shaft height	Heat output W
132 to 160	100
180 to 200	55
225 to 250	92
280	109

Voltages, see Options.

It is also possible to connect a voltage (which should equal approximately 4 to 10 % of the rated motor voltage) to stator terminals U1 and V1. 20 to 30 % of the motor rated current is normally sufficient to provide adequate heating.

Insulation

The motor windings are designed to comply with insulation class F.

Electric strength

See Catalog D 81.1.

Technical data (continued)

Mechanical design

1LP4/1LP6 motors are naturally cooled units without fans. Depending on the shaft height, brakes with different torques can be built onto the motors. Housing and terminal box are made of grey cast iron. The brake itself does not have a separate terminal box; all the brake connections, whether coil, microswitch or heater, are taken to the motor terminal box.

Types of construction

The motors are available in types of construction IM B3, IM B35, IM V5, IM B5 and IM V1. Other types of construction on request. The position of the condensate drain holes is determined by the construction type.

Housing

The housing and terminal box of the motor are made of grey cast iron.
The DE flange and the feet (bolted-on) can be supplied in GGG 40 as an option.

Degree of protection

The degree of protection of the standard motor models is IP55. IP56 is also available as an option.
The water drain holes on motors with this degree of protection must be opened at regular intervals as part of the maintenance cycle to allow any condensate that has collected inside the motor to drain off.

Paint finish

The motors are coated as standard in a special finish RAL 7030 with a coat thickness of 180 µ. Other colors are available at an additional cost.
A further option is an "offshore finish" with a coat thickness of 220 µ.

Mounted equipment

Sensing equipment such as the POG10 incremental encoder (made by Baumer-Hübner) can be mounted on the motors.
The brakes themselves can be supplied with an emergency manual release mechanism (see KFB spring-operated brake "Emergency release with hand lever").

Terminal box

On standard models, the terminal box is mounted on the top at the DE and is always the next size larger than on the basic models of the 1LG motor. The feet are cast on.

The terminal box can also be positioned on the left or right (as viewed from the DE), but this option is only possible on motors with bolted-on feet. If the motor is to have bolted-on feet and a terminal box positioned on top, options **K11** and **J22** must be selected in the order.

On motors with a brake, the terminal box is fitted at the NDE (non-drive end). The option **M64** must be specified additionally.

All connecting terminals for the motor and brake including auxiliaries are housed in the motor terminal box.

Motor shaft height	Terminal box	Terminal stud	Max. cross section	Cable entry hole[1)]	Sealing area
			mm^2		mm
132, 160	GT320	M5	16	M40 x 1.5	19 to 28
180	GT421 (identical in construction to GK340)	M5	16	M40 x 1.5	19 to 28
200	GT591	M6	25	M50 x 1.5	27 to 35
225	GT591	M8	35	M50 x 1.5	27 to 35
250, 280	GT691	M10	120	M63 x 1.5	32 to 42

Auxiliary terminal designations

Temperature sensor	Terminal designation
3 PTC thermistors for alarm	1TP1-1TP2
3 PTC thermistors for tripping	2TP1-2TP2
Bimetallic (NC contact)	2TP1-2TP2
Standstill heating (motor)	HE1-HE2
Brake coil DC	BA1-BA2
Brake coil AC	BD1-BD2
Standstill heating (brake)	BRHE1-BRHE2
Microswitch brake opened	BRS1-BRS3
Microswitch brake air-gap monitoring	BRS1-BRS3

Shaft extension

Standard brake motors are designed with a cylindrical shaft extension.

Maximum speed

The maximum permissible speed is 3000 rpm.

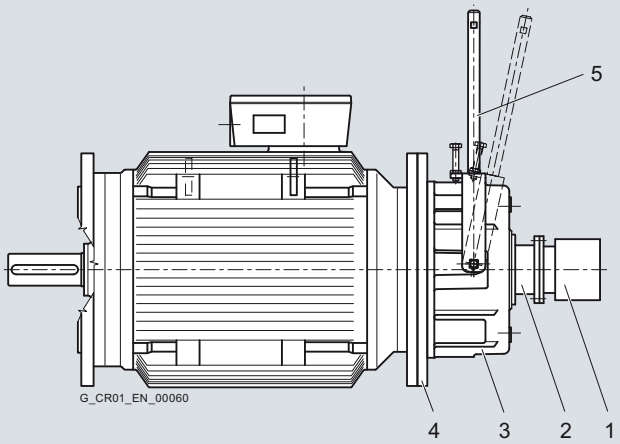
Bearings

Motor shaft height	DE bearing	NDE bearing
132	6208 2ZC3	6208 2ZC3
160	6209 2ZC3	6209 2ZC3
180	6210 ZC3	6210 ZC3
200	6212 ZC3	6212 ZC3
225	6213 ZC3	6213 ZC3
250	6215 ZC3	6215 ZC3
280	6217 C3	6217 C3

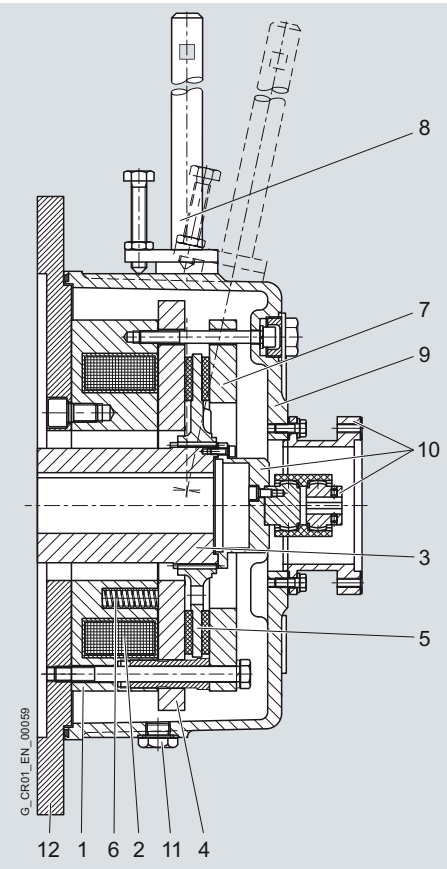
[1)] If the motor has been ordered with temperature sensor, an extra M20 x 1.5 hole is provided.
If the motor has been ordered with heater, an extra M20 x 1.5 hole is provided.

Design of KFB spring-operated brakes

The electromagnetic double-disc spring-operated brake KFB, see picture on the bottom right, is intended to operate solely as a holding brake for this application. With the exception of emergency braking, it may only be operated as a dynamically loaded operational brake if it is appropriately dimensioned (see Pages 2/7 and 2/9) or after consultation with the manufacturer. It is a spring-loaded, electrically operated, double-disc brake, which operates when the power is switched off. When the coil (**2**) is energized with a DC voltage, the brake is released electromagnetically. If the coil (**2**) is de-energized, the springs (**6**) press the armature plate (**4**) axially against the friction-lining carrier (**5**) which in turn presses against the brake flange (**7**); this sequence provides the braking action. The brake is released when the coil (**2**) is energized. The magnetic field attracts the armature plate (**4**) towards the coil form (**1**), counteracting the spring pressure on the coil form. The air gap can be adjusted within a wide range, ensuring high availability of the brake. The motor and brake are coupled by means of a flange **12**). Emergency brake release is possible by means of two emergency release screws – optionally with hand lever release.
As a result of the compact design with the enclosed coil form housing and appropriate sealing from the shaft, the brake has degree of protection IP67 when the housing is closed.
All the brake connections such as coil, microswitch, etc. are taken to the motor terminal box.



1 Rotary encoder POG10
2 Tacho bushing T2 with coupling and assembly components
3 KFB brake
4 IEC mounting flange
5 Hand lever for emergency release (option)



1 Coil form
2 Coil
3 Hub
4 Armature plate
5 Friction-lining carrier
6 Springs
7 Brake flange
8 Hand lever
9 Housing
10 Tacho assembly components
11 Service screw
12 Mounting flange

7

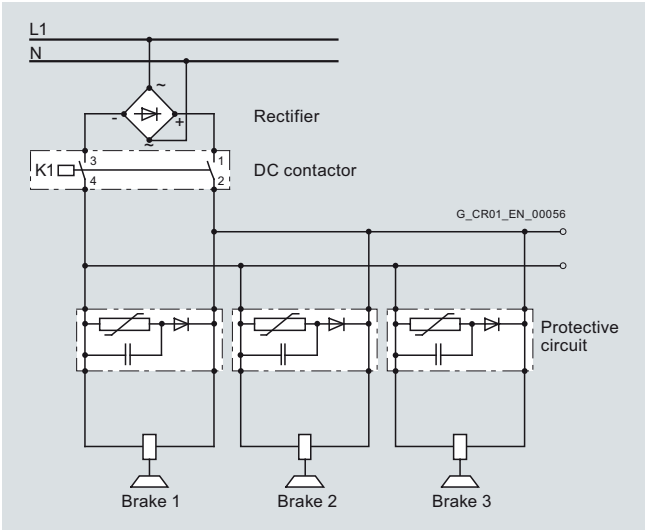
Design of KFB spring-operated brake (continued)

Protective element

The brakes should be connected at the DC end, i.e. between the rectifier and coil (see circuit diagram below). This ensures a significantly shorter closing time than if the brake were connected at the AC end. A protective element (varistor + spark quenching) must be fitted in parallel to each brake coil. This protects the brake coil against excessively high de-energization voltages on the one hand, and the contactor contacts on the other. These protective elements must be installed close to the brake coils where possible, e.g. in the motor terminal box or in a distribution board on the subframes in the case of traversing gear.
Protective elements PE-400/150/5 are directly available from the manufacturer [1] under order number 008099300249.

Technical data

Protective element	
Max. connection voltage (coil voltage)	400 V DC
Max. coil current	5 A
Max. energy absorption of one trip	150 J
Max. continuous output (average) of energy absorption	5 W
Trip peak at max. coil current	<450 V
Ambient temperature	–40 °C to +50 °C
Permissible cross section of connecting lead	0.2 to 2.5 mm^2
Weight approx.	0.2 kg
Degree of protection	IP20



Special versions

Emergency release with hand lever, option **J25**

In addition to brake release at zero current via two emergency release screws, it is also possible to release the brake by means of a hand lever permanently mounted on the brake housing. The lever is lockable.

Microswitch for "brake released" monitoring, option **J26**

The brake can be fitted with a microswitch for monitoring the "brake released" state. The contact is rated for:

- < 30 V DC, 5.0 A
- < 125 V DC, 0.5 A
- < 250 V AC, 5.0 A

Microswitch for air-gap monitoring/wear, option **J24**

A 2nd microswitch can be fitted to monitor the "maximum air gap" function. Tripping of this contact indicates that full braking power is no longer available and the air gap must be adjusted immediately. The contact load rating is identical to that of the "brake released" microswitch.

Standstill heating, option **J27**

The installation of a heater can prevent the formation of condensate, e.g. caused by fluctuations in temperature and air humidity, inside the brake. This heater must not be switched on when the motor is operating.
The heater is designed for a supply voltage of 230 V AC and a heat output of 40 W.

Encoder mounting, option **J28/J29**

An encoder (e.g. POG 10) can be mounted on the brake. Additional mounting components and other measures are required on the brake to fit an encoder.

Tacho socket T2 with coupling and mounting components is ordered with option **J28** (see Page 7/63, picture at top right, index 2).

If an encoder is to be fitted at a later date, the brake can be supplied prepared for encoder mounting. This is possible with option **J29**. Option **J29** does not include the coupling and mounting components.

It is also possible to retrofit an encoder by replacing the brake housing (the parts required, such as new housing, coupling, etc., can be ordered directly from the manufacturer [1] using the brake serial number as a reference).

Brake control unit BCU

A brake control unit (BCU) can also be used to supply and monitor the brake on single drives. For technical data, price, etc., please contact the manufacturer [1] directly.

Rectifier in terminal box, option **C07/C01**

The brake motors can also be supplied with a bridge rectifier installed.
Notice!
It must, however, be noted that the activation time for the brake can be a factor of 10 longer than the values specified in the tables on Page 7/67 because it is connected at the AC current side.

Three-phase squirrel-cage motors 1LP4, 1LP6, 60 Hz variant

The motor types 1LP4 and 1LP6 are also available in a 60 Hz variant.
The following must be stated in addition to the order number:

400 VΔ 1LP....-.....**L5K**
460 VΔ 1LP....-.....**L5L**
500 VΔ 1LP....-.....**L5M**

Technical data on request.

[1] Vendor:
Pintsch Bamag GmbH
Hünxerstr. 149
D-46537 Dinslaken
Tel. (+49)2064/602-0
www.PintschBamag.de

Planning information for KFB spring-operated brakes

The following dimensioning parameters must be taken into account when a brake is selected:

Braking torque

On the assumption that the deceleration rate must be approximately equal to the acceleration rate, the braking torque should be calculated as follows:

$M_{BR} = M_{Ja} \times \eta^2$

M_{BR} = Braking torque of mechanical brake
M_{Ja} = Accelerating torque for accelerating linear-motion and rotating masses

Accordingly, the braking torque of the mechanical brake must be approximately equal to the required maximum motor torque.

Braking energy on emergency trip

The braking energy for occasional emergency trips must be checked to ensure that it does not cause the brake to overheat. Please refer to table "Technical data of brakes" for permissible values. The braking energy produced for traversing gear can be calculated approximately with the following equation:

$$Q = \frac{I_{tot} \times n_{Br}^2}{182.4 \times 10^3} \times \frac{M_{Br}}{M_{Br} \pm M_L} \left[\text{kJ}\right]$$

Q = Energy capability/braking energy in kJ
M_{Br} = Existing braking torque in Nm
M_L = Total of all load torques in Nm referred to the brake (motor) shaft
n_{Br} = Speed of brake (motor) shaft in rpm
I_{tot} = Total moment of inertia to be braked in kgm^2 reduced to the brake (motor) shaft
M_L = is positive if it supports braking (e.g. hoisting a load)
M_L = is negative if it counteracts braking (e.g. lowering a load)

The total moment of inertia I_{tot} is the sum of the individual moments of inertia of the plant components to be braked, reduced to the brake (motor) shaft, and the moment of inertia of the linear-motion masses. The equivalent mass inertia I_{Eqv} of a linear-motion mass m with velocity ν, referred to the brake (motor) speed n_{Br}, is calculated as follows:

$$I_{Eqv} = 91.2 \times m \times \left(\frac{\nu}{n_{Br}}\right)^2 \left[\text{kgm}^2\right]$$

m = Mass of the linear-motion load in kg
ν = Velocity of the linear-motion load in m/s
n_{Br} = Speed of the brake (motor) shaft in rpm

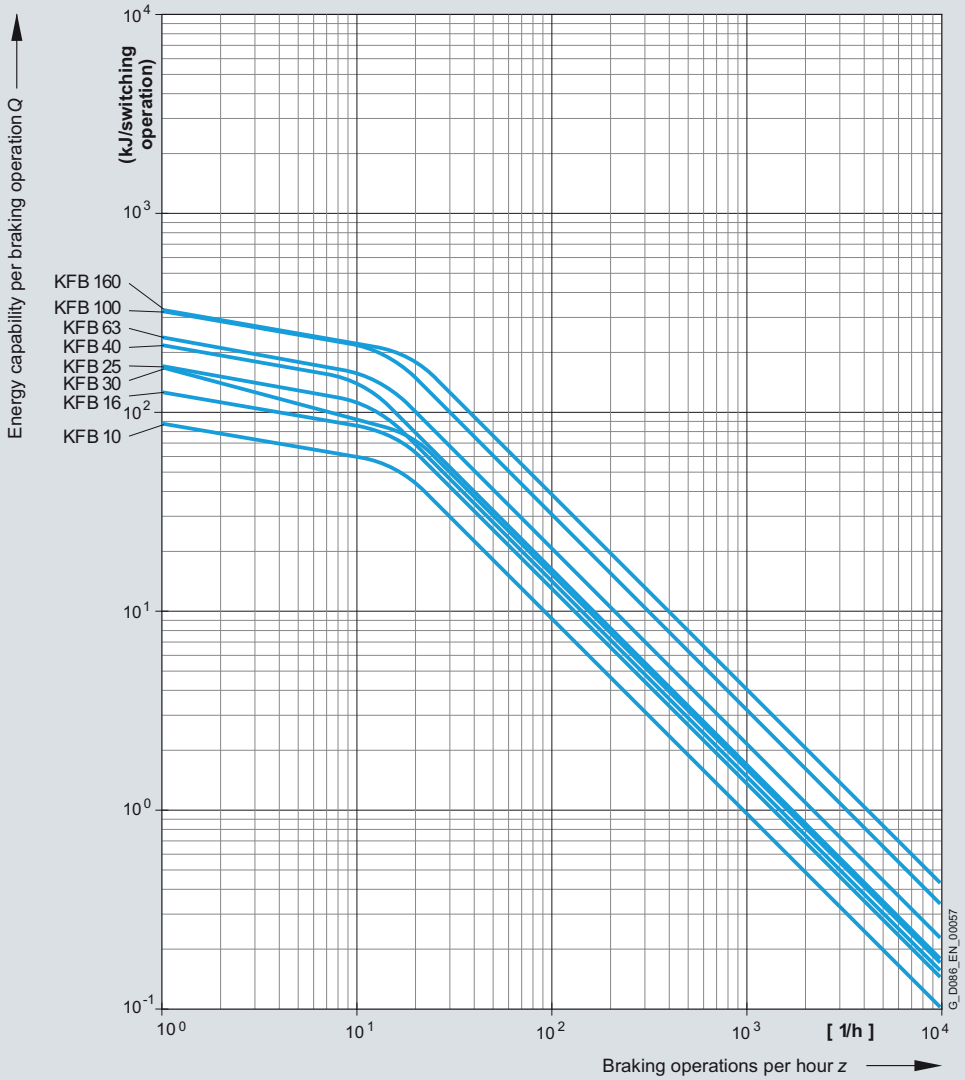
The velocity and/or speed to be entered here must equal the maximum values in normal operation. An increase in velocity resulting from wind forces may also need to be taken into account.

Planning information for KFB spring-operated brakes (continued)

Braking energy and energy capability

The brake must be capable of absorbing the heat produced by the occasional emergency braking operation. The maximum permissible energy capability *Q* is shown in the diagram below as a function of the number of switching operations.

The permissible energy capability *Q* for a single emergency trip can be found in table "Technical data of brakes".



When the switching energy per braking operation and number of braking operations per hour are known, the brake size can be calculated.
Example:
Q = 35 kJ/switching operations and
z = 100 braking operations/hour
= brake KFB 160

Energy capability *Q*, braking speed *n* = 1500 rpm

Technical data of KFB spring-operated brakes

		KFB 10	KFB 16	KFB 25	KFB 30	KFB 40	KFB 63	KFB 100	KFB 160
Braking torque	Nm	100	160	250	300	400	630	1000	1600
Permissible speed	rpm	6000	6000	6000	6000	5500	4700	4000	3600
Rated voltage [1]	V DC	207	207	207	207	207	207	207	207
Rated output	W	100	118	160	154	188	206	316	340
Rated current	A	0.48	0.57	0.77	0.74	0.91	1	1.53	1.64
Moment of inertia	kgm^2	0.0017	0.0037	0.0048	0.0055	0.0068	0.017	0.036	0.05
Weight approx.	kg	19	28	42	50	55	74	106	168
Energy capability Q at n =1500 rpm/z = 1	kJ	88	126	169	167	216	235	321	331
Energy capability Q at n =1500 rpm/z = 100	kJ	8	11.7	12.6	13.8	14.5	18.4	27.1	34.8
Closing time t_1	ms	55	75	80	85	90	120	135	195
Release time t_2	ms	128	173	239	245	251	342	375	498

Q = Energy capability per braking operation [kJ per switching operation]
n = Speed [rpm]
z = Braking operations per hour [1/h]

t_1 = Closing time [2]: Time from power OFF until 90 % of rated braking torque is reached
t_2 = Release time [2]: Time from power ON until 10 % of rated braking torque is reached
t = Measured at 20°C

The normal version of the brake is supplied for a coil voltage of 207 V DC. Voltages of 110 V DC and 180 V DC are also available at no extra cost (please state in plain text in the order). Other coil voltages on request.

[1] Rated voltage according to DIN IEC 38 with tolerances of +6 % and –10 % according to DIN VDE 0580

[2] Switching time terms defined according to DIN VDE 0580; Closing time t_1 = Connection time t_1; Release time t_2 = Disconnection time t_2

1LP4, 1LP6 motors, shaft heights 132 to 280
Brake motors with fitted spring-operated brakes

Selection and ordering data

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
4-pole, 1500 rpm, 50 Hz											
Intermittent duty S3 – 15 % or S2 – 30 min											
132 S	1440	6.6	43.8	13.7	72	22.8	0.018	**1LP6130-4CA9 ■ ■■■**	55	**1LP6130-4CM8 ■**	55
132 M	1440	9	59.7	18.3	98	30.4	0.023	**1LP6133-4CA9 ■ ■■■**	62	**1LP6133-4CM8 ■**	62
160 M	1440	13.2	87.5	25.8	144	43	0.043	**1LP6163-4CA9 ■ ■■■**	100	**1LP6163-4CM8 ■**	100
160 L	1440	18	119.5	34.5	196	57	0.055	**1LP6166-4CA9 ■ ■■■**	114	**1LP6166-4CM8 ■**	114
180 M	1455	22.2	146	42	242	70	0.099	**1LP4183-4CA9 ■ ■■■**	135	**1LP6183-4CM8 ■**	150
180 L	1455	26.4	173	50	286	83	0.12	**1LP4186-4CA9 ■ ■■■**	150	**1LP6186-4CM8 ■**	175
180 L	1455	36	236	71	392	118	0.14	**1LP4188-4CA9 ■ ■■■**	175	**-**	-
200 L	1455	36	236	67	392	112	0.19	**1LP4207-4CA9 ■ ■■■**	195	**1LP6207-4CM8 ■**	220
200 L	1455	44	289	83	482	138	0.23	**1LP4208-4CA9 ■ ■■■**	220	**1LP6208-4CM8 ■**	280
200 L	1458	54	354	102	596	170	0.29	**1LP4204-4CA9 ■ ■■■**	280	**-**	-
225 S	1467	44	286	82	480	136	0.37	**1LP4220-4CA9 ■ ■■■**	255	**1LP6220-4CM8 ■**	290
225 M	1467	54	352	97	582	162	0.45	**1LP4223-4CA9 ■ ■■■**	290	**1LP6223-4CM8 ■**	320
225 M	1467	66	430	119	712	198	0.49	**1LP4228-4CA9 ■ ■■■**	320	**-**	-
250 M	1474	66	427	120	710	200	0.69	**1LP4253-4CA9 ■ ■■■**	375	**1LP6253-4CM8 ■**	445
250 M	1478	90	581	164	966	272	0.86	**1LP4258-4CA9 ■ ■■■**	445	**1LP6258-4CM8 ■**	505
250 M	1478	108	698	195	1160	324	0.98	**1LP4254-4CA9 ■ ■■■**	505	**-**	-
280 S	1482	90	580	164	964	272	1.2	**1LP4280-4CA9 ■ ■■■**	515	**1LP6280-4CM8 ■**	560
280 M	1483	108	695	192	1158	320	1.4	**1LP4283-4CA9 ■ ■■■**	560	**1LP6283-4CM8 ■**	660
280 M	1485	132	849	238	1414	396	1.71	**1LP4288-4CA9 ■ ■■■**	660	**1LP6288-4CM8 ■**	720
280 M	1484	158	1017	294	1698	490	1.9	**1LP4284-4CA9 ■ ■■■**	720	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.
For ordering example, see Page 7/81.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
4-pole, 1500 rpm, 50 Hz											
Intermittent duty S3 – 25 % or S2 – 60 min											
132 S	1455	5.5	36	11.4	72	22.8	0.018	**1LP6130-4CA9 ■ ■■■**	55	**1LP6130-4CM8 ■**	55
132 M	1455	7.5	49	15.2	98	30.4	0.023	**1LP6133-4CA9 ■ ■■■**	62	**1LP6133-4CM8 ■**	62
160 M	1460	11	72	21.5	144	43	0.043	**1LP6163-4CA9 ■ ■■■**	100	**1LP6163-4CM8 ■**	100
160 L	1460	15	98	28.5	196	57	0.055	**1LP6166-4CA9 ■ ■■■**	114	**1LP6166-4CM8 ■**	114
180 M	1465	18.5	121	35	242	70	0.099	**1LP4183-4CA9 ■ ■■■**	135	**1LP6183-4CM8 ■**	150
180 L	1465	22	143	41.5	286	83	0.12	**1LP4186-4CA9 ■ ■■■**	150	**1LP6186-4CM8 ■**	175
180 L	1465	30	196	59	392	118	0.14	**1LP4188-4CA9 ■ ■■■**	175	**-**	-
200 L	1465	30	196	56	392	112	0.19	**1LP4207-4CA9 ■ ■■■**	195	**1LP6207-4CM8 ■**	220
200 L	1465	37	241	69	482	138	0.23	**1LP4208-4CA9 ■ ■■■**	220	**1LP6208-4CM8 ■**	280
200 L	1468	45	293	85	596	170	0.29	**1LP4204-4CA9 ■ ■■■**	280	**-**	-
225 S	1475	37	240	68	480	136	0.37	**1LP4220-4CA9 ■ ■■■**	255	**1LP6220-4CM8 ■**	290
225 M	1475	45	291	81	582	162	0.45	**1LP4223-4CA9 ■ ■■■**	290	**1LP6223-4CM8 ■**	320
225 M	1475	55	356	99	712	198	0.49	**1LP4228-4CA9 ■ ■■■**	320	**-**	-
250 M	1480	55	355	100	710	200	0.69	**1LP4253-4CA9 ■ ■■■**	375	**1LP6253-4CM8 ■**	445
250 M	1482	75	483	136	966	272	0.86	**1LP4258-4CA9 ■ ■■■**	445	**1LP6258-4CM8 ■**	505
250 M	1482	90	580	162	1160	324	0.98	**1LP4254-4CA9 ■ ■■■**	505	**-**	-
280 S	1485	75	482	136	964	272	1.2	**1LP4280-4CA9 ■ ■■■**	515	**1LP6280-4CM8 ■**	560
280 M	1485	90	579	160	1158	320	1.4	**1LP4283-4CA9 ■ ■■■**	560	**1LP6283-4CM8 ■**	660
280 M	1488	110	707	198	1414	396	1.71	**1LP4288-4CA9 ■ ■■■**	660	**1LP6288-4CM8 ■**	720
280 M	1486	132	849	245	1698	490	1.9	**1LP4284-4CA9 ■ ■■■**	720	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

Note
With duty type S2 – 60 min., the output of motors in shaft heights 132 and 160 is only 90 % of the specified values.

For ordering example, see Page 7/81.

1LP4, 1LP6 motors, shaft heights 132 to 280
Brake motors with fitted spring-operated brakes

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
4-pole, 1500 rpm, 50 Hz											
Intermittent duty S3 – 40 %											
132 S	1462	4.4	28.7	10	72	22.8	0.018	**1LP6130-4CA9 ■ ■■■**	55	**1LP6130-4CM8 ■**	55
132 M	1462	6	39.2	13.2	98	30.4	0.023	**1LP6133-4CA9 ■ ■■■**	62	**1LP6133-4CM8 ■**	62
160 M	1470	8.8	57.2	18	144	43	0.043	**1LP6163-4CA9 ■ ■■■**	100	**1LP6163-4CM8 ■**	100
160 L	1470	12	78	24.5	196	57	0.055	**1LP6166-4CA9 ■ ■■■**	114	**1LP6166-4CM8 ■**	114
180 M	1472	14.8	96	30	242	70	0.099	**1LP4183-4CA9 ■ ■■■**	135	**1LP6183-4CM8 ■**	150
180 L	1472	17.6	114	35	286	83	0.12	**1LP4186-4CA9 ■ ■■■**	150	**1LP6186-4CM8 ■**	175
180 L	1472	24	156	52	392	118	0.14	**1LP4188-4CA9 ■ ■■■**	175	**-**	-
200 L	1472	24	156	47	392	112	0.19	**1LP4207-4CA9 ■ ■■■**	195	**1LP6207-4CM8 ■**	220
200 L	1472	29	188	59	482	138	0.23	**1LP4208-4CA9 ■ ■■■**	220	**1LP6208-4CM8 ■**	280
200 L	1474	36	233	73	596	170	0.29	**1LP4204-4CA9 ■ ■■■**	280	**-**	-
225 S	1480	29	187	57	480	136	0.37	**1LP4220-4CA9 ■ ■■■**	255	**1LP6220-4CM8 ■**	290
225 M	1480	36	232	68	582	162	0.45	**1LP4223-4CA9 ■ ■■■**	290	**1LP6223-4CM8 ■**	320
225 M	1480	44	284	82	712	198	0.49	**1LP4228-4CA9 ■ ■■■**	320	**-**	-
250 M	1486	44	282	82	710	200	0.69	**1LP4253-4CA9 ■ ■■■**	375	**1LP6253-4CM8 ■**	445
250 M	1487	60	385	113	966	272	0.86	**1LP4258-4CA9 ■ ■■■**	445	**1LP6258-4CM8 ■**	505
250 M	1487	72	462	135	1160	324	0.98	**1LP4254-4CA9 ■ ■■■**	505	**-**	-
280 S	1489	60	385	116	964	272	1.2	**1LP4280-4CA9 ■ ■■■**	515	**1LP6280-4CM8 ■**	560
280 M	1489	72	462	131	1158	320	1.4	**1LP4283-4CA9 ■ ■■■**	560	**1LP6283-4CM8 ■**	660
280 M	1490	88	564	168	1414	396	1.71	**1LP4288-4CA9 ■ ■■■**	660	**1LP6288-4CM8 ■**	720
280 M	1489	105	673	208	1698	490	1.9	**1LP4284-4CA9 ■ ■■■**	720	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

For ordering example, see Page 7/81.

7

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
4-pole, 1500 rpm, 50 Hz											
Intermittent duty S3 – 60 %											
132 S	1475	3.3	21.4	8.3	72	22.8	0.018	**1LP6130-4CA9 ■ ■■■**	55	**1LP6130-4CM8 ■**	55
132 M	1475	4.5	29.1	11	98	30.4	0.023	**1LP6133-4CA9 ■ ■■■**	62	**1LP6133-4CM8 ■**	62
160 M	1480	6.6	42.6	14.5	144	43	0.043	**1LP6163-4CA9 ■ ■■■**	100	**1LP6163-4CM8 ■**	100
160 L	1480	9	58	20	196	57	0.055	**1LP6166-4CA9 ■ ■■■**	114	**1LP6166-4CM8 ■**	114
180 M	1480	11.1	72	25.5	242	70	0.099	**1LP4183-4CA9 ■ ■■■**	135	**1LP6183-4CM8 ■**	150
180 L	1480	13.2	85	29	286	83	0.12	**1LP4186-4CA9 ■ ■■■**	150	**1LP6186-4CM8 ■**	175
180 L	1480	18	116	44	392	118	0.14	**1LP4188-4CA9 ■ ■■■**	175	**-**	-
200 L	1480	18	116	39.5	392	112	0.19	**1LP4207-4CA9 ■ ■■■**	195	**1LP6207-4CM8 ■**	220
200 L	1480	22	142	51	482	138	0.23	**1LP4208-4CA9 ■ ■■■**	220	**1LP6208-4CM8 ■**	280
200 L	1481	27	174	63	596	170	0.29	**1LP4204-4CA9 ■ ■■■**	280	**-**	-
225 S	1485	22	141	46	480	136	0.37	**1LP4220-4CA9 ■ ■■■**	255	**1LP6220-4CM8 ■**	290
225 M	1485	27	174	54	582	162	0.45	**1LP4223-4CA9 ■ ■■■**	290	**1LP6223-4CM8 ■**	320
225 M	1485	33	212	65	712	198	0.49	**1LP4228-4CA9 ■ ■■■**	320	**-**	-
250 M	1490	33	211	67	710	200	0.69	**1LP4253-4CA9 ■ ■■■**	375	**1LP6253-4CM8 ■**	445
250 M	1490	45	288	93	966	272	0.86	**1LP4258-4CA9 ■ ■■■**	445	**1LP6258-4CM8 ■**	505
250 M	1490	54	346	111	1160	324	0.98	**1LP4254-4CA9 ■ ■■■**	505	**-**	-
280 S	1492	45	288	93	964	272	1.2	**1LP4280-4CA9 ■ ■■■**	515	**1LP6280-4CM8 ■**	560
280 M	1492	54	346	104	1158	320	1.4	**1LP4283-4CA9 ■ ■■■**	560	**1LP6283-4CM8 ■**	660
280 M	1492	66	422	141	1414	396	1.71	**1LP4288-4CA9 ■ ■■■**	660	**1LP6288-4CM8 ■**	720
280 M	1491	79	506	175	1698	490	1.9	**1LP4284-4CA9 ■ ■■■**	720	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

For ordering example, see Page 7/81.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
4-pole, 1500 rpm, 50 Hz											
Intermittent duty S3 - 100 % or continuous duty S1											
132 S	1485	2	12.9	7.2	72	22.8	0.018	**1LP6130-4CA9 ■ ■■■**	55	**1LP6130-4CM8 ■**	55
132 M	1485	2.8	18	9.2	98	30.4	0.023	**1LP6133-4CA9 ■ ■■■**	62	**1LP6133-4CM8 ■**	62
160 M	1490	4.1	26.3	11.5	144	43	0.043	**1LP6163-4CA9 ■ ■■■**	100	**1LP6163-4CM8 ■**	100
160 L	1490	5.6	35.9	15.5	196	57	0.055	**1LP6166-4CA9 ■ ■■■**	114	**1LP6166-4CM8 ■**	114
180 M	1488	6.9	44.5	21	242	70	0.099	**1LP4183-4CA9 ■ ■■■**	135	**1LP6183-4CM8 ■**	150
180 L	1488	8.2	52.7	23.5	286	83	0.12	**1LP4186-4CA9 ■ ■■■**	150	**1LP6186-4CM8 ■**	175
180 L	1488	11.2	72	34	392	118	0.14	**1LP4188-4CA9 ■ ■■■**	175	**-**	-
200 L	1488	11.2	72	31	392	112	0.19	**1LP4207-4CA9 ■ ■■■**	195	**1LP6207-4CM8 ■**	220
200 L	1488	13.8	89	40	482	138	0.23	**1LP4208-4CA9 ■ ■■■**	220	**1LP6208-4CM8 ■**	280
200 L	1488	16.8	108	49	596	170	0.29	**1LP4204-4CA9 ■ ■■■**	280	**-**	-
225 S	1491	13.8	88	36	480	136	0.37	**1LP4220-4CA9 ■ ■■■**	255	**1LP6220-4CM8 ■**	290
225 M	1491	16.8	108	42	582	162	0.45	**1LP4223-4CA9 ■ ■■■**	290	**1LP6223-4CM8 ■**	320
225 M	1491	20	128	49	712	198	0.49	**1LP4228-4CA9 ■ ■■■**	320	**-**	-
250 M	1495	20	128	52	710	200	0.69	**1LP4253-4CA9 ■ ■■■**	375	**1LP6253-4CM8 ■**	445
250 M	1495	28	179	74	966	272	0.86	**1LP4258-4CA9 ■ ■■■**	445	**1LP6258-4CM8 ■**	505
250 M	1495	34	217	88	1160	324	0.98	**1LP4254-4CA9 ■ ■■■**	505	**-**	-
280 S	1496	28	179	75	964	272	1.2	**1LP4280-4CA9 ■ ■■■**	515	**1LP6280-4CM8 ■**	560
280 M	1496	34	217	80	1158	320	1.4	**1LP4283-4CA9 ■ ■■■**	560	**1LP6283-4CM8 ■**	660
280 M	1496	41	262	111	1414	396	1.71	**1LP4288-4CA9 ■ ■■■**	660	**1LP6288-4CM8 ■**	720
280 M	1495	49	313	138	1698	490	1.9	**1LP4284-4CA9 ■ ■■■**	720	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

For ordering example, see Page 7/81.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated}	P_{rated}	M_{rated}	I_{rated}	M_{max}	I_{max}	J	Order No.	kg	Order No.	kg
	rpm	kW	Nm	A	Nm	A	kgm²				
6-pole, 1000 rpm, 50 Hz											
Intermittent duty S3 – 15 % or S2 – 30 min											
132 S	930	3.6	37	9.6	60	16	0.015	**1LP6130-6CA9 ■ ■■**	50	**1LP6130-6CM8 ■**	50
132 M	930	4.8	49.3	11.3	80	18.8	0.019	**1LP6133-6CA9 ■ ■■**	57	**1LP6133-6CM8 ■**	57
132 M	930	6.6	67.8	15.6	110	26	0.025	**1LP6134-6CA9 ■ ■■**	66	**1LP6134-6CM8 ■**	66
160 M	950	9	90.5	20.5	150	34	0.044	**1LP6163-6CA9 ■ ■■**	103	**1LP6163-6CM8 ■**	103
160 L	950	13.2	133	29.5	218	49	0.063	**1LP6166-6CA9 ■ ■■**	122	**1LP6166-6CM8 ■**	122
180 L	960	18	179	35.5	296	59	0.18	**1LP4186-6CA9 ■ ■■**	145	**1LP6186-6CM8 ■**	170
180 L	960	22	219	45	364	75	0.2	**1LP4188-6CA9 ■ ■■**	170	**1LP6188-6CM8 ■**	215
180 L	965	26	257	52	432	87	0.255	**1LP4184-6CA9 ■ ■■**	215	**-**	-
200 L	968	22	217	44	362	73	0.24	**1LP4206-6CA9 ■ ■■**	185	**1LP6206-6CM8 ■**	200
200 L	968	26	256	52	430	87	0.29	**1LP4207-6CA9 ■ ■■**	200	**1LP6207-6CM8 ■**	235
200 L	968	36	355	72	588	120	0.36	**1LP4208-6CA9 ■ ■■**	235	**1LP6208-6CM8 ■**	305
200 L	969	44	434	88	724	146	0.48	**1LP4204-6CA9 ■ ■■**	305	**-**	-
225 M	974	36	353	69	586	114	0.49	**1LP4223-6CA9 ■ ■■**	270	**1LP6223-6CM8 ■**	315
225 M	974	44	431	84	722	140	0.62	**1LP4228-6CA9 ■ ■■**	315	**1LP6228-6CM8 ■**	355
225 M	974	54	529	104	880	174	0.75	**1LP4224-6CA9 ■ ■■**	355	**-**	-
250 M	978	44	430	84	722	140	0.76	**1LP4253-6CA9 ■ ■■**	355	**1LP6253-6CM8 ■**	390
250 M	978	54	527	101	876	168	0.93	**1LP4258-6CA9 ■ ■■**	390	**1LP6258-6CM8 ■**	440
250 M	978	66	644	125	1070	208	1.07	**1LP4254-6CA9 ■ ■■**	440	**-**	-
280 S	982	54	525	100	872	166	1.1	**1LP4280-6CA9 ■ ■■**	455	**1LP6280-6CM8 ■**	500
280 M	983	66	642	120	1066	200	1.4	**1LP4283-6CA9 ■ ■■**	490	**1LP6283-6CM8 ■**	550
280 M	982	90	875	163	1454	272	1.65	**1LP4288-6CA9 ■ ■■**	550	**1LP6288-6CM8 ■**	660
280 M	982	108	1050	199	1746	332	1.94	**1LP4284-6CA9 ■ ■■**	660	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

For ordering example, see Page 7/81.

1LP4, 1LP6 motors, shaft heights 132 to 280
Brake motors with fitted spring-operated brakes

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
6-pole, 1000 rpm, 50 Hz											
Intermittent duty S3 – 25 % or S2 – 60 min											
132 S	950	3	30	8	60	16	0.015	**1LP6130-6CA9 ■ ■■■**	50	**1LP6130-6CM8 ■**	50
132 M	950	4	40	9.4	80	18.8	0.019	**1LP6133-6CA9 ■ ■■■**	57	**1LP6133-6CM8 ■**	57
132 M	950	5.5	55	13	110	26	0.025	**1LP6134-6CA9 ■ ■■■**	66	**1LP6134-6CM8 ■**	66
160 M	960	7.5	75	17	150	34	0.044	**1LP6163-6CA9 ■ ■■■**	103	**1LP6163-6CM8 ■**	103
160 L	960	11	109	24.5	218	49	0.063	**1LP6166-6CA9 ■ ■■■**	122	**1LP6166-6CM8 ■**	122
180 L	970	15	148	29.5	296	59	0.18	**1LP4186-6CA9 ■ ■■■**	145	**1LP6186-6CM8 ■**	170
180 L	970	18.5	182	37.5	364	75	0.2	**1LP4188-6CA9 ■ ■■■**	170	**1LP6188-6CM8 ■**	215
180 L	975	22	216	43.5	432	87	0.255	**1LP4184-6CA9 ■ ■■■**	215	**-**	-
200 L	975	18.5	181	36.5	362	73	0.24	**1LP4206-6CA9 ■ ■■■**	185	**1LP6206-6CM8 ■**	200
200 L	975	22	215	43.5	430	87	0.29	**1LP4207-6CA9 ■ ■■■**	200	**1LP6207-6CM8 ■**	235
200 L	975	30	294	60	588	120	0.36	**1LP4208-6CA9 ■ ■■■**	235	**1LP6208-6CM8 ■**	305
200 L	976	37	362	73	724	146	0.48	**1LP4204-6CA9 ■ ■■■**	305	**-**	-
225 M	978	30	293	57	586	114	0.49	**1LP4223-6CA9 ■ ■■■**	270	**1LP6223-6CM8 ■**	315
225 M	978	37	361	70	722	140	0.62	**1LP4228-6CA9 ■ ■■■**	315	**1LP6228-6CM8 ■**	355
225 M	978	45	440	87	880	174	0.75	**1LP4224-6CA9 ■ ■■■**	355	**-**	-
250 M	982	37	361	70	722	140	0.76	**1LP4253-6CA9 ■ ■■■**	355	**1LP6253-6CM8 ■**	390
250 M	982	45	438	84	876	168	0.93	**1LP4258-6CA9 ■ ■■■**	390	**1LP6258-6CM8 ■**	440
250 M	982	55	535	104	1070	208	1.07	**1LP4254-6CA9 ■ ■■■**	440	**-**	-
280 S	985	45	436	83	872	166	1.1	**1LP4280-6CA9 ■ ■■■**	455	**1LP6280-6CM8 ■**	500
280 M	985	55	533	100	1066	200	1.4	**1LP4283-6CA9 ■ ■■■**	490	**1LP6283-6CM8 ■**	550
280 M	985	75	727	136	1454	272	1.65	**1LP4288-6CA9 ■ ■■■**	550	**1LP6288-6CM8 ■**	660
280 M	985	90	873	166	1746	332	1.94	**1LP4284-6CA9 ■ ■■■**	660	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

Note
With duty type S2 – 60 min., the output of motors in shaft heights 132 and 160 is only 90 % of the specified values.

For ordering example, see Page 7/81.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
6-pole, 1000 rpm, 50 Hz											
Intermittent duty S3 – 40 %											
132 S	960	2.4	23.9	7	60	16	0.015	**1LP6130-6CA9 ■ ■■■**	50	**1LP6130-6CM8 ■**	50
132 M	960	3.2	31.8	8.3	80	18.8	0.019	**1LP6133-6CA9 ■ ■■■**	57	**1LP6133-6CM8 ■**	57
132 M	960	4.4	43.8	11.4	110	26	0.025	**1LP6134-6CA9 ■ ■■■**	66	**1LP6134-6CM8 ■**	66
160 M	970	6	59	15.5	150	34	0.044	**1LP6163-6CA9 ■ ■■■**	103	**1LP6163-6CM8 ■**	103
160 L	970	8.8	86.5	22	218	49	0.063	**1LP6166-6CA9 ■ ■■■**	122	**1LP6166-6CM8 ■**	122
180 L	981	12	118	24	296	59	0.18	**1LP4186-6CA9 ■ ■■■**	145	**1LP6186-6CM8 ■**	170
180 L	981	14.8	144	32	364	75	0.2	**1LP4188-6CA9 ■ ■■■**	170	**1LP6188-6CM8 ■**	215
180 M	984	17.6	171	37	432	87	0.255	**1LP4184-6CA9 ■ ■■■**	215	**-**	-
200 L	980	14.8	144	31.5	362	73	0.24	**1LP4206-6CA9 ■ ■■■**	185	**1LP6206-6CM8 ■**	200
200 L	980	17.6	172	36.5	430	87	0.29	**1LP4207-6CA9 ■ ■■■**	200	**1LP6207-6CM8 ■**	235
200 L	980	24	234	52	588	120	0.36	**1LP4208-6CA9 ■ ■■■**	235	**1LP6208-6CM8 ■**	305
200 L	981	29	282	63	724	146	0.48	**1LP4204-6CA9 ■ ■■■**	305	**-**	-
225 M	984	24	233	46	586	114	0.49	**1LP4223-6CA9 ■ ■■■**	270	**1LP6223-6CM8 ■**	315
225 M	984	29	281	56	722	140	0.62	**1LP4228-6CA9 ■ ■■■**	315	**1LP6228-6CM8 ■**	355
225 M	984	36	349	70	880	174	0.75	**1LP4224-6CA9 ■ ■■■**	355	**-**	-
250 M	986	29	281	58	722	140	0.76	**1LP4253-6CA9 ■ ■■■**	355	**1LP6253-6CM8 ■**	390
250 M	986	36	349	70	876	168	0.93	**1LP4258-6CA9 ■ ■■■**	390	**1LP6258-6CM8 ■**	440
250 M	986	44	426	86	1070	208	1.07	**1LP4254-6CA9 ■ ■■■**	440	**-**	-
280 S	989	36	348	71	872	166	1.1	**1LP4280-6CA9 ■ ■■■**	455	**1LP6280-6CM8 ■**	500
280 M	989	44	425	85	1066	200	1.4	**1LP4283-6CA9 ■ ■■■**	490	**1LP6283-6CM8 ■**	550
280 M	989	60	579	116	1454	272	1.65	**1LP4288-6CA9 ■ ■■■**	550	**1LP6288-6CM8 ■**	660
280 M	989	72	695	141	1746	332	1.94	**1LP4284-6CA9 ■ ■■■**	660	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

For ordering example, see Page 7/81.

1LP4, 1LP6 motors, shaft heights 132 to 280
Brake motors with fitted spring-operated brakes

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
6-pole, 1000 rpm, 50 Hz											
Intermittent duty S3 – 60 %											
132 S	975	1.8	17.6	6.3	60	16	0.01	**1LP6130-6CA9 ■ ■■■**	50	**1LP6130-6CM8 ■**	50
132 M	975	2.4	23.5	7.3	80	18.8	0.01	**1LP6133-6CA9 ■ ■■■**	57	**1LP6133-6CM8 ■**	57
132 M	975	3.3	32.3	9.8	110	26	0.02	**1LP6134-6CA9 ■ ■■■**	66	**1LP6134-6CM8 ■**	66
160 M	980	4.5	44	13	150	34	0.04	**1LP6163-6CA9 ■ ■■■**	103	**1LP6163-6CM8 ■**	103
160 L	980	6.6	64.3	18.8	218	49	0.06	**1LP6166-6CA9 ■ ■■■**	122	**1LP6166-6CM8 ■**	122
180 L	984	9	88	20	296	59	0.18	**1LP4186-6CA9 ■ ■■■**	145	**1LP6186-6CM8 ■**	170
180 L	984	11.1	108	26	364	75	0.2	**1LP4188-6CA9 ■ ■■■**	170	**1LP6188-6CM8 ■**	215
180 L	986	13.2	128	30	432	87	0.25	**1LP4184-6CA9 ■ ■■■**	215	**-**	-
200 L	986	11.1	108	26	362	73	0.24	**1LP4206-6CA9 ■ ■■■**	185	**1LP6206-6CM8 ■**	200
200 L	986	13.2	128	29	430	87	0.29	**1LP4207-6CA9 ■ ■■■**	200	**1LP6207-6CM8 ■**	235
200 L	986	18	174	43	588	120	0.36	**1LP4208-6CA9 ■ ■■■**	235	**1LP6208-6CM8 ■**	305
200 L	986	22	213	52	724	146	0.48	**1LP4204-6CA9 ■ ■■■**	305	**-**	-
225 M	988	18	174	37	586	114	0.49	**1LP4223-6CA9 ■ ■■■**	270	**1LP6223-6CM8 ■**	315
225 M	988	22	213	46	722	140	0.62	**1LP4228-6CA9 ■ ■■■**	315	**1LP6228-6CM8 ■**	355
225 M	988	27	261	57	880	174	0.75	**1LP4224-6CA9 ■ ■■■**	355	**-**	-
250 M	990	22	212	47	722	140	0.76	**1LP4253-6CA9 ■ ■■■**	355	**1LP6253-6CM8 ■**	390
250 M	990	27	260	57	876	168	0.93	**1LP4258-6CA9 ■ ■■■**	390	**1LP6258-6CM8 ■**	440
250 M	990	33	318	70	1070	208	1.07	**1LP4254-6CA9 ■ ■■■**	440	**-**	-
280 S	992	27	260	56	872	166	1.1	**1LP4280-6CA9 ■ ■■■**	455	**1LP6280-6CM8 ■**	500
280 M	992	33	318	68	1066	200	1.4	**1LP4283-6CA9 ■ ■■■**	490	**1LP6283-6CM8 ■**	550
280 M	992	45	433	92	1454	272	1.65	**1LP4288-6CA9 ■ ■■■**	550	**1LP6288-6CM8 ■**	660
280 M	992	54	520	113	1746	332	1.94	**1LP4284-6CA9 ■ ■■■**	660	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

For ordering example, see Page 7/81.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LP4, 1LP6 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LP6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
	n_{rated} rpm	P_{rated} kW	M_{rated} Nm	I_{rated} A	M_{max} Nm	I_{max} A	J kgm^2	Order No.	kg	Order No.	kg
6-pole, 1000 rpm, 50 Hz											
Intermittent duty S3 - 100 % or continuous duty S1											
132 S	988	1.1	10.6	5.7	60	16	0.015	**1LP6130-6CA9 ■ ■■■**	50	**1LP6130-6CM8 ■**	50
132 M	988	1.5	14.5	6.4	80	18.8	0.019	**1LP6133-6CA9 ■ ■■■**	57	**1LP6133-6CM8 ■**	57
132 M	988	2	19.3	8.5	110	26	0.025	**1LP6134-6CA9 ■ ■■■**	66	**1LP6134-6CM8 ■**	66
160 M	988	2.8	27	11	150	34	0.044	**1LP6163-6CA9 ■ ■■■**	103	**1LP6163-6CM8 ■**	103
160 L	988	4.1	39.6	15.5	218	49	0.063	**1LP6166-6CA9 ■ ■■■**	122	**1LP6166-6CM8 ■**	122
180 L	990	5.6	54	16	296	59	0.18	**1LP4186-6CA9 ■ ■■■**	145	**1LP6186-6CM8 ■**	170
180 L	990	6.9	67	21	364	75	0.2	**1LP4188-6CA9 ■ ■■■**	170	**1LP6188-6CM8 ■**	215
180 L	991	8.2	79	24.5	432	87	0.255	**1LP4184-6CA9 ■ ■■■**	215	**-**	-
200 L	991	6.9	66.5	20	362	73	0.24	**1LP4206-6CA9 ■ ■■■**	185	**1LP6206-6CM8 ■**	200
200 L	991	8.2	79	23	430	87	0.29	**1LP4207-6CA9 ■ ■■■**	200	**1LP6207-6CM8 ■**	235
200 L	991	11.2	108	34	588	120	0.36	**1LP4208-6CA9 ■ ■■■**	235	**1LP6208-6CM8 ■**	305
200 L	991	13.8	133	41	724	146	0.48	**1LP4204-6CA9 ■ ■■■**	305	**-**	-
225 M	993	11.2	108	28.5	586	114	0.49	**1LP4223-6CA9 ■ ■■■**	270	**1LP6223-6CM8 ■**	315
225 M	993	13.8	133	35	722	140	0.62	**1LP4228-6CA9 ■ ■■■**	315	**1LP6228-6CM8 ■**	355
225 M	993	16.8	162	43.5	880	174	0.75	**1LP4224-6CA9 ■ ■■■**	355	**-**	-
250 M	994	13.8	133	35	722	140	0.76	**1LP4253-6CA9 ■ ■■■**	355	**1LP6253-6CM8 ■**	390
250 M	994	16.8	161	42	876	168	0.93	**1LP4258-6CA9 ■ ■■■**	390	**1LP6258-6CM8 ■**	440
250 M	994	20	192	52	1070	208	1.07	**1LP4254-6CA9 ■ ■■■**	440	**-**	-
280 S	995	16.8	161	43	872	166	1.1	**1LP4280-6CA9 ■ ■■■**	455	**1LP6280-6CM8 ■**	500
280 M	995	20	192	52	1066	200	1.4	**1LP4283-6CA9 ■ ■■■**	490	**1LP6283-6CM8 ■**	550
280 M	995	28	269	71	1454	272	1.65	**1LP4288-6CA9 ■ ■■■**	550	**1LP6288-6CM8 ■**	660
280 M	995	34	326	86	1746	332	1.94	**1LP4284-6CA9 ■ ■■■**	660	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3, IM V5	**0**	**0**
IM V1, IM B5	**1**	**1**
IM B35	**6**	**6**

For moment of inertia and weight of brakes, see technical data of brakes on Page 7/69.

For ordering example, see Page 7/81.

Selection and ordering data (continued)

Options

Options or order codes (supplement "**-Z**" is required)

Special motor versions	Order No. supplement "**-Z**" with order code and plain text, if required
Motor protection through PTC thermistor with 3 embedded temperature sensors for tripping	**A11**
Motor protection through PTC thermistor with 6 embedded temperature sensors for tripping and alarm	**A12**
Motor temperature detection with embedded temperature sensor KTY 84-130	**A23**
3 bimetallic switches (Klixon) for tripping	**A31**
Standstill heating for 230 V	**K45**
Standstill heating for 115 V	**K46**
Insulated bearing cartridge	**L27**
Acceptance test certificate 3.1 according to EN 10204	**B02**
Temperature class F, used acc. to B, coolant temperature 50 °C, derating approx. 8 %	**C23**
Temperature class F, used acc. to B, coolant temperature 60 °C, derating approx. 18 %	**C25**
Terminal box on RHS	**K09**
Terminal box on LHS	**K10**
Terminal box at NDE (needed for motor with brake)	**M64**
Bolted-on feet	**K11**
Foot made of GGG 40, only in conjunction with K11 or K09 / K10	**J22**
IP56 degree of protection (non-heavy-sea)	**K52**
Cable entry, maximum configuration	**K55**
All cable glands EMC	**J05**
Rotation of the terminal box through 90°, entry from DE	**K83**
Rotation of the terminal box through 90°, entry from NDE	**K84**
Rotation of terminal box through 180°	**K85**
Flange end shield made of GGG 40	**J20**
Standard shaft made of stainless steel	**M65**
Special finish "Offshore" in RAL 7030, stone grey, coat thickness 220 µm	**M91**
Special finish in other standard RAL colors: RAL 1015, 1019, 2003, 2004, 3007, 5007, 5009, 5010, 5012, 5015, 5017, 5018, 5019, 6019, 7000, 7004, 7011, 7016, 7022, 7033	**Y54** • and special finish RAL ....
Second rating plate, supplied separately packed	**K31**
Customized cable entries (plain text is required)	**Y73**
Extra rating plate or rating plate with different data	**Y80** • and info supplied by customer

• This order code only determines the price of the version – additional plain text is required.

Selection and ordering data (continued)

Options or order codes (supplement "**-Z**" is required)

Special brake versions	Order No. supplement "**-Z**" with order code and plain text, if required
Mounting of pulse encoder POG10 DN 1024 I on the brake (possible only in conjunction with J28, option includes the encoder)	**J18**
Mounting of brake KFB 10	**J30**
Mounting of brake KFB 16	**J31**
Mounting of brake KFB 25	**J32**
Mounting of brake KFB 30	**J33**
Mounting of brake KFB 40	**J34**
Mounting of brake KFB 63	**J35**
Mounting of brake KFB 100	**J36**
Mounting of brake KFB 160	**J37**
Brake supply voltage 400 V AC (equivalent to DC = 180 V) with single-way rectifier in the terminal box	**C01**
Hand lever release for brake	**J25**
Microswitch "brake released"	**J26**
Microswitch "air-gap monitoring"	**J24**
Brake standstill heating 230 V	**J27**
Brake with components for mounting encoder POG10 (T2)	**J28**
Brake prepared for mounting an encoder POG10 (T1)	**J29**
Mounting of rotary pulse encoder POG10 DN 1024 I on motor without fan (without fitted brake)	**G80**
Brake supply voltage 230 V AC (equivalent to DC = 207 V) with bridge rectifier in the terminal box	**C07**

Non-standard brake coil voltage on request

Ordering example

Selection criteria		Order No.	Order codes
Motor type	Brake motor without external fan, degree of protection IP55, grey cast iron model	**1LP4**. . .-	
Shaft height	180 M	1LP4**183**-	
No. of poles/speed	4-pole	1LP4183-**4**	
Version	Hoisting gear version	1LP4183-4**CA** . .	
Voltage/frequency	400 VΔ, 50 Hz	1LP4183-4CA**9** .	**L5G**
Type	IM B5	1LP4183-4CA9**1**	L5G
Special version	Motor protection through PTC thermistor with 6 embedded temperature sensors for tripping and alarm	1LP4183-4CA91-**Z**	L5G **A12**
	Standstill heating for 230 V	1LP4183-4CA91-**Z**	L5G A12 **K45**
	Mounting of brake KFB 25	1LP4183-4CA91-**Z**	L5G A12 K45 **J32**
	Hand lever release for brake	1LP4183-4CA91-**Z**	L5G A12 K45 J32 **J25**
	Microswitch "brake released"	1LP4183-4CA91-**Z**	L5G A12 K45 J32 J25 **J26**
	Brake standstill heating 230 V	1LP4183-4CA91-**Z**	L5G A12 K45 J32 J25 J26 **J27**
	Brake with components for mounting encoder POG10 (T2)	1LP4183-4CA91-**Z**	L5G A12 K45 J32 J25 J26 J27 **J28**
Complete identification codes for required version of brake motor		**1LP4183-4CA91-Z L5G A12 K45 J32 J25 J26 J27 J28**	

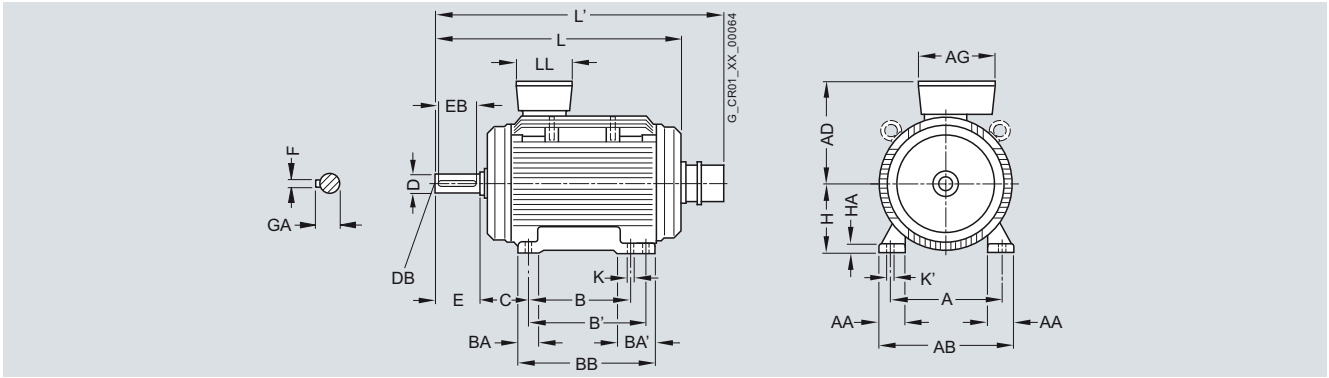
7

1LP4, 1LP6 motors, shaft heights 132 to 280
Brake motors with fitted spring-operated brakes

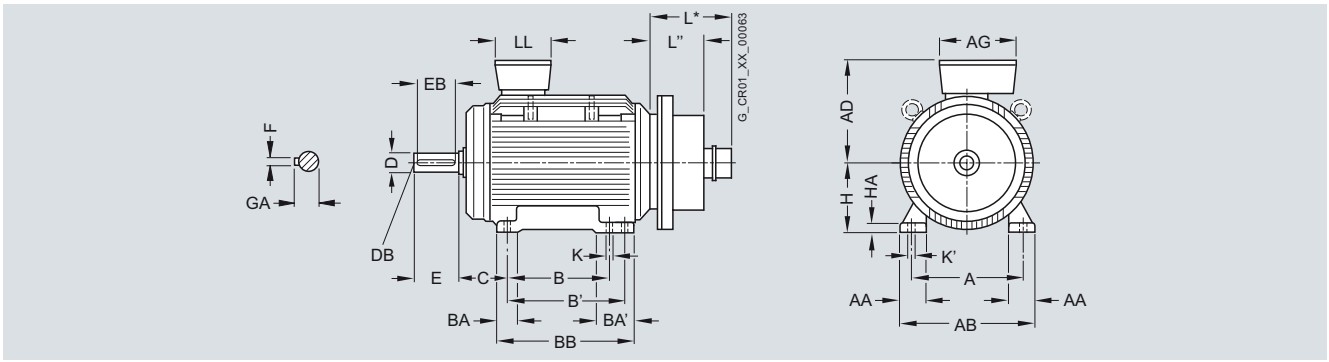
Dimension drawings

1LP4 and 1LP6, type IM B3

with pulse encoder POG10



with brake and pulse encoder POG10



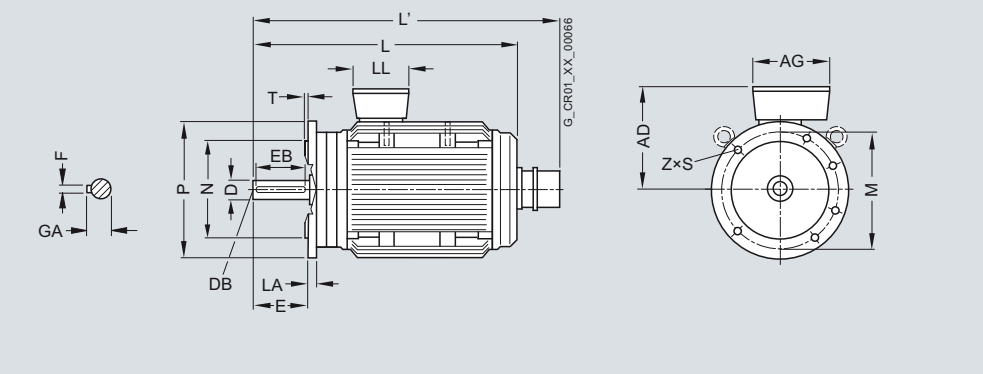
For motor			Dimensions in mm																	
Shaft height	Type	Number of poles	A	AA	AB	AD	AG	B	B'	BA	BA'	BB	C	H	HA	K	K'	L [1]	L' [1]	LL
132 S	1LP6130	4, 6	216	53	256	228	208	140		49	–	180	89	132	15	12	16	397	582	178
132 M	1LP6133	4, 6	216	53	256	228	208	178		49	–	218	89	132	15	12	16	397	582	178
	1LP6134	6																397	582	
160 M	1LP6163	4, 6	254	60	300	256	208	210		57	–	256	108	160	18	15	19	529	714	178
160 L	1LP6166	4, 6	254	60	300	256	208	254		57	–	300	108	160	18	15	19	529	714	178
180 M	1LP4183, 1LP6183	4	279	65	339	325	260	241		70	111	328	121	180	20	15	19	562	714	192
180 L	1LP4186, 1LP6186	4, 6	279	65	339	325	260	241	279	70	111	328	121	180	20	15	19	562	714	192
	1LP4188, 1LP6188	4, 6																613	765	
	1LP4184	6																643	795	
200 L	1LP4206, 1LP6206	6	318	70	378	385	300	305		80	80	355	133	200	25	19	25	617	764	236
	1LP4207, 1LP6207	4, 6																617	764	
	1LP4208, 1LP6208	4, 6																617	764	
	1LP4204	4, 6																734	881	
225 S	1LP4220, 1LP6220	4	356	80	436	410	300	286		85	110	361	149	225	34	19	25	670	830	236
225 M	1LP4223, 1LP6223	4, 6	356	80	436	410	300	286	311	85	110	361	149	225	34	19	25	670	830	236
	1LP4228, 1LP6228	4, 6																730	890	
	1LP4224	6																780	910	
250 M	1LP4253, 1LP6253	4, 6	406	100	490	500	380	349		100	100	409	168	250	40	24	30	764	930	307
	1LP4258, 1LP6258	6																764	930	
	1LP4258, 1LP6258	4																834	1000	
	1LP4254	4, 6																834	1000	
280 S	1LP4280, 1LP6280	4, 6	457	100	540	540	380	368		100	151	479	190	280	40	24	30	830	1005	307
280 M	1LP4283, 1LP6283	4, 6	457	100	540	540	380	368	419	100	151	479	190	280	40	24	30	830	1005	307
	1LP4288, 1LP6288	6																830	1005	
	1LP4288, 1LP6288	4																940	1115	
	1LP4284	6																940	1115	
	1LP4284	4																990	1165	

[1] Dimensions L and L' on request for 1LP6 motors, shaft heights 180 M to 280 M.

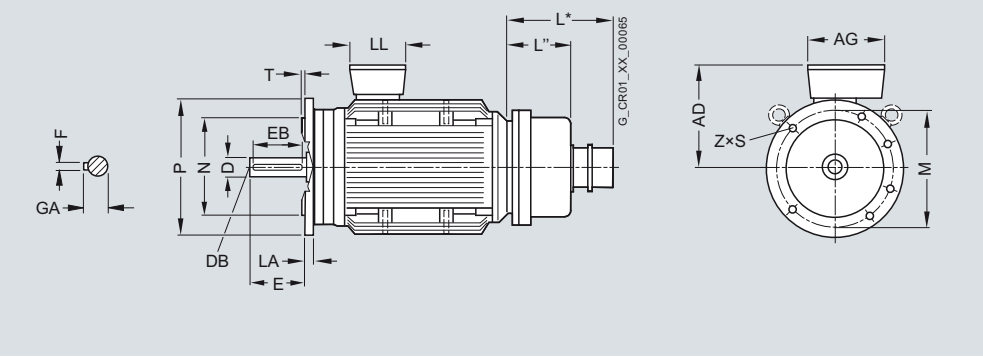
Dimension drawings (continued)

1LP4 and 1LP6, type IM B5

with pulse encoder POG10



with brake and pulse encoder POG10



Brake mounting

Brake	L'' with brake mm
KFB 10	Max. 150
KFB 16	Max. 175
KFB 25	Max. 180
KFB 30	Max. 180
KFB 40	Max. 185
KFB 63	Max. 200
KFB 100	Max. 215
KFB 160	Max. 230

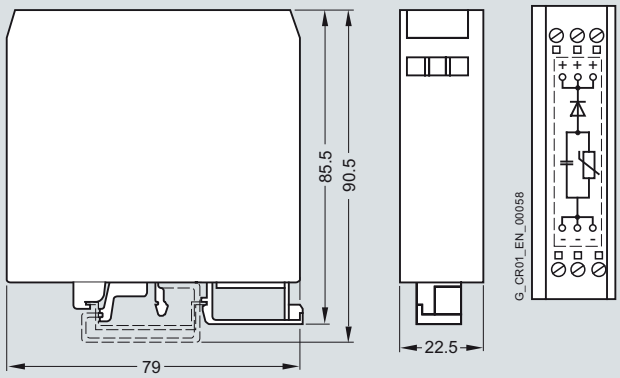
Brake mounting + POG10

Brake	L* with brake + POG10 mm
KFB 10	Max. 315
KFB 16	Max. 330
KFB 25	Max. 345
KFB 30	Max. 345
KFB 40	Max. 355
KFB 63	Max. 370
KFB 100	Max. 385
KFB 160	Max. 400

For motor			Shaft extension DE						Flange dimensions						
Shaft height	Type	Number of poles	D	DB	E	EB	F	GA	LA	M	N	P	S	T	Z
132 S	1LP6130	4, 6	38	M12	80	70	10	41	12	265	230	300	14.5	4	4
132 M	1LP6133 1LP6134	4, 6 6	38	M12	80	70	10	41	12	265	230	300	14.5	4	4
160 M	1LP6163	4, 6	42	M16	110	90	12	45	13	300	250	350	18.5	5	4
160 L	1LP6166	4, 6	42	M16	110	90	12	45	13	300	250	350	18.5	5	4
180 M	1LP4183, 1LP6183	4	48	M16	110	100	14	51.5	13	300	250	350	18.5	5	4
180 L	1LP4186, 1LP6186 1LP4188, 1LP6188 1LP4184	4, 6 4, 6 6	48	M16	110	100	14	51.5	13	300	250	350	18.5	5	4
200 L	1LP4206, 1LP6206 1LP4207, 1LP6207 1LP4208, 1LP6208 1LP4204	6 4, 6 4, 6 4, 6	55	M20	110	100	16	59	15	350	300	400	18.5	5	4
225 S	1LP4220, 1LP6220	4	60	M20	140	125	18	64	16	400	350	450	18.5	5	8
225 M	1LP4223, 1LP6223 1LP4228, 1LP6228 1LP4224	4, 6 4, 6 6	60	M20	140	125	18	64	16	400	350	450	18.5	5	8
250 M	1LP4253, 1LP6253 1LP4258, 1LP6258 1LP4258, 1LP6258 1LP4254	4, 6 6 4 4, 6	65	M20	140	125	18	69	18	500	450	550	22	6	8
280 S	1LP4280, 1LP6280	4, 6	75	M20	140	125	20	79.5	18	500	450	550	22	6	8
280 M	1LP4283, 1LP6283 1LP4288, 1LP6288 1LP4288, 1LP6288 1LP4284 1LP4284	4, 6 6 4 6 4	75	M20	140	125	20	79.5	18	500	450	550	22	6	8

Dimension drawings (continued)

Protective element



Overview

The separately ventilated three-phase motors 1LG4 of shaft height 315 are especially suitable for use as hoisting motors in medium-output drives. The axially mounted external fan means that the motors can operate for long periods with rated torque at low speeds, an operating characteristic required, for example, for the hoisting gear of trestle or assembly cranes.

Encoder mounting

The following encoders can be mounted – between the motor NDE and the external fan – (HOG 10 DN 1024 I encoders are installed on hoisting gear):

- HOG 10D.....
- HOG 10D..... with centrifugal switch FSL
- HOG 10D..... with centrifugal switch ESL (on request).

The connections of the encoder and centrifugal switch (if applicable) are taken to an auxiliary terminal box. As a result, the fan unit does not need to be disassembled when the encoder cables are connected on the system.

The table below shows an overview of the available motor outputs.

Product range

Motor type	Number of poles	Winding utilization factor	Power	Rated speed	Power	Rated speed	Power	Rated speed
			50 Hz	50 Hz	69 Hz	69 Hz	87 Hz	87 Hz
			S1/kW	rpm	S1/kW	rpm	S1/kW	rpm
1LG4316-6	6	F	117	987	150	1367	181	1726
1LG4317-6	6	F	141	987	180	1367	219	1726
1LG4318-6	6	F	171	987	219	1367	265	1726
1LG4314-6	6	F	214	987	274	1367	332	1726
1LG4316-8	8	F	101	736	129	1022	156	1291
1LG4317-8	8	F	123	736	157	1022	191	1291
1LG4318-8	8	F	148	736	189	1022	229	1291
1LG4314-8	8	F	179	736	229	1022	277	1291

Technical data

The maximum permissible field-weakening speed is 2600 rpm for all the variants listed above.

The following rated voltages are available:

- 400 V 3 AC
- 460 V 3 AC
- 500 V 3 AC
- 690 V 3 AC (special insulation!)

The standard version of the external fan motor is designed for
50 Hz 220 – 240 V 3 AC Δ/380 – 420 V Y, 2.0/1.15 A
60 Hz 440 – 480 V 3 AC Y, 1.05 A
Other rated voltages can be ordered with order code **Y81** in plain text.

We recommend that the external fan motor is ordered with a standstill for outdoor installations. Cables for the external fan motors must always enter from below. The fan cowl can be turned accordingly.
The motors are available in types of construction B3 and B35. Type of construction B5 on request.

The basic version of the 1LG4 motor without an external fan is described in Catalog D 81.1. The electrical data of the motors for intermittent duty S3 plus the relevant planning data can be found on the following pages.
The special models normally required for hoisting gear are the only options included in this catalog. For further options, see Catalog D 81.1.

1LG4, 1LG6 motors, shaft height 315 L
Hoisting motors with fitted external fan

Selection and ordering data

Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LG4 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LG6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
n_{rated}	P_{rated}	M_{rated}	I_{rated}	M_{max}	I_{max}	J				
rpm	kW	Nm	A	Nm	A	kgm²	Order No.	kg	Order No.	kg
6-pole, 1000 rpm, 50 Hz										
Intermittent duty S3 – 25 %										
979	169	1648	298	2264	426	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM8 ■**	1045
	204	1990	360	2728	510	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM8 ■**	1215
	248	2419	440	3308	618	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM8 ■**	1280
	310	3024	550	4140	765	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 – 40 %										
983	147	1428	260	2264	426	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM8 ■**	1045
	177	1719	312	2728	510	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM8 ■**	1215
	215	2089	380	3308	618	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM8 ■**	1280
	269	2613	478	4140	765	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 – 60 %										
985	131	1270	232	2264	426	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM8 ■**	1045
	158	1532	278	2728	510	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM8 ■**	1215
	191	1852	340	3308	618	4.5	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM8 ■**	1280
	239	2317	428	4140	765	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 - 100 % or continuous duty S1										
987	117	1132	210	2264	426	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM8 ■**	1045
	141	1364	252	2728	510	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM8 ■**	1215
	171	1654	305	3308	618	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM8 ■**	1280
	214	2070	386	4140	765	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3	**0**	**0**
IM B35	**6**	**6**

For ordering example, see Page 7/92.

Selection and ordering data (continued)

Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LG4 for voltages 400 VΔ, 50 Hz 460 VΔ, 50 Hz 500 VΔ, 50 Hz	Weight approx. (without brake)	1LG6 for voltage 690 VY, 50 Hz	Weight approx. (without brake)
n_{rated}	P_{rated}	M_{rated}	I_{rated}	M_{max}	I_{max}	J				
rpm	kW	Nm	A	Nm	A	kgm²	Order No.	kg	Order No.	kg
8-pole, 750 rpm, 50 Hz										
Intermittent duty S3 – 25 %										
727	146	1918	275	2622	390	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM8 ■**	1040
	178	2338	334	3192	468	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM8 ■**	1135
	215	2824	402	3840	562	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM8 ■**	1305
	259	3402	465	4646	655	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 – 40 %										
731	127	1659	236	2622	390	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM8 ■**	1040
	155	2025	286	3192	468	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM8 ■**	1135
	186	2430	342	3840	562	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM8 ■**	1305
	225	2939	353	4646	655	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 – 60 %										
734	113	1470	207	2622	390	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM8 ■**	1040
	139	1809	255	3192	468	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM8 ■**	1135
	166	2160	303	3840	562	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM8 ■**	1305
	202	2628	353	4646	655	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 - 100 % or continuous duty S1										
736	101	1311	187	2622	390	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM8 ■**	1040
	123	1596	227	3192	468	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM8 ■**	1135
	148	1920	272	3840	562	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM8 ■**	1305
	179	2323	320	4646	655	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-

Voltage:		
400 VΔ, 50 Hz	**L 5 G**	
460 VΔ, 50 Hz	**L 5 H**	
500 VΔ, 50 Hz	**L 5 J**	
Type:		
IM B3	**0**	**0**
IM B35	**6**	**6**

For ordering example, see Page 7/92.

1LG4, 1LG6 motors, shaft height 315 L
Hoisting motors with fitted external fan

Selection and ordering data (continued)

Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LG4 for voltages 400 VΔ, 69 Hz 460 VΔ, 69 Hz 500 VΔ, 69 Hz	Weight approx. (without brake)	1LG6 for voltage 690 VY, 69 Hz	Weight approx. (without brake)
n_{rated}	P_{rated}	M_{rated}	I_{rated}	M_{max}	I_{max}	J				
rpm	kW	Nm	A	Nm	A	kgm^2	Order No.	kg	Order No.	kg
6-pole, 1380 rpm, 69 Hz										
Intermittent duty S3 – 25 %										
1356	218	1535	388	2096	536	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5W**	1045
	261	1838	455	2514	655	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■**	1215
	318	2240	554	3060	788	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5W**	1280
	397	2796	695	3828	990	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 – 40 %										
1361	189	1326	335	2096	536	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5W**	1045
	227	1593	396	2514	655	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■ L5W**	1215
	276	1937	477	3060	788	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5W**	1280
	345	2421	598	3828	990	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 – 60 %										
1365	168	1175	298	2096	536	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5W**	1045
	202	1413	353	2514	655	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■ L5W**	1215
	245	1714	424	3060	788	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5W**	1280
	307	2148	535	3828	990	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 - 100 % or continuous duty S1										
1367	150	1048	268	2096	536	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5W**	1045
	180	1257	316	2514	655	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■ L5W**	1215
	219	1530	388	3060	788	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5W**	1280
	274	1914	476	3828	990	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-

Voltage:		
400 VΔ, 69 Hz	**L 5 N**	
460 VΔ, 69 Hz	**L 5 P**	
500 VΔ, 69 Hz	**L 5 Q**	
Type:		
IM B3	**0**	**0**
IM B35	**6**	**6**

For ordering example, see Page 7/92.

Selection and ordering data (continued)

Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LG4 for voltages 400 VΔ, 69 Hz 460 VΔ, 69 Hz 500 VΔ, 69 Hz	Weight approx. (without brake)	1LG6 for voltage 690 VY, 69 Hz	Weight approx. (without brake)
n_{rated}	P_{rated}	M_{rated}	I_{rated}	M_{max}	I_{max}	J				
rpm	kW	Nm	A	Nm	A	kgm^2	Order No.	kg	Order No.	kg
8-pole, 1035 rpm, 69 Hz										
Intermittent duty S3 – 25 %										
1009	187	1770	351	2410	490	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5W**	1040
	228	2158	418	2934	585	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5W**	1135
	274	2593	502	3532	700	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5W**	1305
	332	3142	600	4280	846	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 – 40 %										
1015	162	1524	300	2410	490	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5W**	1040
	198	1863	357	2934	585	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5W**	1135
	238	2239	427	3532	700	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5W**	1305
	288	2710	512	4280	846	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 – 60 %										
1019	144	1350	266	2410	490	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5W**	1040
	176	1649	315	2934	585	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5W**	1135
	212	1987	378	3532	700	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5W**	1305
	256	2399	455	4280	846	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 - 100 % or continuous duty S1										
1022	129	1205	239	2410	490	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5W**	1040
	157	1467	280	2934	585	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5W**	1135
	189	1766	336	3532	700	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5W**	1305
	229	2140	408	4280	846	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-

Voltage:		
400 VΔ, 69 Hz	**L 5 N**	
460 VΔ, 69Hz	**L 5 P**	
500 VΔ, 69 Hz	**L 5 Q**	
Type:		
IM B3	**0**	**0**
IM B35	**6**	**6**

For ordering example, see Page 7/92.

1LG4, 1LG6 motors, shaft height 315 L
Hoisting motors with fitted external fan

Selection and ordering data (continued)

Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LG4 for voltages 400 VΔ, 87 Hz 460 VΔ, 87 Hz 500 VΔ, 87 Hz	Weight approx. (without brake)	1LG6 for voltage 690 VY, 87 Hz	Weight approx. (without brake)
n_{rated}	P_{rated}	M_{rated}	I_{rated}	M_{max}	I_{max}	J				
rpm	kW	Nm	A	Nm	A	kgm^2	Order No.	kg	Order No.	kg
6-pole, 1740 rpm, 87 Hz										
Intermittent duty S3 – 25 %										
1714	262	1460	461	2002	646	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5X**	1045
	318	1772	548	2424	782	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■ L5X**	1215
	384	2140	665	2932	932	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5X**	1280
	481	2680	848	3674	1195	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 – 40 %										
1721	228	1265	397	2002	646	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5X**	1045
	276	1532	469	2424	782	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■ L5X**	1215
	334	1853	572	2932	932	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5X**	1280
	418	2319	728	3674	1195	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 – 60 %										
1724	203	1124	355	2002	646	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5X**	1045
	245	1357	420	2424	782	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■ L5X**	1215
	297	1645	509	2932	932	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5X**	1280
	372	2061	648	3674	1195	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-
Intermittent duty S3 - 100 % or continuous duty S1										
1726	181	1001	318	2002	646	3.2	**1LG4316-6CA9 ■ ■■■**	925	**1LG6316-6CM9 ■ L5X**	1045
	219	1212	380	2424	782	4	**1LG4317-6CA9 ■ ■■■**	1015	**1LG6317-6CM9 ■ L5X**	1215
	265	1466	454	2932	932	4.7	**1LG4318-6CA9 ■ ■■■**	1215	**1LG6318-6CM9 ■ L5X**	1280
	332	1837	580	3674	1195	5.5	**1LG4314-6CA9 ■ ■■■**	1435	**-**	-

Voltage:		
400 VΔ, 87 Hz	**L 5 R**	
460 VΔ, 87 Hz	**L 5 S**	
500 VΔ, 87 Hz	**L 5 T**	
Type:		
IM B3	**0**	**0**
IM B35	**6**	**6**

For ordering example, see Page 7/92.

Selection and ordering data (continued)

Rated speed	Rated output	Rated torque	Rated current (at 400 V)	Max. torque	Max. current	Moment of inertia (without brake)	Three-phase squirrel-cage motors 1LG4 for voltages 400 VΔ, 87 Hz 460 VΔ, 87 Hz 500 VΔ, 87 Hz	Weight approx. (without brake)	1LG6 for voltage 690 VY, 87 Hz	Weight approx. (without brake)
n_{rated}	P_{rated}	M_{rated}	I_{rated}	M_{max}	I_{max}	J				
rpm	kW	Nm	A	Nm	A	kgm^2	Order No.	kg	Order No.	kg
8-pole, 1305 rpm, 87 Hz										
Intermittent duty S3 – 25 %										
1275	226	1693	412	2308	578	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5X**	1040
	277	2075	508	2826	735	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5X**	1135
	332	2487	609	3388	855	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5X**	1305
	402	3011	712	4098	1005	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 – 40 %										
1282	196	1460	351	2308	578	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5X**	1040
	241	1795	434	2826	735	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5X**	1135
	288	2145	522	3388	855	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5X**	1305
	349	2600	610	4098	1005	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 – 60 %										
1287	175	1299	315	2308	578	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5X**	1040
	214	1588	383	2826	735	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5X**	1135
	256	1900	460	3388	855	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5X**	1305
	310	2300	538	4098	1005	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-
Intermittent duty S3 - 100 % or continuous duty S1										
1291	156	1154	280	2308	578	3.1	**1LG4316-8CB9 ■ ■■■**	900	**1LG6316-8CM9 ■ L5X**	1040
	191	1413	340	2826	735	3.9	**1LG4317-8CB9 ■ ■■■**	1055	**1LG6317-8CM9 ■ L5X**	1135
	229	1694	410	3388	855	4.5	**1LG4318-8CB9 ■ ■■■**	1135	**1LG6318-8CM9 ■ L5X**	1305
	277	2049	478	4098	1005	5.5	**1LG4314-8CB9 ■ ■■■**	1415	**-**	-

Voltage:		
400 VΔ, 87 Hz	**L 5 R**	
460 VΔ, 87 Hz	**L 5 S**	
500 VΔ, 87 Hz	**L 5 T**	
Type:		
IM B3	**0**	**0**
IM B35	**6**	**6**

For ordering example, see Page 7/92.

Selection and ordering data (continued)

Options

Options or order codes (supplement "**-Z**" is required)

Special versions	Order No. supplement "**-Z**" with order code and plain text, if required
Motor protection through PTC thermistor with 3 embedded temperature sensors for tripping	**A11**
Motor protection through PTC thermistor with 6 embedded temperature sensors for tripping and alarm	**A12**
Motor temperature detection with embedded temperature sensor KTY 84-130	**A23**
Mounting of rotary pulse encoder HOG10 DN1024I terminal box moisture protection	**J15**
Mounting of rotary pulse encoder HOG10 DN1024I terminal box dust protection	**J16**
Standstill heating for 230 V	**K45**
Standstill heating for 115 V	**K46**
Insulated bearing cartridge	**L27**
Special finish in other standard RAL colors: RAL 1015, 1019, 2003, 2004, 3007, 5007, 5009, 5010, 5012, 5015, 5017, 5018, 5019, 6019, 7000, 7004, 7011, 7016, 7022, 7033	**Y54** • and special finish RAL ....
Special finish in RAL 7030, stone grey, coat thickness 90 µm	**K26**
Special finish "Offshore" in RAL 7030, stone grey, coat thickness 220 µm	**M91**
Non-standard cable entry holes, specify size and number in plain text	**Y73** • and info supplier by customer
Terminal box on RHS	**K09**
Terminal box on LHS	**K10**
Rotation of the terminal box through 90°, entry from DE	**K83**
Rotation of the terminal box through 90°, entry from NDE	**K84**
Rotation of terminal box through 180°	**K85**
Second rating plate, supplied separately packed	**K31**
Mounting of rotary pulse encoder HOG10 DN1024I + FSL (speed ... rpm) terminal box moisture protection	**Y74**
Mounting of rotary pulse encoder HOG10 DN1024I + FSL (speed ... rpm) terminal box dust protection	**Y76**
Extra rating plate or rating plate with different data	**Y80** • and info supplied by customer
Non-standard voltage and/or frequency of the external fan motor, standstill heating	**Y81** • and info supplied by customer
Extra rating plate with identification code	**Y82** • and info supplied by customer

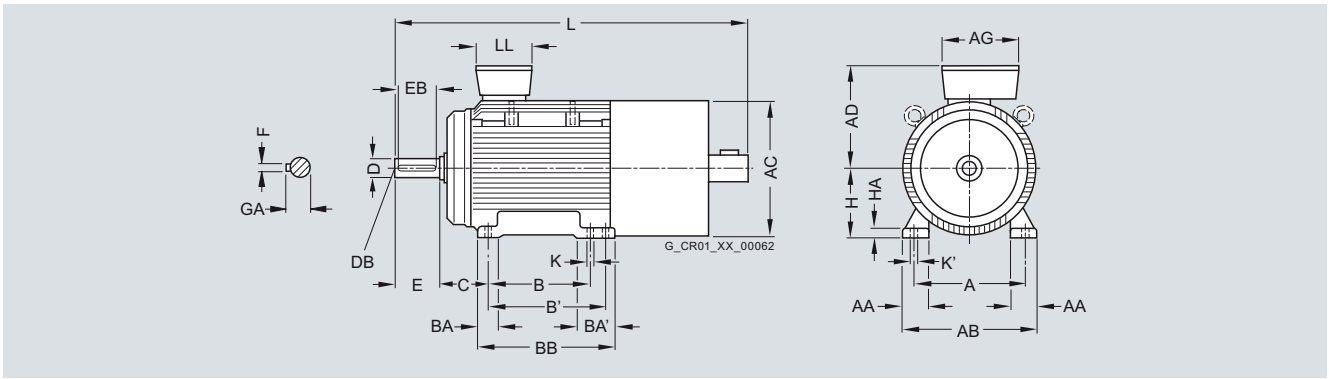
- This order code only determines the price of the version – additional plain text is required.

Ordering example

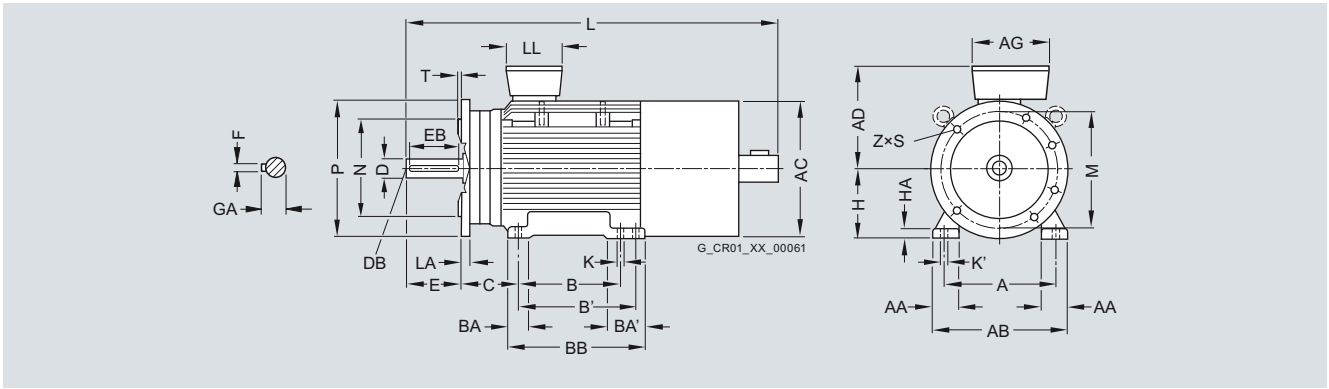
Selection criteria		Order No.	Order codes
Motor type	Standard motor with improved efficiency, IP55 degree of protection, cast-iron version	**1LG4**. . .-	
Shaft height	315 L	1LG4**316-**	
No. of poles/speed	6-pole	1LG4316-**6**	
Version	Hoisting gear version	1LG4316-6**CA** . .	
Voltage/frequency	400 VΔ, 50 Hz	1LG4316-6CA**9** .	**L5G**
Type	IM B3	1LG4316-6CA9**0**	L5G
Special version	Motor temperature detection with embedded temperature sensor KTY 84-130	1LG4316-6CA90-**Z**	L5G **A23**
	Standstill heating for 230 V	1LG4316-6CA90-**Z**	L5G A23 **K45**
	Mounting of rotary pulse encoder HOG10 DN1024I + FSL (speed ... rpm) terminal box dust protection	1LG4316-6CA90-**Z**	L5G A23 K45 **Y76**
Complete identification codes for required version of hoisting motor		**1LG4316-6CA90-Z L5G A23 Y76 K45**	

Dimension drawings

1LG4/1LG6, type IM B3



1LG4/1LG6, type IM B35

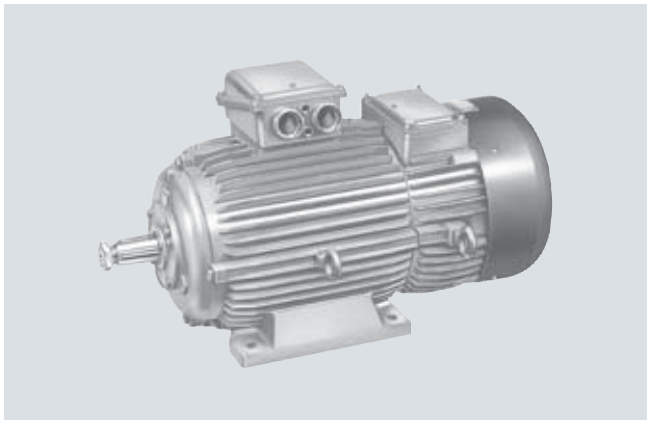


For motor		Dimensions to IEC																	
Type	Number of poles	A	AA	AB	AD	AG	B	B'	BA	BA'	BB	C	H	HA	K	K'	L	AC	LL
1LG4316 **1LG6316**	6, 8 6, 8	508	120	610	495	379	457	508	125	176	578	216	315	50	28	35	1522	610	307
1LG4317 **1LG6317** **1LG6317**	6, 8 6 8	508	120	610	495	379	457	508	125	176	578	216	315	50	28	35	1522 1662 1522	610	307
1LG4318 **1LG4318** **1LG6318** **1LG6318**	6 8 6 8	508	120	610	495	379	457	508	155 125 155 125	250 176 250 176	666 578 666 578	216	315	30 50 30 50	28	35	1662 1522 1662 1662	610	307
1LG4314	6, 8	508	120	610	495	379	457	508	155	250	666	216	315	30	28	35	1749	610	307

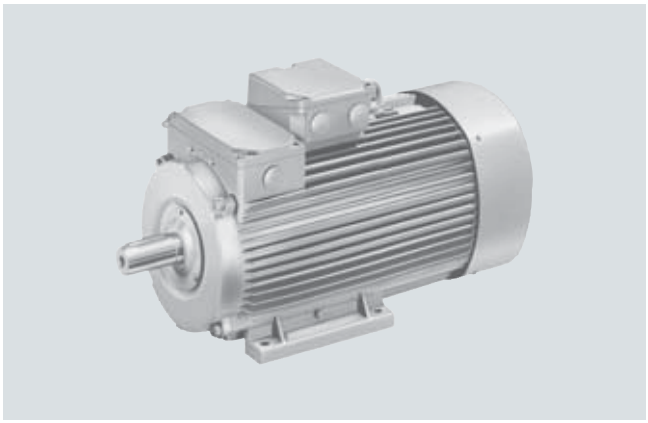
For motor		Shaft extension DE						Flange dimensions						
Type	Number of poles	D	DB	E	EB	F	GA	LA	M	N	P	S	T	Z
1LG4316 **1LG6316**	6, 8 6, 8	80	M20	170	140	22	85	22	600	550	660	22	6	8
1LG4317 **1LG6317**	6, 8 6, 8	80	M20	170	140	22	85	22	600	550	660	22	6	8
1LG4318 **1LG6318**	6, 8 6, 8	80	M20	170	140	22	85	22	600	550	660	22	6	8
1LG4314	6, 8	80	M20	170	140	22	85	22	600	550	660	22	6	8

1LT9 motors, shaft heights 100 L to 315 L

Overview



Slip-ring motor with conical shaft extension



Slip-ring motor with cylindrical shaft extension

Hoisting gear drives – for cranes in particular – are subject to extremely high levels of torque during acceleration. Voltage dips can also occur during acceleration phases. A high stalling torque is essential, therefore, for ensuring that the crane operates reliably.

The hoisting gear motors 1LT9 and 1LT8 are designed specially for intermittent duty and are characterized by their:

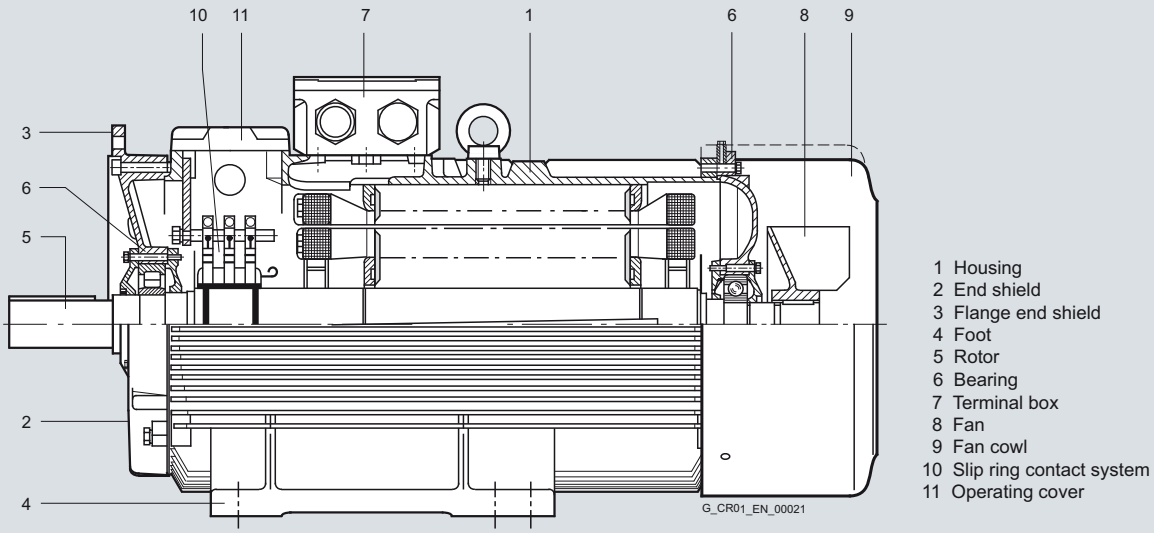
- Rugged design
- High stalling torque
- High climate resistance

DIN 42681 requires a relative stalling torque of at least 2.2 times the rated torque, SEB 841 101-70 of at least 2.5 times the rated torque at 40 % CDF.

The relative stalling torques of the hoisting gear motors manufactured by Siemens AG are significantly higher than these values. They are largely maintained even at 25 % CDF, which ensures that cranes can still operate reliably if they are overloaded or if voltage dips occur.

All hoisting gear motors are suitable for use with stator-circuit phase-angle control. The tacho-generator required for recording the speed can be mounted at the NDE of the motors.

The diagram below shows the design of slip-ring motor 1LT8 (shaft heights 225M to 315M).



Design of slip-ring motor 1LT8

Technical data

Electrical design

Standard winding

The hoisting gear motors manufactured by Siemens AG are shipped with a standard winding for the following rated voltages:

- 50 Hz, 380 V, 400 V, 500 V, 660 V, 690 V 3 AC
- 60 Hz, 460 V 3 AC

Motors with a winding for 50 Hz, 380 V / 400 V 3 AC can also be connected to supplies with 60 Hz, 440 V / 460 V 3 AC, although they must be operated at a maximum 110 % of the 50 Hz output. The speed varies in proportion to the frequency and the rotor standstill voltage in the ratio of 440 V / 380 V or 460 V / 400V. The torque overload capability does not change (see also the Selection and ordering data).

Non-standard winding

The motors are equipped with a non-standard winding for operating voltages of between 380 and 690 V, 50 or 60 Hz that are outside the values specified above. The technical data at 50 Hz roughly correspond with the catalog specifications for the motors with standard windings. At 60 Hz, the rated output changes to approximately 110 % of the rated output at 50 Hz. Further technical data for 60 Hz are available on request.

Tolerances

According to IEC 60034-1, the following deviations from the rating data are permitted:

- Slip ± 20 %
- Stalling torque – 10 %
- Moment of inertia ± 10 %

Insulation

In the standard version, the stator and rotor windings have temperature class F.

According to IEC 60034-1, the stator windings are tested at a test voltage of 2 x U_{rated} + 1000 V (but at least 1500 V). The rotor windings of hoisting gear motors are tested with 4 times the rotor standstill voltage + 1000 V.

PTC thermistor temperature sensors

The standard 1LT motors are not shipped with temperature sensors. If required, however, three or six temperature sensors can be installed in the stator winding of these motors for alarm and/or tripping.

In all cases, the terminals for the temperature sensors are located in the terminal box.

Terminal designations

Temperature sensor	Terminal designation Shaft heights 100 to 200	From shaft height 225 upwards
Alarm	1, 2	1TP1, 1TP2
Tripping	3, 4	2TP1, 2TP2

Terminal box

The terminal box is located on the top of all standard hoisting gear motors. A side arrangement is possible up to shaft height 200L.

The terminal box for 1LT motors only has cable entries on one side, although it can be rotated through 180° with fixed terminals. In the standard version, the cable entries are on the right (as viewed from the drive end). All terminal boxes fulfill degree of protection IP55.

Specially marked terminals are provided for the protective conductor.

If required, two additional holes M20 x 1.5 can be provided for 1LT8 motors. If a motor with PTC thermistors and standstill heating is ordered, two M20 x 1.5 holes are provided as standard in the terminal box.

Motor type	Thread Terminal bolt Stator	Cable entry Stator	Thread Terminal bolt Rotor	Cable entry Rotor	Cable entry Additional equipment
1LT9 107 **1LT9 113** **1LT9 114**	M5	M25 x 1.5	M5	M25 x 1.5	M16 x 1.5
1LT9 133 **1LT9 134** **1LT9 135**	M6	M32 x 1.5	M6	M32 x 1.5	M16 x 1.5
1LT9 163 **1LT9 166** **1LT9 186**	M8	M40 x 1.5	M8	M40 x 1.5	2 x M16 x 1.5
1LT9 206 **1LT9 207**	M10	M50 x 1.5	M10	M50 x 1.5	2 x M16 x 1.5
1LT8 223 **1LT8 224** **1LT8 253** **1LT8 254-4**	M8	M50 x 1.5	M8	M50 x 1.5	M20 x 1.5
1LT8 254-6/8/10 **1LT8 280** **1LT8 283**	M10	M63 x 1.5	M8	M63 x 1.5	M20 x 1.5
1LT8 310 **1LT8 313**	M10	M63 x 1.5	M8	M63 x 1.5	M20 x 1.5
1LT8 314 **1LT8 315** **1LT8 317** [1] **1LT8 318** [1]	M12	Encapsulated gland	M10	M63 x 1.5	M20 x 1.5

[1] Version 220 / 380 VΔ/Y or 230 / 400 VΔ/Y not available.

Technical data (continued)

Slip-rings and brushgear

Motor type	Arrangement	Accessibility	Cover	Brushgear	Slip-ring material
1LT9 107 — 1LT9 207	At NDE in pot-type end shield	From above, rotatable through 90° later	Cast iron	Two-arm clamp-type brush holder	Cast bronze
1LT8 223 — 1LT8 313	At DE, integrated in cast-iron housing	From above	Cast iron	Box-type brush holder	Brass
1LT8 314 — 1LT8 318	At NDE in pot-type end shield	From above	Cast iron	Two-arm clamp-type brush holder	Brass

Mechanical design

Types of construction

To EN 60034-7, flange to DIN 42948.

The hoisting gear motors up to shaft height 200 L can be operated in mounting positions IM B6, IM B7, IM B8, IM V5, and IM V6 or IM V1 (except in the basic construction types IM B3 or IM B5). When an order is placed, however, the installation type must always be specified (because of the position of the condensate drain holes, for example).

For this reason, they are normally designated only with the basic construction type on the rating plate.

If motors as of shaft height 180 in a construction type with feet are mounted on the wall, it is recommended that the motor feet are supported.

Hoisting gear motors as of shaft height 225 M can only be shipped in construction types IM B3, IM B35, and IM V1.

A protective top cover is required for all construction types in which the shaft extension is facing down.

If basic construction type IM B3 or IM B5 is used in a different mounting position, the position of the condensate drain holes must be taken into account (if necessary, turn the end shield). Condensate inside the motor must be allowed to drain off through the condensate drain holes.

Housing

The motor housing is made of gray cast iron.

Frame feet

The undersides of the feet are machined. The relevant tolerances are specified in the dimensions table.

Shaft extensions

In the standard version, the hoisting gear motors are shipped as follows:

- 1LT9 up to shaft height 160: with a cylindrical shaft extension to DIN 748 [1)]
- 1LT9 as of shaft height 180: with a conical shaft extension to DIN 1448 [2)]
- 1LT8: with a conical shaft extension to DIN 1448 [2)]

Other shaft extensions (e.g. to DIN 42681) are available on request. Conical shaft extensions have a 1:10 pitch, a threaded stem, and are shipped with a spring washer and hexagon nut.

With all motors, the end face at the ND end is accessible and is suitable for taking speed measurements. Motors in the basic construction types IM B3 and IM B5 can also be shipped with two shaft extensions.

As of shaft height 180, the motors are equipped with a conical shaft extension, which is more suitable for transmitting high impulse torques because it ensures that the coupling is attached more securely to the shaft extension.

The featherkey on conical shaft extensions simply provides additional security. Under normal operating conditions, it does not need to transmit any forces because the entire torque is transmitted via the conical fit. The hole for the coupling half must always be made using a taper plug gage, whereby the smallest diameter must be between 0.2 and 0.6 mm smaller than the diameter d_2 or d_3 of the shaft extension.

When the coupling half is pushed onto the shaft extension, the end face is approximately 2 – 6 mm from the shaft shoulder. This ensures that the shoulder nut does not push against the thread end when it is tightened and that it sits securely on the shaft.

The couplings are normally mounted cold. The coupling hub is pushed on in an axial direction and expands to such an extent that the required frictional locking for transmitting the torque is ensured. A specific torque or gage is not required.

Mounted tachometer

In open-loop drive control systems with a control range, a tachogenerator can be fitted to record the speed at the NDE of the motor. It is mounted on the fan cowl.

The following tachometers are preferred:

- On motors of shaft height 100 to 200
  GMP 1.0 S-4, construction type IM B5 S
  U_{rated} = 100 V at 1000 rpm I_{rated} = 100 mA
  Brush quality H 73
  Degree of protection IP55
- On motors of shaft height 225 to 315
  GMP 1.0 LT-4, construction type IM B5 N
  U_{rated} = 100 V at 1000 rpm
  I_{rated} = 100 mA
  Brush quality H 73
  Degree of protection IP55

If a different tachometer is to be fitted, information should be requested (e.g. HOG10). Tachometers are provided by the factory.

[1)] Conical shaft extension available at an additional cost.

[2)] Cylindrical shaft extension available at an additional cost.

Technical data (continued)

Degree of protection to DIN VDE 0530-5

Hoisting gear motors are mainly operated in intermittent duty S3. In this operating mode, there is a high risk of condensate building up inside the motor, particularly if the motor is operated outdoors. The condensate must be able to drain off, which is why the following degrees of protection have been defined for standard hoisting gear motors:

- Motor housing IP54 with open water drain holes
- Terminal box IP55

Higher degrees of protection are available (IP55), although they are not recommended for motors that operate in intermittent duty due to the build-up of condensate inside the motor.
If flange motors are to be fitted to a gear unit with neither an intermediate housing nor a coupling, a seal to protect against the ingress of oil must be fitted to the flange end shield. If this seal is not fitted on the gear unit side, the appropriate options for the motor must be ordered. With 1LT9 motors, a radial seal is then fitted to the DE end shield. If nothing is specified in the order regarding the mounted gearing, it is assumed that a coupling is used for transmitting power.

Maximum permissible speed

The maximum permissible operating speed is specified in the technical data / selection tables. In accordance with IEC 60034-1, the motors are run at 1.2 times this speed over a period of 2 minutes as part of an overspeed test.

Special versions of hoisting gear motors are available for higher operating speeds (please inquire).

Water (condensate) drain holes

Hoisting gear motors with degree of protection IP54 always have water (condensate) drain holes that prevent water from collecting inside the motor.

With degree of protection IP55, the water drain holes are always sealed. The water drain holes on motors with this degree of protection must be opened at regular intervals as part of the maintenance cycle to allow any condensate that has collected inside the motor to drain off.

Mechanical balance quality

The rotors in hoisting gear motors are dynamically balanced with an inserted half featherkey. This corresponds to vibration severity grade A. The vibrational characteristics of the motor are specified in IEC 60034-14.

If special requirements exist with regard to the mechanical balance quality, the rotors can also be balanced in accordance with vibration severity grade B (see table on Page 7/4) (please inquire).

Rating plates

A stainless steel rating plate specifying the rated motor data is fitted to the housing or fan cowl of Siemens hoisting gear motors.

1LT9 motors have international rating plates, while 1LT8 motors have dual-language ones (German/English).

Other language combinations or single-language rating plates can also be fitted (extra charge).

The following data is specified as standard:

- Operating voltage
- Type
- IP54 degree of protection
- Rated output
- Rated current
- Rated speed
- Rotor current

Rated output, current, and speed are specified for S3 – 15, –25, –40, –60, –100 % CDF.

If a higher degree of protection or insulation class is required, this can also be specified accordingly.

Replaceability of older motors

1LT9 and 1LT8 motors can usually replace older motors. Since various standards have changed over time, however, it is advisable in certain cases to check the technical data and mounting dimensions. Special attention must be paid to the following:

- Position of the terminal boxes
- Foot dimensions and shaft heights
- Shaft extensions
- Characteristic rotor resistance k

$$k = \frac{u_2}{i_2 \times \sqrt{3}}$$

u_2 Rotor standstill voltage
i_2 Rotor current

Special versions can sometimes be adapted to older versions.

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Technical data (continued)

Bearings

All hoisting gear motors are equipped with standard rolling-contact bearings that comply with the following standards:

- Deep-groove ball bearing
  - 62..C3, DIN 625
  - 63..C3, DIN 625
- Cylindrical-roller bearing
  - NU..., DIN 5412

The bearings of the 1LT9 motors are greased for life. An optional regreasing device can also be installed for exceptional operating conditions. High-temperature, long-term grease is used for lubrication. The bearings used are listed in the table in the section "Bearing assignment for 1LT9 motors". Cylindrical-roller bearings are installed in drives with increased lateral forces.

In all cases, the bearing seal is compatible with the ordered motor degree of protection.

The standard 1LT8 motors are equipped with bearings of dimension series 03 with permanent lubrication. The bearing play for all deep-groove ball bearings complies with C3; for cylindrical-roller bearings, the bearing play is "standard".

An optional regreasing device can also installed in motors for exceptional operating conditions (e.g. coolant temperature above 55 °C). High-temperature grease is used for lubrication. Regreasing devices are available for all motors at extra cost.

For drives in which high lateral forces occur (e.g. pinion output in crane slewing gears), cylindrical-roller bearings are installed in 1LT8 motors at the D end instead of deep-groove ball bearings (assuming that the end shield has not been modified).

The bearing seal in all motors complies with degree of protection IP54, whereby the bearing is sealed externally by a V ring. Anti-corrosion measures may be required if the motor is installed in a corrosive environment (please inquire).

With 1LT8 motors, measurement nipples can be fitted to the end shield to monitor the bearings in accordance with the "shock pulse measurement" (SPM) method.

Rolling-contact bearings

The bearings for hoisting gear motors 1LT9 and 1LT8 are designed for coupling outputs. The bearings for motors up to shaft height 313 are greased for life; as of shaft height 314, a regreasing device is installed.

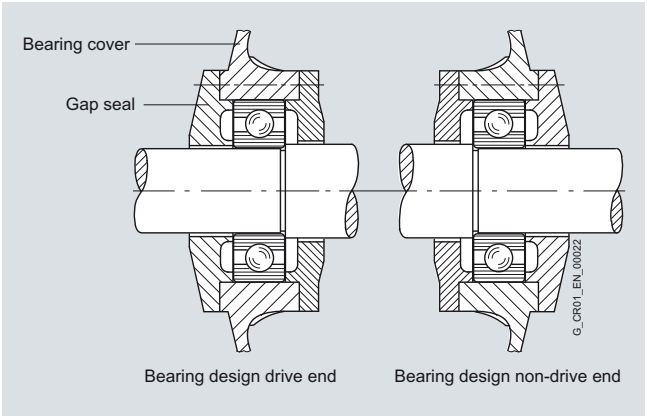
If required, motors up to shaft height 313 can also be shipped with a regreasing device (optional). Reinforced bearings are required for drives with increased lateral forces (code: K20).

Bearing assignment for 1LT9 motors

Type	DE bearing	V ring	NDE bearing	V ring	Figure
1LT9 107	6206 2Z C3	–	6206 C3	–	See section "Shaft heights 100 to 132"
1LT9 113/114	6306 2Z C3	–	6306 C3	–	
1LT9 133/134/135	6308 C3	–	6308 C3	–	
1LT9 163/166	6309 C3	–	6309 C3	–	See section "Shaft heights 160 to 200"
1LT9 186	6311 C3	–	6310 C3	–	
1LT9 206/207	6313 C3	–	6312 C3	–	

Shaft heights 100 to 132

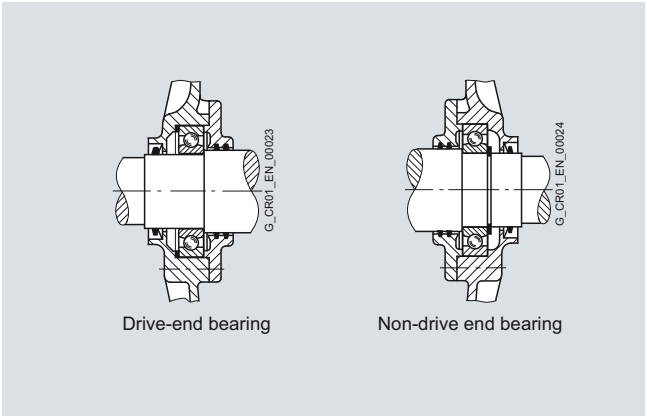
Shaft height 100 and 112 motors are equipped as standard with bearings fixed by means of retaining rings DIN 471 and DIN 472 at the NDE. With shaft height 132, the location bearing on the ND end is positioned in the end shield hub by means of a bearing cover.



Bearing arrangement for shaft height 100 to 132

Shaft heights 160 to 200

The bearing assignment is for configuration purposes only; binding statements about the bearings for motors that have already been shipped can be requested. Please specify the serial number.



Bearing arrangement for shaft height 160 to 200

Technical data (continued)

Bearing assignment for 1LT8 motors

The bearing assignment is for configuration purposes only; binding statements about the bearings for motors that have already been shipped can be requested. Please specify the serial number.

Motor type	Number of poles	DE bearing	V ring	NDE bearing	V ring	Figure DE bearing	Figure NDE bearing
1LT8 223	4, 6, 8	6313 C3	65 A	6113 C3	60 A	1	2
1LT8 224	4, 6, 8	6313 C3	65 A	6113 C3	60 A		
1LT8 253	4, 6, 8, 10	6315 C3	75 A	6313 C3	65 A	1	2
1LT8 254	4	6315 C3	75 A	6313 C3	65 A		
1LT8 254	6, 8, 10	6316 C3	80 A	6314 C3	80 A		
1LT8 280	4, 6, 8, 10	6317 C3	85 A	6314 C3	70 A	1	2
1LT8 283	4	6317 C3	85 A	6314 C3	70 A		
1LT8 283	6, 8, 10	6317 C3	85 A	6314 C3	70 A		
1LT8 310	4, 6, 8, 10	6319 C3	95 A	6316 C3	80 A	1	2
1LT8 313	4, 6, 8, 10	6319 C3	95 A	6316 C3	80 A	1	2
1LT8 314	4, 6, 8	6320 C3	RB 100 [1]	6317 C3 [2]	85 A	3	4
1LT8 315	4, 6, 8	6320 C3	RB 100 [1]	6317 C3 [2]	85 A	3	4
1LT8 317	4, 6, 8	6320 C3	RB 100 [1]	6317 C3 [2]	85 A	3	4
1LT8 318	4	6320 C3	RB 100 [1]	6317 C3 [2]	85 A	3	4

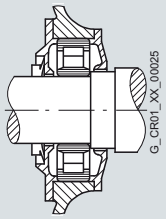


Figure 1

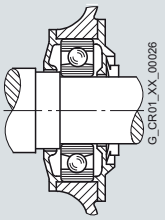


Figure 2

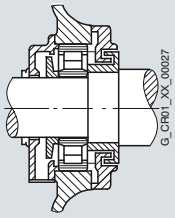


Figure 3

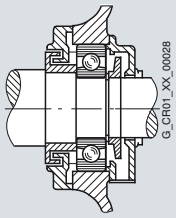


Figure 4

Bearing assignment for 1LT8 motors

Environmental influences and special versions

Ventilation

The hoisting gear motors are equipped with an external fan at the NDE, which blows the cooling air over the housing through the ribs distributed over the circumference (regardless of the direction of rotation). Thermoplastic radial fans are used in standard versions. For ambient temperatures of >60 °C die-cast aluminum radial fans are used.

The fan cowl for all shaft heights is made of sheet steel. If speed monitoring devices (e.g. tacho-generator) are installed, the motors are fitted with cast-metal fan cowls. If the fans are properly dimensioned and the flow of cooling air to the ribbed housing is optimized, effective heat dissipation is ensured even at speeds below the rated speed.

[1] Gamma ring

[2] For vertical construction types Q 317.

1LT9 motors, shaft heights 100 L to 315 L

Technical data (continued)

Paint finish to RAL 7030

The standard paint finish to RAL 7030 is suitable for indoor and (in temperate climates) outdoor use. In extreme climates (e.g. constantly high humidity or chemically corrosive atmospheres), a special paint finish is required.

A special paint finish is also required if it is expected that the motor will be stored outdoors for a long period of time and it cannot be protected against rain.

For other exceptional ambient conditions, special surface protectors can also be shipped (optional).

Version with	Suitable for climate group to IEC publication 721-2-1	Temperature resistance	Composition (a top coat only is applied to silumin parts) Primer	Top coat
Standard finish	**Moderate**			
	For indoors and outdoors, temporarily: up to 100 % rel. humidity at temperatures of up to +30°C	Briefly: +120 °C	Base: alkyd resin or CN amino resin	Up to shaft height 200 Base: nitro combi; As of shaft height 225 Base: polyurethane
	Continuous: up to 85 % rel. humidity at temperatures of up to +25 °C	Continuous: +100 °C		
Special finish	**Worldwide**			
	For outdoor use Short term: up to 100 % rel. humidity at temperatures of up to +35 °C	Briefly: +140 °C	Base: alkyd resin or CN amino resin	Up to shaft height 200 Base: epoxide; As of shaft height 225 Base: polyurethane (2 coats)
	Continuous: up to 98 % rel. humidity at temperatures of up to +30°C Additionally: for aggressive atmospheres up to 1 % acid and alkali concentration or permanent dampness in sheltered rooms	Continuous: +120 °C		

Standstill heating

Hoisting gear motors that are installed outdoors and subject to fluctuating temperatures and humidity can additionally be equipped with a standstill heater which prevents condensation from forming when the motor is at a standstill. Standstill heating is also recommended when motors are used in very cold environments. Standstill heating must not be switched on during operation.

The table below shows the heat output of standstill heaters.

For motors 1LT9/1LT8	Supply voltage	Heat output
Shaft height	V	W
100 L to 112 M	115 or 230	40
132 M to 160 L	115 or 230	100
180 M to 200 L	115 or 230	100
225 S to 250 M	115 or 230	55
280 S to 315 L	115 or 230	100

Terminal designations	
Shaft heights 100 to 200	9, 10
From shaft height 225 upwards	HE1, HE2

Climate resistance of motors 1LT9 and 1LT8

The version with enhanced corrosion protection is also decontaminable. The data apply to the corrosion protection. The temperature limits for electrical machines must also be observed.

	Standard version	Version with enhanced corrosion protection
Climatic areas	A and T to DIN 50019	H and M to DIN 50019
Climatic group	Moderate to IEC 721-2-1	Worldwide to IEC 721-2-1

Radio interference

Hoisting gear motors with slip-ring rotors generally fulfill radio nterference suppression level N to EN 550014-1 (IEC/CISPR 14-1), which is sufficient for installation in industrial and residential areas.

Technical data (continued)

Temperature and installation altitude

In accordance with IEC 60034, the rated outputs for intermittent duty (S3 – 15, –25, –40, –60, and –100 %) apply at a frequency of 50 Hz, with a coolant temperature (*CT*) of 40 °C, and at an installation altitude of up to 1000 m above sea level.

Under other conditions, the permissible output must be determined in accordance with the tables below. Note that this only applies to output (i.e. the thermal utilization of the motor). The absolute torques that can be utilized (start-up torque, stalling torque) are not affected and still correspond with the values in the selection tables.

As far as dimensioning the hoisting gear motors is concerned, this means that the factors specified below must always be taken into account if the effective torque rather than the start-up torque was the deciding factor in the choice of the drive motor.

Effect of the coolant temperature

At installation altitudes of up to 1000 m above sea level and when the coolant temperature is not 40 °C (*CT*), the factors in the table below are used for the permissible output as a function of the thermal class. For *CT* 10 up to *CT* 35, a correction of the temperature rise limit is thus agreed in accordance with EN 60034-1.

CT °C	10	15	20	25	30	35	40	45	50	55	60
$P_{perm.}/P_{rated}$	1.16	1.13	1.11	1.08	1.06	1.03	1	0.96	0.92	0.87	0.82

Effect of installation altitude

If the machine is to be operated at an altitude of between 1000 m and 4000 m and the maximum coolant temperature has not been defined, the following is assumed:

- The reduced cooling effect caused by the altitude is compensated by a decrease in the maximum ambient temperature to under 40 °C.

This assumption is valid when the coolant temperatures (see table below) as a function of the installation altitude and thermal class are not exceeded. The motors can be operated at the rated output as specified in the catalog.

Assuming that the coolant temperature is 40 °C even at higher altitudes, the factors listed in the table "Effect of coolant temperature and installation altitude" apply for the permissible output.

Altitude *m*	*CT* max. °C at $P = P_{rated}$
1000	40
2000	30
3000	19
4000	9

Effect of coolant temperature and installation altitude

If the coolant temperatures is not specified for installation altitudes of more than 1000 m above sea level, the table under "Effect of installation altitude" applies.

If the coolant temperatures are different to those specified in this table, the relevant factors in the table under "Effect of coolant temperature" and the table below must be multiplied with each other to yield the permissible output. The coolant temperature and installation altitude are rounded to 5 °C and 500 m respectively.

If the motor is derated significantly for the above reasons, the operating values are not as favorable as a result of the partial load utilization of the motors. Motors whose output has been derated by 15 % or more, therefore, must be ordered with a non-standard winding.

Altitude m	1000	1500	2000	2500	3000	3500	4000
$P_{perm.}/P_{rated}$	1	0.97	0.94	0.9	0.86	0.82	0.77

1LT9 motors, shaft heights 100 L to 200 L

Selection and ordering data

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT9 shaft heights 100 L to 200 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1500 rpm (max. permissible operating speed 3000 rpm)											
Intermittent duty S3 – 15 %											
100 L	1200	2.5	19.8	1.9	6.4	24	2.05	85	0.006	**1LT9 107-4AA ■ ■**	40
112 M	1350	3.7	27.6	2.5	8.2	23	2.65	110	0.012	**1LT9 113-4AA ■ ■**	48
112 M	1300	5	36.7	2.3	11.7	27	3	140	0.013	**1LT9 114-4AA ■ ■**	50
132 M	1370	6.8	48	2.5	15	33	2.25	140	0.024	**1LT9 133-4AA ■ ■**	69
132 M	1390	8	55	2.7	17.1	31	3.15	170	0.032	**1LT9 134-4AA ■ ■**	80
132 M	1390	9.5	65	2.5	20.5	35	2.7	180	0.035	**1LT9 135-4AA ■ ■**	86
160 M	1395	13	89	2.4	27.6	47	2.2	180	0.062	**1LT9 163-4AA ■ ■**	138
160 L	1410	19.5	132	2.7	40.9	48	3.1	260	0.083	**1LT9 166-4AA ■ ■**	150
180 L	1440	27	182	2.5	55	61	2.43	270	0.154	**1LT9 186-4AA ■ ■**	215
200 L	1425	33	221	2.3	61	95	1.48	230	0.2	**1LT9 206-4AA ■ ■**	245
200 L	1430	40	267	2.5	76	92	1.69	270	0.24	**1LT9 207-4AA ■ ■**	260
Intermittent duty S3 – 25 %											
100 L	1245	2.3	17.7	2.2	5.7	20	2.45	85	0.006	**1LT9 107-4AA ■ ■**	40
112 M	1365	3.3	24	2.9	7.5	20	3.2	110	0.012	**1LT9 113-4AA ■ ■**	48
112 M	1325	4.5	32.4	2.6	10.5	23	3.5	140	0.013	**1LT9 114-4AA ■ ■**	50
132 M	1390	5.7	39.6	3	12.8	28	2.8	140	0.024	**1LT9 133-4AA ■ ■**	69
132 M	1400	7	47.8	3.1	15.1	26.5	3.8	170	0.032	**1LT9 134-4AA ■ ■**	80
132 M	1410	8.7	59	2.7	18.6	30.5	3.05	180	0.035	**1LT9 135-4AA ■ ■**	86
160 M	1410	11	74.5	2.9	24	40	2.6	180	0.062	**1LT9 163-4AA ■ ■**	138
160 L	1425	16.5	111	3.3	38	40	3.75	260	0.083	**1LT9 166-4AA ■ ■**	150
180 L	1445	23	154	2.9	48	54	2.89	270	0.154	**1LT9 186-4AA ■ ■**	215
200 L	1435	28	186	2.7	53	77	1.72	230	0.2	**1LT9 206-4AA ■ ■**	245
200 L	1440	34	226	2.9	64	78	2	270	0.24	**1LT9 207-4AA ■ ■**	260
Intermittent duty S3 – 40 %											
100 L	1290	2	14.9	2.6	5	17	2.9	85	0.006	**1LT9 107-4AA ■ ■**	40
112 M	1380	3	21	3.2	6.9	18	3.55	110	0.012	**1LT9 113-4AA ■ ■**	48
112 M	1350	4	28.3	3	9.5	19	4.25	140	0.013	**1LT9 114-4AA ■ ■**	50
132 M	1400	5	34.2	3.5	11.4	25	3.25	140	0.024	**1LT9 133-4AA ■ ■**	69
132 M	1410	6.3	42.7	3.5	13.7	24	4.25	170	0.032	**1LT9 134-4AA ■ ■**	80
132 M	1425	7.5	50	3.2	16.2	26	3.6	180	0.035	**1LT9 135-4AA ■ ■**	86
160 M	1425	10	57	3.2	23	36	2.9	180	0.062	**1LT9 163-4AA ■ ■**	138
160 L	1435	14.5	96.5	3.7	35	35	4.3	260	0.083	**1LT9 166-4AA ■ ■**	150
180 L	1450	20	133	3.3	43	46	3.39	270	0.154	**1LT9 186-4AA ■ ■**	215
200 L	1445	24	159	3.2	46	66	2.01	230	0.2	**1LT9 206-4AA ■ ■**	245
200 L	1445	29	192	3.4	56	66	2.36	270	0.24	**1LT9 207-4AA ■ ■**	260

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT9 shaft heights 100 L to 200 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1500 rpm (max. permissible operating speed 3000 rpm)											
Intermittent duty S3 – 60 %											
100 L	1320	1.8	12.9	2.9	4.6	15	3.3	85	0.006	**1LT9 107-4AA ■ ■**	40
112 M	1400	2.6	18	3.8	6.1	16	4.3	110	0.012	**1LT9 113-4AA ■ ■**	48
112 M	1375	3.5	24.3	3.5	9.1	16	5	140	0.013	**1LT9 114-4AA ■ ■**	50
132 M	1410	4.5	30.5	3.9	10.5	22	3.7	140	0.024	**1LT9 133-4AA ■ ■**	69
132 M	1425	5.3	35.5	4.2	12	20	5.2	170	0.032	**1LT9 134-4AA ■ ■**	80
132 M	1430	6.6	41.1	3.7	15	23.5	4.2	180	0.035	**1LT9 135-4AA ■ ■**	86
160 M	1435	8.5	56.6	3.8	20	30	3.45	180	0.062	**1LT9 163-4AA ■ ■**	138
160 L	1445	12.5	82.6	4.4	33	30	5	260	0.083	**1LT9 166-4AA ■ ■**	150
180 L	1455	17.5	116	3.8	39	41	3.8	270	0.154	**1LT9 186-4AA ■ ■**	215
200 L	1450	21	138	3.7	44	57	2.33	230	0.2	**1LT9 206-4AA ■ ■**	245
200 L	1450	25	165	3.9	50	57	2.73	270	0.24	**1LT9 207-4AA ■ ■**	260
Intermittent duty S3 – 100 %											
100 L	1360	1.5	10.5	3.6	4.1	12	4.1	85	0.006	**1LT9 107-4AA ■ ■**	40
112 M	1410	2.2	15	4.5	5.6	13	4.9	110	0.012	**1LT9 113-4AA ■ ■**	48
112 M	1390	3	20.6	4.1	8.3	14	5.8	140	0.013	**1LT9 114-4AA ■ ■**	50
132 M	1420	4	26.9	4.4	9.5	19	4.25	140	0.024	**1LT9 133-4AA ■ ■**	69
132 M	1430	4.8	32	4.7	11.2	17.6	5.6	170	0.032	**1LT9 134-4AA ■ ■**	80
132 M	1440	5.5	37	4.5	13	19	5.2	180	0.035	**1LT9 135-4AA ■ ■**	86
160 M	1440	7.5	49.6	4.3	19	27	3.85	180	0.062	**1LT9 163-4AA ■ ■**	138
160 L	1450	11	72.4	5	32	27	5.6	260	0.083	**1LT9 166-4AA ■ ■**	150
180 L	1460	15	94	4.5	36	35	4.45	270	0.154	**1LT9 186-4AA ■ ■**	215
200 L	1460	18.5	121	4.2	37	50	2.66	230	0.2	**1LT9 206-4AA ■ ■**	245
200 L	1455	22	145	4.5	45	50	3.12	270	0.24	**1LT9 207-4AA ■ ■**	260

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance *k*: approx. +20 %

1LT8 motors, shaft heights 225 M to 315 L

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT8 shaft heights 225 M to 315 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1500 rpm (max. permissible operating speed 2200 rpm)											
Intermittent duty S3 – 15 %											
225 M	1455	53	348	2.8	96.5	99	1.92	330	0.48	**1LT8 224-4AA ■■**	330
250 M	1467	65	423	2.6	117	206	0.55	195	0.57	**1LT8 253-4AA ■■**	425
250 M	1465	80	522	2.4	138	210	0.65	235	0.632	**1LT8 254-4AA ■■**	450
280 S	1465	105	685	2.3	186	270	0.51	240	1.25	**1LT8 280-4AA ■■**	590
280 M	1478	132	854	3.2	233	263	0.68	310	1.85	**1LT8 283-4AA ■■**	710
315 S	1479	160	1034	3.3	268	319	0.56	310	2.85	**1LT8 310-4AA ■■**	890
315 M	1475	190	1232	3.1	310	313	0.69	375	3.48	**1LT8 313-4AA ■■**	1010
315 M	1479	225	1455	3.1	373	339	0.7	410	5.32	**1LT8 314-4AA ■■**	1275
315 M	1481	270	1743	3.1	437	330	0.88	505	5.96	**1LT8 315-4AA ■■**	1350
315 L	1484	340	2191	3.1	560	328	1.13	640	7.29	**1LT8 317-4AA ■■**	1540
315 L	1472	430	2794	2.6	728	362	1.16	725	8.06	**1LT8 318-4AA ■■**	1620
Intermittent duty S3 – 25 %											
225 M	1460	45	295	3.3	82	84	2.27	330	0.48	**1LT8 224-4AA ■■**	330
250 M	1472	55	357	3	99	174	0.65	195	0.57	**1LT8 253-4AA ■■**	425
250 M	1470	68	442	2.8	119	179	0.77	235	0.632	**1LT8 254-4AA ■■**	450
280 S	1470	90	585	2.7	159	232	0.6	240	1.25	**1LT8 280-4AA ■■**	590
280 M	1480	110	710	3.9	199	219	0.82	310	1.85	**1LT8 283-4AA ■■**	710
315 S	1483	132	851	4	221	263	0.68	310	2.85	**1LT8 310-4AA ■■**	890
315 M	1480	160	1034	3.7	264	264	0.82	375	3.48	**1LT8 313-4AA ■■**	1010
315 M	1482	190	1226	3.6	315	286	0.83	410	5.32	**1LT8 314-4AA ■■**	1275
315 M	1483	230	1483	3.7	380	281	1.04	505	5.96	**1LT8 315-4AA ■■**	1350
315 L	1486	290	1866	3.6	477	280	1.32	640	7.29	**1LT8 317-4AA ■■**	1540
315 L	1479	360	2328	3.1	606	302	1.39	725	8.06	**1LT8 318-4AA ■■**	1620
Intermittent duty S3 – 40 %											
225 M	1465	39	254	3.8	72	73	2.61	330	0.48	**1LT8 224-4AA ■■**	330
250 M	1475	48	311	3.5	87.5	152	0.74	195	0.57	**1LT8 253-4AA ■■**	425
250 M	1475	58	376	3.3	103	152	0.89	235	0.632	**1LT8 254-4AA ■■**	450
280 S	1475	75	486	3.2	135	193	0.72	240	1.25	**1LT8 280-4AA ■■**	590
280 M	1483	95	612	4.5	174	189	0.95	310	1.85	**1LT8 283-4AA ■■**	710
315 S	1485	115	740	4.6	195	229	0.78	310	2.85	**1LT8 310-4AA ■■**	890
315 M	1482	140	903	4.3	230	231	0.94	375	3.48	**1LT8 313-4AA ■■**	1010
315 M	1484	165	1062	4.2	276	249	0.95	410	5.32	**1LT8 314-4AA ■■**	1275
315 M	1485	200	1288	4.2	334	245	1.19	505	5.96	**1LT8 315-4AA ■■**	1350
315 L	1487	250	1608	4.2	411	241	1.53	640	7.29	**1LT8 317-4AA ■■**	1540
315 L	1482	315	2033	3.6	523	260	1.61	725	8.06	**1LT8 318-4AA ■■**	1620

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT8 shaft heights 225 M to 315 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1500 rpm (max. permissible operating speed 2200 rpm)											
Intermittent duty S3 – 60 %											
225 M	1470	34	221	4.3	64	64	2.98	330	0.48	**1LT8 224-4AA ■■**	330
250 M	1478	42	271	4	77.5	133	0.85	195	0.57	**1LT8 253-4AA ■■**	425
250 M	1477	51	330	3.7	91.5	134	1.01	235	0.632	**1LT8 254-4AA ■■**	450
280 S	1475	68	440	3.5	124	175	0.79	240	1.25	**1LT8 280-4AA ■■**	590
280 M	1484	85	547	5.0	160	169	1.06	310	1.85	**1LT8 283-4AA ■■**	710
315 S	1487	100	643	5.3	173	199	0.9	310	2.85	**1LT8 310-4AA ■■**	890
315 M	1483	125	806	4.8	208	206	1.05	375	3.48	**1LT8 313-4AA ■■**	1010
315 M	1486	150	965	4.6	253	226	1.05	410	5.32	**1LT8 314-4AA ■■**	1275
315 M	1486	180	1158	4.7	304	220	1.33	505	5.96	**1LT8 315-4AA ■■**	1350
315 L	1489	225	1445	4.7	370	217	1.7	640	7.29	**1LT8 317-4AA ■■**	1540
315 L	1485	280	1803	4	465	234	1.79	725	8.06	**1LT8 318-4AA ■■**	1620
Intermittent duty S3 – 100 %											
225 M	1475	30	194	4.9	58	56	3.4	330	0.48	**1LT8 224-4AA ■■**	330
250 M	1482	37	238	4.5	69	117	0.96	195	0.57	**1LT8 253-4AA ■■**	425
250 M	1480	45	290	4.2	82.5	118	1.15	235	0.632	**1LT8 254-4AA ■■**	450
280 S	1480	60	387	4	112	154	0.9	240	1.25	**1LT8 280-4AA ■■**	590
280 M	1486	75	482	5.7	145	149	1.2	310	1.85	**1LT8 283-4AA ■■**	710
315 S	1488	90	578	5.8	158	179	1	310	2.85	**1LT8 310-4AA ■■**	890
315 M	1485	110	708	5.4	185	181	1.2	375	3.48	**1LT8 313-4AA ■■**	1010
315 M	1488	132	848	5.3	223	199	1.19	410	5.32	**1LT8 314-4AA ■■**	1275
315 M	1488	160	1028	5.3	270	196	1.49	505	5.96	**1LT8 315-4AA ■■**	1350
315 L	1490	200	1283	5.3	332	193	1.91	640	7.29	**1LT8 317-4AA ■■**	1540
315 L	1488	250	1607	4.5	419	213	1.97	725	8.06	**1LT8 318-4AA ■■**	1620

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance *k*: approx. +20 %

1LT9 motors, shaft heights 100 L to 200 L

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT9 shaft heights 100 L to 200 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1000 rpm (max. permissible operating speed 2500 rpm)											
Intermittent duty S3 – 15 %											
100 L	880	1.8	19.5	2.8	6	15	2.7	80	0.01	**1LT9 107-6AA ■ ■**	40
112 M	930	2.5	25.7	2.5	7.3	19	2.4	90	0.018	**1LT9 113-6AA ■ ■**	48
112 M	870	3.8	43	2.1	10.8	23	2.9	115	0.018	**1LT9 114-6AA ■ ■**	48
132 M	850	5.2	58.4	2.1	13.8	34	1.85	110	0.032	**1LT9 133-6AA ■ ■**	69
132 M	900	6	64	2.4	15.7	31	2.2	130	0.038	**1LT9 134-6AA ■ ■**	80
132 M	870	7	77	2.2	19.5	38	2.1	140	0.046	**1LT9 135-6AA ■ ■**	86
160 M	930	9.5	98	2.2	28	34	2.9	180	0.094	**1LT9 163-6AA ■ ■**	138
160 L	920	13.5	142	2	31	36	4.2	260	0.128	**1LT9 166-6AA ■ ■**	150
180 L	930	21	216	2.1	45	58	2.3	230	0.193	**1LT9 186-6AA ■ ■**	215
200 L	940	28	285	2.2	57	69	2.1	255	0.245	**1LT9 207-6AA ■ ■**	245
Intermittent duty S3 – 25 %											
100 L	890	1.7	18.2	2.8	5.8	13.5	3	80	0.01	**1LT9 107-6AA ■ ■**	40
112 M	940	2.3	23.4	2.7	6.9	17	2.65	90	0.018	**1LT9 113-6AA ■ ■**	48
112 M	890	3.3	37.1	2.5	9.7	20	3.3	115	0.018	**1LT9 114-6AA ■ ■**	48
132 M	875	4.7	51.3	2.4	13.2	32	2	110	0.032	**1LT9 133-6AA ■ ■**	69
132 M	920	5.2	54	2.8	14.3	26	2.7	130	0.038	**1LT9 134-6AA ■ ■**	80
132 M	890	6.5	70	2.4	18.2	34	2.4	140	0.046	**1LT9 135-6AA ■ ■**	86
160 M	940	8	81	2.7	19	29	3.6	180	0.094	**1LT9 163-6AA ■ ■**	138
160 L	930	11.5	118	2.4	27	32	4.7	260	0.128	**1LT9 166-6AA ■ ■**	150
180 L	940	17.5	178	2.5	38	48	2.8	230	0.193	**1LT9 186-6AA ■ ■**	215
200 L	950	24	240	2.5	49	59	2.5	255	0.245	**1LT9 207-6AA ■ ■**	245
Intermittent duty S3 – 40 %											
100 L	900	1.5	16	3.1	5.6	12	3.55	80	0.01	**1LT9 107-6AA ■ ■**	40
112 M	950	2	20	3.2	6.4	15.5	3.25	90	0.018	**1LT9 113-6AA ■ ■**	48
112 M	910	3	32.9	2.8	9.2	18	3.7	115	0.018	**1LT9 114-6AA ■ ■**	48
132 M	900	4	42.7	2.9	12.1	26	2.45	110	0.032	**1LT9 133-6AA ■ ■**	69
132 M	930	4.5	46	3.3	13.2	22	3.1	130	0.038	**1LT9 134-6AA ■ ■**	80
132 M	910	5.5	58	2.8	15.8	26.5	3.05	140	0.046	**1LT9 135-6AA ■ ■**	86
160 M	950	7	70	3.1	17.4	25	4	180	0.094	**1LT9 163-6AA ■ ■**	138
160 L	940	10	102	2.8	24	27	5.6	260	0.128	**1LT9 166-6AA ■ ■**	150
180 L	950	15	151	2.9	34	41	3.2	230	0.193	**1LT9 186-6AA ■ ■**	215
200 L	955	20	200	3	42	49	3	255	0.245	**1LT9 207-6AA ■ ■**	245

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT9 shaft heights 100 L to 200 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1000 rpm (max. permissible operating speed 2500 rpm)											
Intermittent duty S3 – 60 %											
100 L	920	1.3	13.5	3.6	5.7	11	4.2	80	0.01	**1LT9 107-6AA ■ ■**	40
112 M	960	1.8	18	3.7	6.2	13.5	3.6	90	0.018	**1LT9 113-6AA ■ ■**	48
112 M	925	2.6	28	3.3	8.5	15	4.4	115	0.018	**1LT9 114-6AA ■ ■**	48
132 M	910	3.6	37.8	3.3	11.4	23	2.75	110	0.032	**1LT9 133-6AA ■ ■**	69
132 M	935	4.1	42	3.7	12.4	20	3.6	130	0.038	**1LT9 134-6AA ■ ■**	80
132 M	925	4.8	50	3.2	15	23	3.5	140	0.046	**1LT9 135-6AA ■ ■**	86
160 M	960	6	60	3.6	16.2	21	4.9	180	0.094	**1LT9 163-6AA ■ ■**	138
160 L	950	8.5	85	3.2	22	23	6.5	260	0.128	**1LT9 166-6AA ■ ■**	150
180 L	955	13	130	3.3	30	35	3.8	230	0.193	**1LT9 186-6AA ■ ■**	215
200 L	960	17.5	174	3.5	38	42	3.5	255	0.245	**1LT9 207-6AA ■ ■**	245
Intermittent duty S3 – 100 %											
100 L	935	1.1	11.2	4.3	5	9.2	4.9	80	0.01	**1LT9 107-6AA ■ ■**	40
112 M	965	1.5	15	4.5	5.7	11.5	4.1	90	0.018	**1LT9 113-6AA ■ ■**	48
112 M	940	2.2	23.3	4	8	13	5.1	115	0.018	**1LT9 114-6AA ■ ■**	48
132 M	920	3	31	4	11	18	3.5	110	0.032	**1LT9 133-6AA ■ ■**	69
132 M	940	3.5	35.6	4.4	11.6	18	4.4	130	0.038	**1LT9 134-6AA ■ ■**	80
132 M	940	4	40	3.8	14	18.5	4.4	140	0.046	**1LT9 135-6AA ■ ■**	86
160 M	965	5.5	54.5	4	15.2	20	5.2	180	0.094	**1LT9 163-6AA ■ ■**	138
160 L	960	7.5	74.6	3.7	20	21	7.2	260	0.128	**1LT9 166-6AA ■ ■**	150
180 L	960	11	109	3.9	27	30	4.4	230	0.193	**1LT9 186-6AA ■ ■**	215
200 L	965	15	148	4	35	36	4.1	255	0.245	**1LT9 207-6AA ■ ■**	245

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance *k*: approx. +20 %

1LT8 motors, shaft heights 225 M to 315 L

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT8 shaft heights 225 M to 315 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1000 rpm (max. permissible operating speed 2080 rpm)											
Intermittent duty S3 – 15 %											
225 M	960	35	348	2.2	68.5	87	1.66	250	0.464	**1LT8 223-6AA ■■**	305
225 M	960	42	418	2	79	90	1.86	290	0.535	**1LT8 224-6AA ■■**	320
250 M	965	55	545	2.1	103	243	0.33	140	1	**1LT8 253-6AA ■■**	425
250 M	974	70	687	2.1	126	247	0.41	175	1.61	**1LT8 254-6AA ■■**	580
280 S	975	85	833	2.2	159	276	0.4	190	1.82	**1LT8 280-6AA ■■**	600
280 M	975	105	1030	2.1	188	276	0.49	235	2.37	**1LT8 283-6AA ■■**	700
315 S	980	140	1366	2.2	253	333	0.49	260	3.95	**1LT8 310-6AA ■■**	950
315 M	978	165	1613	2.1	296	329	0.54	310	4.31	**1LT8 313-6AA ■■**	1000
315 M	980	190	1854	2	329	340	0.59	345	6.8	**1LT8 314-6AA ■■** [1]	1290
315 M	981	230	2242	2	415	319	0.81	445	8	**1LT8 315-6AA ■■** [1]	1380
315 L	983	280	2724	2	491	336	0.88	515	9.6	**1LT8 317-6AA ■■** [1]	1590
Intermittent duty S3 – 25 %											
225 M	965	30	297	2.8	60	74	2.09	250	0.464	**1LT8 223-6AA ■■**	305
225 M	965	35	347	2.5	66	75	2.29	290	0.535	**1LT8 224-6AA ■■**	320
250 M	975	48	470	2.4	90	212	0.44	140	1	**1LT8 253-6AA ■■**	425
250 M	975	60	588	2.4	111	212	0.55	175	1.61	**1LT8 254-6AA ■■**	580
280 S	975	72	706	2.6	133	235	2.7	190	1.82	**1LT8 280-6AA ■■**	600
280 M	975	90	883	2.4	160	236	0.61	235	2.37	**1LT8 283-6AA ■■**	700
315 S	985	115	1116	2.7	206	273	0.55	260	3.95	**1LT8 310-6AA ■■**	950
315 M	981	140	1365	2.5	249	279	0.64	310	4.31	**1LT8 313-6AA ■■**	1000
315 M	982	160	1558	2.4	276	286	0.7	345	6.8	**1LT8 314-6AA ■■** [1]	1290
315 M	984	195	1895	2.4	344	271	0.95	445	8	**1LT8 315-6AA ■■** [1]	1380
315 L	986	240	2328	2.3	411	336	1.03	515	9.6	**1LT8 317-6AA ■■** [1]	1590
Intermittent duty S3 – 40 %											
225 M	970	25	246	3.2	49.5	62	2.33	250	0.464	**1LT8 223-6AA ■■**	305
225 M	970	30	295	2.9	58	64	2.62	290	0.535	**1LT8 224-6AA ■■**	320
250 M	975	40	392	3.0	76	176	0.5	140	1	**1LT8 253-6AA ■■**	425
250 M	980	50	488	3.0	93	177	0.64	175	1.61	**1LT8 254-6AA ■■**	580
280 S	980	63	615	3.2	118	205	0.56	190	1.82	**1LT8 280-6AA ■■**	600
280 M	980	75	732	2.9	135	197	0.69	235	2.37	**1LT8 283-6AA ■■**	700
315 S	987	100	969	3.1	181	238	0.63	260	3.95	**1LT8 310-6AA ■■**	950
315 M	984	120	1166	3	213	239	0.75	310	4.31	**1LT8 313-6AA ■■**	1000
315 M	984	140	1360	2.7	241	251	0.79	345	6.8	**1LT8 314-6AA ■■** [1]	1290
315 M	986	170	1649	2.8	295	236	1.09	445	8	**1LT8 315-6AA ■■** [1]	1380
315 L	988	210	2033	2.6	358	252	1.18	515	9.6	**1LT8 317-6AA ■■** [1]	1590

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

[1] Trans-standard motors (larger trans-standard motors available on request).

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT8 shaft heights 225 M to 315 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1000 rpm (max. permissible operating speed 2080 rpm)											
Intermittent duty S3 – 60 %											
225 M	973	22	216	3.6	45	55	2.62	250	0.464	**1LT8 223-6AA ■■**	305
225 M	975	26	255	3.3	54	56	2.99	290	0.535	**1LT8 224-6AA ■■**	320
250 M	980	34	332	3.4	65	150	0.57	140	1	**1LT8 253-6AA ■■**	425
250 M	980	42	410	3.5	79	149	0.73	175	1.61	**1LT8 254-6AA ■■**	580
280 S	985	53	514	3.6	102	173	0.65	190	1.82	**1LT8 280-6AA ■■**	600
280 M	983	65	632	3.3	118	171	0.81	235	2.37	**1LT8 283-6AA ■■**	700
315 S	988	87	842	3.6	162	207	0.73	260	3.95	**1LT8 310-6AA ■■**	950
315 M	986	105	1018	3.4	188	209	0.86	310	4.31	**1LT8 313-6AA ■■**	1000
315 M	986	125	1212	3.1	217	224	0.89	345	6.8	**1LT8 314-6AA ■■** [1]	1290
315 M	987	150	1453	3.1	260	208	1.24	445	8	**1LT8 315-6AA ■■** [1]	1380
315 L	989	185	1789	3	315	222	1.34	515	9.6	**1LT8 317-6AA ■■** [1]	1590
Intermittent duty S3 – 100 %											
225 M	978	18.5	181	4.3	39.5	46	3.14	250	0.464	**1LT8 223-6AA ■■**	305
225 M	980	22	214	3.9	39	47	3.56	290	0.535	**1LT8 224-6AA ■■**	320
250 M	980	30	292	3.8	58.5	132	0.68	140	1	**1LT8 253-6AA ■■**	425
250 M	985	37	359	4.0	72	131	0.84	175	1.61	**1LT8 254-6AA ■■**	580
280 S	987	45	436	4.2	88	146	0.75	190	1.82	**1LT8 280-6AA ■■**	600
280 M	986	55	533	4	102	144	0.94	235	2.37	**1LT8 283-6AA ■■**	700
315 S	990	75	724	4.1	143	178	0.84	260	3.95	**1LT8 310-6AA ■■**	950
315 M	988	90	871	4	165	180	0.99	310	4.31	**1LT8 313-6AA ■■**	1000
315 M	987	110	1066	3.5	193	197	1.01	345	6.8	**1LT8 314-6AA ■■** [1]	1290
315 M	989	132	1276	3.6	228	183	1.4	445	8	**1LT8 315-6AA ■■** [1]	1380
315 L	990	160	1545	3.5	273	192	1.55	515	9.6	**1LT8 317-6AA ■■** [1]	1590

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance k: approx. +20 %

[1] Trans-standard motors (larger trans-standard motors available on request).

1LT9 motors, shaft heights 160 L to 200 L

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT9 shaft heights 160 L to 200 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 750 rpm (max. permissible operating speed 1875 rpm)											
Intermittent duty S3 – 15 %											
160 L	685	9.5	133	1.8	26	29	3.7	200	0.125	**1LT9 166-8AA ■■**	150
180 L	690	15	208	2	43	50	2.64	210	0.21	**1LT9 186-8AA ■■**	190
200 L	705	22	299	2	59	57	2.53	250	0.34	**1LT9 207-8AA ■■**	260
Intermittent duty S3 – 25 %											
160 L	695	8	110	2.2	24	26	4.4	200	0.125	**1LT9 166-8AA ■■**	150
180 L	710	12.5	168	2.3	37	41	3.19	210	0.21	**1LT9 186-8AA ■■**	190
200 L	715	18	241	2.4	48	44	3.14	250	0.34	**1LT9 207-8AA ■■**	260
Intermittent duty S3 – 40 %											
160 L	705	7	95	2.5	22	22	5.2	200	0.125	**1LT9 166-8AA ■■**	150
180 L	715	10.5	140	2.7	33	34	3.79	210	0.21	**1LT9 186-8AA ■■**	190
200 L	710	15	202	2.9	41	38	3.8	250	0.34	**1LT9 207-8AA ■■**	260
Intermittent duty S3 – 60 %											
160 L	710	6	80.7	2.9	20	18.5	6.25	200	0.125	**1LT9 166-8AA ■■**	150
180 L	710	9	121	3.1	31	28	4.49	210	0.21	**1LT9 186-8AA ■■**	190
200 L	725	13	172	3.3	38	33	4.37	250	0.34	**1LT9 207-8AA ■■**	260
Intermittent duty S3 – 100 %											
160 L	715	5.5	73.5	3.2	19	16.5	7	200	0.125	**1LT9 166-8AA ■■**	150
180 L	735	7.5	97	3.8	28	23	5.51	210	0.21	**1LT9 186-8AA ■■**	190
200 L	730	11	144	3.9	34	28	5.15	250	0.34	**1LT9 207-8AA ■■**	260

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance k: approx. +20 %

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT8 shaft heights 225 M to 315 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 750 rpm (max. permissible operating speed 1875 rpm)											
Intermittent duty S3 – 15 %											
225 M	705	30	407	1.8	66	85	1.61	220	0.464	**1LT8 223-8AA ■■**	305
225 M	720	35	465	2	75.5	80	1.95	270	0.57	**1LT8 224-8AA ■■**	330
250 M	720	42	558	1.9	86	173	0.5	150	1	**1LT8 253-8AA ■■**	425
250 M	728	55	722	1.7	110	179	0.61	190	1.78	**1LT8 254-8AA ■■**	600
280 S	725	70	923	1.9	142	216	0.53	200	1.95	**1LT8 280-8AA ■■**	660
280 M	726	90	1185	1.8	183	222	0.65	250	2.37	**1LT8 283-8AA ■■**	710
315 S	730	110	1441	1.8	214	239	0.72	285	3.95	**1LT8 310-8AA ■■**	950
315 M	730	140	1834	1.6	277	240	0.87	360	4.31	**1LT8 313-8AA ■■**	1000
315 M	733	160	2088	1.9	308	353	0.46	280	6.8	**1LT8 314-8AA ■■** [1]	1290
315 M	735	190	2472	1.8	362	309	0.71	380	8.1	**1LT8 315-8AA ■■** [1]	1390
315 L	735	220	2863	1.6	420	309	0.82	440	9.8	**1LT8 317-8AA ■■** [1]	1600
Intermittent duty S3 – 25 %											
225 M	715	25	334	2.1	56	71	1.95	220	0.464	**1LT8 223-8AA ■■**	305
225 M	725	30	395	2.3	65	69	2.44	270	0.57	**1LT8 224-8AA ■■**	330
250 M	725	35	461	2.2	72	144	0.62	150	1	**1LT8 253-8AA ■■**	425
250 M	730	48	629	1.9	96	157	0.8	190	1.78	**1LT8 254-8AA ■■**	600
280 S	730	60	786	2.2	125	185	0.66	200	1.95	**1LT8 280-8AA ■■**	660
280 M	730	75	982	2.1	151	185	0.8	250	2.37	**1LT8 283-8AA ■■**	710
315 S	735	93	1210	2.2	179	202	0.81	285	3.95	**1LT8 310-8AA ■■**	950
315 M	732	115	1502	2	225	198	1.05	360	4.31	**1LT8 313-8AA ■■**	1000
315 M	736	140	1819	2.2	268	309	0.52	280	6.8	**1LT8 314-8AA ■■** [1]	1290
315 M	739	160	2070	2.1	297	260	0.84	380	8.1	**1LT8 315-8AA ■■** [1]	1390
315 L	737	195	2530	1.8	372	274	0.93	440	9.8	**1LT8 317-8AA ■■** [1]	1600
Intermittent duty S3 – 40 %											
225 M	720	20	265	2.7	47	56	2.27	220	0.464	**1LT8 223-8AA ■■**	305
225 M	730	25	327	2.8	55.5	57	2.73	270	0.57	**1LT8 224-8AA ■■**	330
250 M	725	30	396	2.6	62.5	124	0.7	150	1	**1LT8 253-8AA ■■**	425
250 M	735	40	520	2.3	81	130	0.91	190	1.78	**1LT8 254-8AA ■■**	600
280 S	730	50	655	2.7	106	154	0.75	200	1.95	**1LT8 280-8AA ■■**	660
280 M	735	63	820	2.6	130	156	0.93	250	2.37	**1LT8 283-8AA ■■**	710
315 S	737	80	1038	2.5	157	173	0.95	285	3.95	**1LT8 310-8AA ■■**	950
315 M	735	100	1301	2.3	197	172	1.21	360	4.31	**1LT8 313-8AA ■■**	1000
315 M	739	115	1488	2.6	221	254	0.64	280	6.8	**1LT8 314-8AA ■■** [1]	1290
315 M	740	140	1809	2.4	262	228	0.96	380	8.1	**1LT8 315-8AA ■■** [1]	1390
315 L	739	170	2200	2.1	327	239	1.06	440	9.8	**1LT8 317-8AA ■■** [1]	1600

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance k: approx. +20 %

[1] Trans-standard motors (larger trans-standard motors available on request).

1LT8 motors, shaft heights 225 M to 315 L

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT8 shaft heights 225 M to 315 L**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 750 rpm (max. permissible operating speed 1875 rpm)											
Intermittent duty S3 – 60 %											
225 M	725	18	237	3.0	43	51	2.59	220	0.464	**1LT8 223-8AA ■ ■**	305
225 M	730	22	288	3.2	50.5	51	3.06	270	0.57	**1LT8 224-8AA ■ ■**	330
250 M	730	26	340	3	57	107	0.81	150	1	**1LT8 253-8AA ■ ■**	425
250 M	737	32	415	2.9	66	104	1.05	190	1.78	**1LT8 254-8AA ■ ■**	600
280 S	735	44	572	3.1	97	136	0.85	200	1.95	**1LT8 280-8AA ■ ■**	660
280 M	737	55	713	3	118	136	1.06	250	2.37	**1LT8 283-8AA ■ ■**	710
315 S	739	70	906	2.9	138	152	1.08	285	3.95	**1LT8 310-8AA ■ ■**	950
315 M	738	88	1140	2.6	173	161	1.38	360	4.31	**1LT8 313-8AA ■ ■**	1000
315 M	740	105	1357	2.9	207	232	0.7	280	6.8	**1LT8 314-8AA ■ ■** [1]	1290
315 M	741	125	1613	2.7	237	203	1.08	380	8.1	**1LT8 315-8AA ■ ■** [1]	1390
315 L	740	150	1938	2.4	287	211	1.2	440	9.8	**1LT8 317-8AA ■ ■** [1]	1600
Intermittent duty S3 – 100 %											
225 M	728	15	197	3.6	38	42	3.02	220	0.464	**1LT8 223-8AA ■ ■**	305
225 M	735	18.5	240	3.8	45	43	3.63	270	0.57	**1LT8 224-8AA ■ ■**	330
250 M	735	22	286	3.5	50	91	0.95	150	1	**1LT8 253-8AA ■ ■**	425
250 M	740	27	349	3.4	56	88	1.25	190	1.78	**1LT8 254-8AA ■ ■**	600
280 S	735	37	481	3.6	86	114	1.01	200	1.95	**1LT8 280-8AA ■ ■**	660
280 M	740	47	607	3.4	108	116	1.3	250	2.37	**1LT8 283-8AA ■ ■**	710
315 S	740	60	775	3.4	123	130	1.27	285	3.95	**1LT8 310-8AA ■ ■**	950
315 M	740	75	969	3.1	153	129	1.61	360	4.31	**1LT8 313-8AA ■ ■**	1000
315 M	742	90	1160	3.4	182	198	0.82	280	6.8	**1LT8 314-8AA ■ ■** [1]	1290
315 M	742	110	1418	3	214	179	1.23	380	8.1	**1LT8 315-8AA ■ ■** [1]	1390
315 L	742	132	1701	2.7	252	186	1.37	440	9.8	**1LT8 317-8AA ■ ■** [1]	1600

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance k: approx. +20 %

[1] Trans-standard motors (larger trans-standard motors available on request).

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	**Three-phase slip-ring motors 1LT8 shaft heights 250 M to 315 M**	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 600 rpm (max. permissible operating speed 1500 rpm)											
Intermittent duty S3 – 15 %											
250 M	575	30	499	1.8	75	148	0.49	125	0.937	**1LT8 253-3AA ■■**	425
250 M	578	35	579	1.9	89	144	0.6	150	1.61	**1LT8 254-3AA ■■**	580
280 S	575	48	798	1.7	119	185	0.5	160	1.82	**1LT8 280-3AA ■■**	600
280 M	580	60	990	1.7	148	190	0.59	195	2.37	**1LT8 283-3AA ■■**	710
315 S	584	75	1228	1.7	180	197	0.69	235	3.95	**1LT8 310-3AA ■■**	1000
315 M	583	90	1476	1.7	211	195	0.84	285	4.31	**1LT8 313-3AA ■■**	1050
Intermittent duty S3 – 25 %											
250 M	580	26	428	2.1	65	129	0.56	125	0.937	**1LT8 253-3AA ■■**	425
250 M	580	32	528	2.1	83	132	0.66	150	1.61	**1LT8 254-3AA ■■**	580
280 S	580	42	692	2	112	162	0.57	160	1.82	**1LT8 280-3AA ■■**	600
280 M	583	55	902	1.9	136	174	0.65	195	2.37	**1LT8 283-3AA ■■**	710
315 S	584	70	1142	1.9	172	184	0.74	235	3.95	**1LT8 310-3AA ■■**	1000
315 M	584	87	1425	1.8	206	189	0.87	285	4.31	**1LT8 313-3AA ■■**	1050
Intermittent duty S3 – 40 %											
250 M	580	23	380	2.4	59	114	0.63	125	0.937	**1LT8 253-3AA ■■**	425
250 M	585	28	457	2.4	76	115	0.75	150	1.61	**1LT8 254-3AA ■■**	580
280 S	585	37	605	2.3	105	143	0.65	160	1.82	**1LT8 280-3AA ■■**	600
280 M	585	48	785	2.1	124	152	0.74	195	2.37	**1LT8 283-3AA ■■**	710
315 S	585	60	976	2.2	149	158	0.86	235	3.95	**1LT8 310-3AA ■■**	1000
315 M	586	75	1224	2.1	176	163	1.01	285	4.31	**1LT8 313-3AA ■■**	1050
Intermittent duty S3 – 60 %											
250 M	585	20	327	2.8	54	99	0.73	125	0.937	**1LT8 253-3AA ■■**	425
250 M	587	24	391	2.8	71	99	0.87	150	1.61	**1LT8 254-3AA ■■**	580
280 S	587	32	521	2.7	96	124	0.74	160	1.82	**1LT8 280-3AA ■■**	600
280 M	587	42	684	2.4	116	133	0.85	195	2.37	**1LT8 283-3AA ■■**	710
315 S	586	52	843	2.6	133	137	0.99	235	3.95	**1LT8 310-3AA ■■**	1000
315 M	590	65	1057	2.5	155	141	1.17	285	4.31	**1LT8 313-3AA ■■**	1050
Intermittent duty S3 – 100 %											
250 M	590	16.5	267	3.4	50	82	0.88	125	0.937	**1LT8 253-3AA ■■**	425
250 M	590	20	324	3.6	66	82	1.06	150	1.61	**1LT8 254-3AA ■■**	580
280 S	589	27	438	3.2	94	104	0.89	160	1.82	**1LT8 280-3AA ■■**	600
280 M	589	35	568	2.9	107	111	1.01	195	2.37	**1LT8 283-3AA ■■**	710
315 S	590	44	710	3.1	122	116	1.17	235	3.95	**1LT8 310-3AA ■■**	1000
315 M	590	55	891	3.0	134	119	1.38	285	4.31	**1LT8 313-3AA ■■**	1050

Order No. suffixes, see Page 7/114.

For ordering example, see Page 7/115.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance k: approx. +20 %

Trans-standard motors (10-pole) available on request

1LT9, 1LT8 motors, shaft heights 100 L to 315 L

Selection and ordering data (continued)

Order No. supplement

Position in the order number	1	2	3	4	5	6	7		8	9	10	11	12		
	1	**L**	**T**	**9**	**.**	**.**	**.**	**–**	**.**	**A**	**A**	■	■	**–**	**Z**
	1	**L**	**T**	**8**	**.**	**.**	**.**	**–**	**.**	**A**	**A**	■	■	**–**	**Z**
Shaft height															
Number of poles															
Voltage and frequency															
50 Hz															
• 380 V												**1**			
• 400 V												**4**			
• 500 V												**3**			
• 660 V												**7**			
• 690 V												**6**			
60 Hz															
• 460 V												**8**			
Other voltage and/or frequency [1]												**9**			
Type															
• IM B3													**0**		
• IM B5 [2]													**1**		
• IM B35													**6**		
• IM V1 (with protective cover)													**4**		
Special version [3]															**Z**

For ordering example, see Page 7/115.

[1] Option: Order code L1Y and plain text.

[2] Only possible up to shaft height 200 L.

[3] Order No. supplement "**-Z**" only if ordering with order code and plain text, if required. Specify special versions with order code, see table on Page 7/115.

Selection and ordering data (continued)

Options

Additional identification codes for special 1LT9 and 1LT8 motor versions

Version	For explanations see Page	Order No. supplement "**-Z**" with order code and/or plain text
Higher coolant temperatures or installation altitude on request	7/99	CT ... °C (round up to 5°) or installation altitude ... m above sea level (round up to 500 m) Specify required output
Motor protection by PTC thermistor [1] - With three embedded temperature sensors for alarm - With three embedded temperature sensors for tripping - With six embedded temperature sensors for alarm and tripping	7/93	 **A10** **A11** **A12**
Non-standard cable entry Rotation of terminal box through 180°	7/93	**K85**
Terminal box, side, right Terminal box, side, left (only possible up to shaft height 200 L)	7/93	**K09** **K10**
Second standard shaft extension [2]	7/94	**K16**
Radial seal at DE for flange-mounting motors [3]	7/96	**K17**
Reinforced bearing at DE SPM measurement nipple (as of shaft height 225)	7/96	**K20** **G50**
Standstill heating - For 230 V - For 115 V	7/98	 **K45** **K46**
Fitted tacho-generator GMP 1.0 s-4; IM B5	7/94	**G37**
Paint finish: - Standard paint finish in colors other than RAL 7030 - Special paint finish in RAL 7030 - Special paint finish in colors other than RAL 7030	7/98	 **Y53** – and additional plain text: Standard paint finish RAL... **K26** **Y54** – and additional plain text: Special paint finish RAL...
Regreasing device	7/96	**K40**
IP55 degree of protection	7/95	**K49**

Ordering example

Selection criteria	Order No.											Order code
Hoisting gear motor	**1LT8**											
75 kW at S3 – 40 %, shaft height 280 S		**280**										
4-pole, 1500 rpm				**4**								
Rated voltage 3 AC, 50 Hz, 380 V							**4**					
Type IM B3								**0**				
Identification for special version										**Z**		
Order code for standstill heating for 230 V												**K45**
Complete identification codes for required version of motor	**1LT8**	**280**	**–**	**4**	**A**	**A**	**4**	**0**	**–**	**Z**		
	K45											

[1] For appropriate tripping unit, see Catalog LV1.

[2] For motors as of shaft height 180 M in vertical construction types, the transmittable torque needs to be recalculated (please inquire).

[3] Not possible for construction type IM V3.

Selection and ordering data (continued)

Outputs of 1LT9 motors in S2 duty

Shaft height	Type	Rated outputs of motors 1LT9 in short-time duty S2								
		at 1500 rpm for			at 1000 rpm for			at 750 rpm for		
		30 min	60 min	90 min	30 min	60 min	90 min	30 min	60 min	90 min
		kW	kW	kW	kW	kW	kW	kW	kW	kW
100 L	1LT9 107	1.9	1.7	1.6	1.4	1.3	1.2			
112 M	1LT9 113	2.8	2.5	2.3	1.8	1.7	1.5			
	1LT9 114	3.8	3.3	3.1	2.8	2.5	2.3			
132 M	1LT9 133	5	4.5	4.2	3.9	3.4	3.1			
	1LT9 134	6.6	5.7	5.2	4.8	4.1	3.8			
	1LT9 135	7.3	6.3	5.8	5.3	4.6	4.3			
160 M	1LT9 163	9.5	8.2	7.5	7.6	6.5	6			
160 L	1LT9 166	14.3	12.3	11.3	11.3	9.7	8.8	6.7	6.3	5.8
180 L	1LT9 186	21	18.5	17	16	14	12.5	11	9.5	8.5
200 L	1LT9 206	28	24	21						
	1LT9 207	34	29	25	24	20	17.5	18	15	13

Outputs of 1LT8 motors in S2 duty available on request.

Dimension drawings

Binding dimensions

The dimensions specified for the construction types listed on the right are binding for all listed versions.

Type	Binding dimensions
IM B3	a, b, h, s, w_1, d, l, t, u
IM B5 IM B14 IM V1	b_1, e_1, i_2, s_2, d, l, t, u
IM B35	a, b, b_1, e_1, h, i_2, s, s_2, w_1, d, l, t, u

Dimensions to DIN 42939

In the standard version, the shaft extensions of the motors up to shaft height 160 to DIN 748 are cylindrical while the shaft extensions for motors as of frame size 180 to DIN 1448 are conical.

Dimensional tolerance

The tolerances on the right apply to the dimensions a, b, e_1, and h specified in the dimensions tables.

Keyways and featherkeys (dimensions t, t_1, u, and u_1) are manufactured to DIN 6885 (sheet 2).

Dimension	Dimensions	Tolerance
a and b	Up to 250 mm More than 250 mm up to 500 mm More than 500 mm up to 750 mm	± 0.75 mm ± 1.0 mm ± 1.5 mm
e_1	Up to 200 mm More than 200 mm up to 500 mm More than 500 mm	± 0.25 mm ± 0.5 mm ± 1.0 mm
h	Up to 200 mm More than 200 mm	– 0.5 mm – 1.0 mm

Fits

The shaft extensions specified in the dimensions tables and the diameter of the centering disk are designed in accordance with the following fits.

The drilled holes of couplings and belt pulleys should have at least an ISO H7 fit. Cylindrical shaft extensions are equipped with a centering thread to DIN 332, sheet 2.

Dimension	ISO fit to DIN 748, DIN 7160, DIN 7161, and DIN 42948	
d and d_1	Up to 11 mm Ø	j6
	More than 11 mm Ø	k6
	More than 50 mm Ø	m6
b_1	Up to 230 mm Ø	j6
	More than 230 mm Ø	h6

Shaft extension diameter	Thread
Up to 30 mm	M10
More than 30 up to 38 mm	M12
More than 38 up to 50 mm	M16
More than 50 up to 85 mm	M20

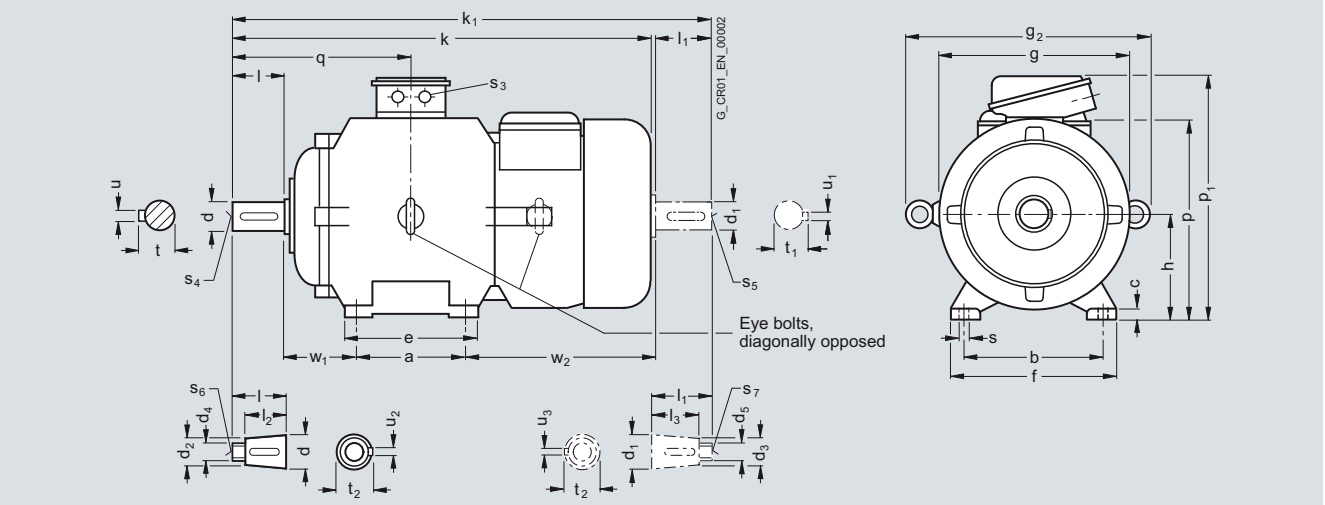
Hexagon nuts on conical shaft extensions in standard version motors (shoulder nuts)

Dimension						Associated spring washer form B
d_4, d_5	c	d_8	e	m	s	DIN 127
M30 x 2	5	36	63.5	19	55	36
M36 x 3	5	42	63.5	19	55	42
M42 x 3	5	48	75	25	65	48
M48 x 3	6	56	86.5	25	75	56
M56 x 4	6	64	98	28	85	64
M64 x 4	6	72	110	28	95	72
M72 x 4	6	80	121	34	105	80
M80 x 4	6	90	133	34	115	90

1LT9, 1LT8 motors, shaft heights 100 L to 315 L

Dimension drawings for 1LT9

Type IM B3



For motor Shaft height	Type	DIN IEC	Dimensions in mm a B	b A	c HA	e BB	f AB	g AC	g2	h H	k L	k1 LC	p HB	p1 HD	q	s 1) K	s3 K	w1 C	w2 CA
100 L	1LT9 107		140	160	14	175	200	195	268	100	493	559	198	273	193	M10	2 x M25 x 1.5	63	236
112 M	1LT9 113		140	190	14	175	235	219	282	112	531.5	597.5	222	297	200	M10	2 x M25 x 1.5	70	254
	1LT9 114																		
132 M	1LT9 133		178	216	18	220	260	260	350	132	618	713	265	327	258	M10	2 x M32 x 1.5	89	360
	1LT9 134																		
	1LT9 135																		
160 M	1LT9 163		210	254	24	264	314	315	422	160	726	866	320	413	323	M12	2 x M40 x 1.5	108	403
160 L	1LT9 166		254			308					770	910			345				425
180 L	1LT9 186		279	279	26	310	350	350	456	180	865	1005	360	450	370.5	M12	2 x M40 x 1.5	121	494.5
200 L	1LT9 206		305	318	30	365	400	388	512	200	924	1064	394	496	395.5	M16	2 x M50 x 1.5	133	542.5
	1LT9 207																		

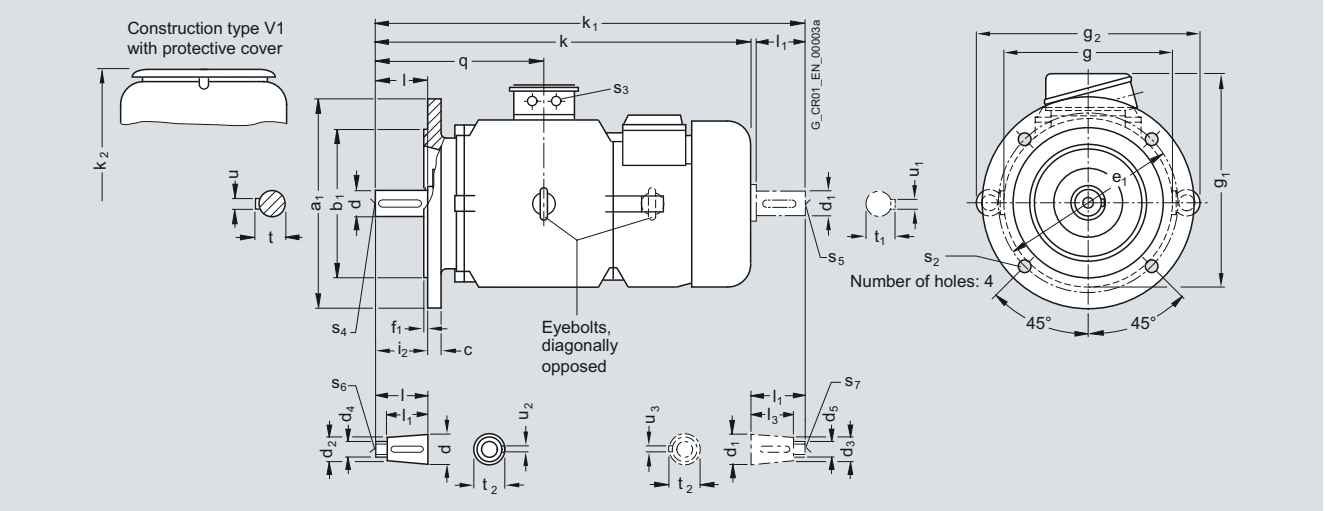
For motor Shaft height	Type	DIN IEC	cyl. shaft extensions DE 2) d D 3)	l E 3)	t GA 3)	u F 3)	s4	cyl. shaft extension NDE d1 DA 3)	l1 EA 3)	t1 GA 3)	u1 F 3)	s5
100 L	1LT9 107		28	60	31	8	M10	28	60	31	8	M10
112 M	1LT9 113		28	60	31	8	M10	28	60	31	8	M10
	1LT9 114											
132 M	1LT9 133		38	80	41	10	M12	38	80	41	10	M12
	1LT9 134											
	1LT9 135											
160 M	1LT9 163		42	110	45	12	M16	42	110	45	12	M16
160 L	1LT9 166											
180 L	1LT9 186		48	110	51.5	14	M16	48	110	51.5	14	M16
200 L	1LT9 206		55	110	59	16	M20	55	110	59	16	M20
	1LT9 207											

For motor Shaft height	Type	DIN IEC	conical shaft extension DE 4) d	d2	d4	l	l2	t2	u2	s6	conical shaft extension NDE d1	d3	d5	l1	l3	t3	u3	s7
180 L	1LT9 186		48	39.8	M30 x 2	110	82	48.9	12	M10	48	39.8	M30 x 2	110	82	48.9	12	M10
200 L	1LT9 206		55	46.8	M36 x 3	110	82	56.4	14	M12	55	46.8	M36 x 3	110	82	56.4	14	M12
	1LT9 207																	

1) Through-holes for bolt.
2) Conical shaft extension for shaft heights 100 to 160 on request.
3) Designation defined for cylindrical shaft extensions only.
4) Cyl. shaft extension for shaft height 180 and 200, non-standard.

Dimension drawings for 1LT9 (continued)

Types IM B5, IM V1



For motor Shaft height	Type	DIN IEC	Dimensions in mm a_1 p	b_1 N	c_1 LA	e_1 M	f_1 T	s_2 S	z Z	g AC	g_1	g_2	i_2 LE	k L	k_1 LC	k_2 [1] LM	q	s_3 K
100 L	1LT9 107		250	180	16	215	4	14	4	195	271	268	60	493	559	519	193	2 x M25 x 1.5
112 M	1LT9 113		250	180	16	215	4	14	4	219	295	282	60	531,5	587,5	559	200	2 x M25 x 1.5
	1LT9 114																	
132 M	1LT9 133		300	230	20	265	4	14	4	260	325	350	80	618	713	648	258	2 x M32 x 1.5
	1LT9 134																	
	1LT9 135																	
160 M	1LT9 163		350	250	20	300	5	18	4	315	410	422	110	726	866	761	323	2 x M40 x 1.5
160 L	1LT9 166																	
180 L	1LT9 186		350	250	20	300	5	18	4	350	445	456	110	865	1005	903	370,5	2 x M40 x 1.5
200 L	1LT9 206		400	300	20	350	5	18	4	388	485	512	110	924	1064	964	395,5	2 x M50 x 1.5
	1LT9 207																	

For motor			cyl. shaft extensions DE [2]					cyl. shaft extension NDE				
Shaft height	Type	DIN IEC	d D [3]	l E [3]	t GA [3]	u F [3]	s_4	d_1 DA [3]	l_1 EA [3]	t_1 GA [3]	u_1 F [3]	s_5
100 L	1LT9 107		28	60	31	8	M10	28	60	31	8	M10
112 M	1LT9 113		28	60	31	8	M10	28	60	31	8	M10
	1LT9 114											
132 M	1LT9 133		38	80	41	10	M12	38	80	41	10	M12
	1LT9 134											
	1LT9 135											
160 M	1LT9 163		42	110	45	12	M16	42	110	45	12	M16
160 L	1LT9 166											
180 L	1LT9 186		48	110	51,5	14	M16	48	110	51,5	14	M16
200 L	1LT9 206		55	110	59	16	M20	55	110	59	16	M20
	1LT9 207											

For motor			conical shaft extensions DE [4]								conical shaft extension NDE							
Shaft height	Type	DIN IEC	d	d_2	d_4	l	l_2	t_2	u_2	s_6	d_1	d_3	d_5	l_1	l_3	t_3	u_3	s_7
180 L	1LT9 186		48	39,8	M30 x 2	110	82	48,9	12	M10	48	39,8	M30 x 2	110	82	48,9	12	M10
200 L	1LT9 206		48	39,8	M30 x 2	110	82	48,9	12	M10	48	39,8	M30 x 2	110	82	48,9	12	M10
	1LT9 207																	

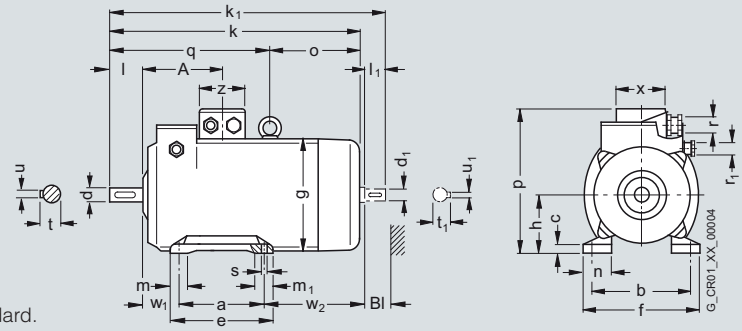
[1] Construction type IM V1 with protective cover.
[2] Conical shaft extension for shaft heights 100 to 160 (on request).
[3] Designation defined for cylindrical shaft extensions only.
[4] Cyl. shaft extension for shaft height 180 and 200, non-standard.

1LT9, 1LT8 motors, shaft heights 100 L to 315 L

Dimension drawings for 1LT8

1LT8 223 to 1LT8 313, type IM B3

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54



Cyl. shaft extension for shaft height > 160 non-standard.

Shaft height	Type	Number of poles	DIN	a	b	c	d	Tolerance d	d_1	Tolerance d_1	e	f	g	h	Tolerance h	k	k_1	l	l_1	m	m_1	n	o
			IEC	B	A	HA	D	–	DA	–	BB	AB	AC	H	–	L	LC	E	EA	BA	–	AA	–
225 M	1LT8 223	4, 6, 8		311	356	25	60	m6	55	m6	368	413	390	225	–0.5	957	1081	140	110	75	75	75	329
	1LT8 224	4, 6, 8		311	356	25	60	m6	55	m6	368	413	390	225	–0.5	957	1081	140	110	75	75	75	329
250 M	1LT8 253	4, 6, 8, 10		349	406	28	70	m6	60	m6	412	471	440	250	–0.5	1072	1224	140	140	84	84	84	427
	1LT8 254	4		349	406	28	70	m6	60	m6	412	471	440	250	–0.5	1072	1224	140	140	84	84	84	427
	1LT8 254	6, 8, 10		349	406	28	70	m6	60	m6	412	469	490	250	–0.5	1166	1321	140	140	84	84	84	420
280 S	1LT8 280	4, 6, 10		368	457	40	80	m6	65	m6	431	522	490	280	–1.0	1201	1350	170	140	96	96	94	420
	1LT8 280	8		368	457	40	80	m6	65	m6	482	522	490	280	–1.0	1281	1430	170	140	96	138	94	500
280 M	1LT8 283	4		419	457	40	80	m6	65	m6	482	522	490	280	–1.0	1281	1430	170	140	96	138	94	500
	1LT8 283	6, 8, 10		419	457	40	80	m6	65	m6	482	522	490	280	–1.0	1281	1430	170	140	96	138	94	500
315 S	1LT8 310	4		406	508	44	90	m6	70	m6	520	590	550	315	–1.0	1363	1515	170	140	120	120	126	582
	1LT8 310	6, 8, 10		406	508	44	90	m6	70	m6	572	590	550	315	–1.0	1443	1595	170	140	120	172	126	662
315 M	1LT8 313	4, 6, 8, 10		457	508	44	90	m6	70	m6	572	590	550	315	–1.0	1443	1595	170	140	120	172	126	662

Shaft height	Type	Number of poles	DIN	p (I) B3	p (II) B3	q	r (I)	r (II)	r_1	s	t	t_1	u	u_1	w_1	w_2	A	Bl	x (I)	x (II)	z (I)	z (II)
			IEC	HD	–	–	–	–	–	K	GA	GC	F	FA	C	CA	–	–	–	–	–	–
225 M	1LT8 223	4, 6, 8		525		628	M50 x 1.5		M50 x 1.5	19	64	59	18	16	149	371	331	40	212		207	
	1LT8 224	4, 6, 8		525		628	M50 x 1.5		M50 x 1.5	19	64	59	18	16	149	371	331	40	212		207	
250 M	1LT8 253	4, 6, 8, 10		576		645	M50 x 1.5		M50 x 1.5	24	74.5	64	20	18	168	426	342	45	212		207	
	1LT8 254	4		576		645	M50 x 1.5		M50 x 1.5	24	74.5	64	20	18	168	426	342	45	212		207	
	1LT8 254	6, 8, 10		638		746	M63 x 1.5		M63 x 1.5	24	74.5	64	20	18	168	524	411	50	280		242	
280 S	1LT8 280	4, 6, 10		668		776	M63 x 1.5		M63 x 1.5	24	85	69	22	18	190	483	411	50	280		242	
	1LT8 280	8		668		776	M63 x 1.5		M63 x 1.5	24	85	69	22	18	190	563	411	50	280		242	
280 M	1LT8 283	4		668		776	M63 x 1.5		M63 x 1.5	24	85	69	22	18	190	512	411	50	280		242	
	1LT8 283	6, 8, 10		668		776	M63 x 1.5		M63 x 1.5	24	85	69	22	18	190	512	411	50	280		242	
315 S	1LT8 310	4		735	695	781	M63 x 1.5	66	M63 x 1.5	28	95	74.5	25	20	216	583	416	55	280	387	242	242
	1LT8 310	6, 8, 10		735	695	781	M63 x 1.5	66	M63 x 1.5	28	95	74.5	25	20	216	663	416	55	280	387	242	242
315 M	1LT8 313	4, 6, 8, 10		735	695	781	M63 x 1.5	66	M63 x 1.5	28	95	74.5	25	20	216	612	416	55	280	387	242	242

Notes:

2nd shaft extension for direct coupling only

Bl = Minimum clearance for air inlet

(I) Terminal box for screwed gland DIN 46 320

(II) Terminal box with encapsulated cable gland

Center holes in the shaft extension DIN 332-DS

from d = 55 mm M12

from d = 60 up to d = 70 mm M16

up to d = 80 mm M20

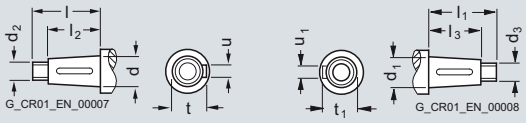
from d = 90 mm M24

Dimension drawings for 1LT8 (continued)

1LT8 223 to 1LT8 313, type IM B3

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54

Conical shaft extension



Taper 1:10 Taper 1:10

Shaft height	Type	Number of poles	DIN IEC	d D	d_1 DA	d_2 –	d_3 –	l E	l_1 EA	l_2 –	l_3 –	t GA	t_1 GC	u F	u_1 FA
225 M	1LT8 223	4, 6, 8		60	55	M42 x 3	M36 x 3	140	110	105	82	61.4	56.4	16	14
	1LT8 224	4, 6, 8		60	55	M42 x 3	M36 x 3	140	110	105	82	61.4	56.4	16	14
250 M	1LT8 253	4, 6, 8, 10		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
	1LT8 254	4		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
	1LT8 254	6, 8, 10		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
280 S	1LT8 280	4, 6, 10		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
	1LT8 280	8		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
280 M	1LT8 283	4		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
	1LT8 283	6, 8, 10		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
315 S	1LT8 310	4		90	70	M56 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 310	6, 8, 10		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
315 M	1LT8 313	4, 6, 8, 10		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18

Notes:

2nd shaft extension for direct coupling only

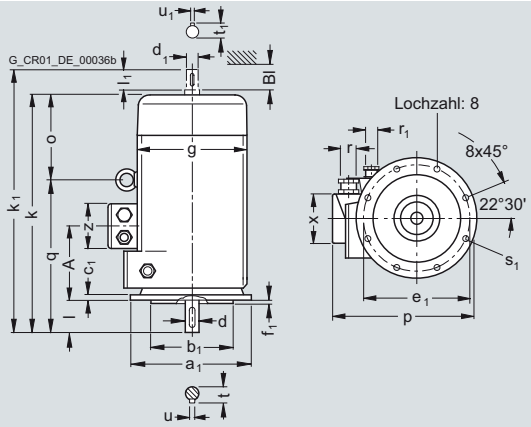
Conical shaft extensions DIN 1448

1LT9, 1LT8 motors, shaft heights 100 L to 315 L

Dimension drawings for 1LT8 (continued)

1LT8 223 to 1LT8 313, type IM V1

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54



Cyl. shaft extension for
shaft height > 160 non-standard.

Shaft height	Type	Number of poles	DIN	a_1	b_1	Toler-ance b_1	c_1	d	Toler-ance d	d_1	Toler-ance d_1	e_1	f_1	g	k	k_1	l	l_1	o	p (I)	p (II)
			IEC	P	N	–	LA	D	–	DA	–	M	T	AC	L	LC	E	EA	–	HD	–
225 M	1LT8 223	4, 6, 8		450	350	h6	16	60	m6	55	m6	400	5	390	957	1081	140	110	329	525	
	1LT8 224	4, 6, 8		450	350	h6	16	60	m6	55	m6	400	5	390	957	1081	140	110	329	525	
250 M	1LT8 253	4, 6, 8, 10		550	450	h6	18	70	m6	60	m6	500	5	440	1072	1224	140	140	427	601	
	1LT8 254	4		550	450	h6	18	70	m6	60	m6	500	5	440	1072	1224	140	140	427	601	
	1LT8 254	6, 8, 10		550	450	h6	18	70	m6	60	m6	500	5	490	1166	1321	140	140	420	663	
280 S	1LT8 280	4, 6, 10		550	450	h6	22	80	m6	65	m6	500	5	490	1201	1350	170	140	420	668	
	1LT8 280	8		550	450	h6	22	80	m6	65	m6	500	5	490	1281	1430	170	140	500	668	
280 M	1LT8 283	4		550	450	h6	22	80	m6	65	m6	500	5	490	1281	1430	170	140	500	668	
	1LT8 283	6, 8, 10		550	450	h6	22	80	m6	65	m6	500	5	490	1281	1430	170	140	500	668	
315 S	1LT8 310	4		660	550	h6	22	90	m6	70	m6	600	6	550	1363	1515	170	140	582	750	710
	1LT8 310	6, 8, 10		660	550	h6	22	90	m6	70	m6	600	6	550	1443	1595	170	140	662	750	710
315 M	1LT8 313	4, 6, 8, 10		660	550	h6	22	90	m6	70	m6	600	6	550	1443	1595	170	140	662	750	710

Shaft height	Type	Number of poles	DIN	q	r (I)	r (II)	r_1	s_1	t	t_1	u	u_1	A	Bl	x (I)	x (II)	z (I)	z (II)
			IEC	–	–	–	–	S	GA	GC	F	FA	–	–	–	–	–	–
225 M	1LT8 223	4, 6, 8		628	M50 x 1.5		M50 x 1.5	18	64	59	18	16	331	40	212		207	
	1LT8 224	4, 6, 8		628	M50 x 1.5		M50 x 1.5	18	64	59	18	16	331	40	212		207	
250 M	1LT8 253	4, 6, 8, 10		645	M50 x 1.5		M50 x 1.5	18	74.5	64	20	18	342	45	212		207	
	1LT8 254	4		645	M50 x 1.5		M50 x 1.5	18	74.5	64	20	18	342	45	212		207	
	1LT8 254	6, 8, 10		746	M63 x 1.5		M63 x 1.5	18	74.5	64	20	18	411	50	280		242	
280 S	1LT8 280	4, 6, 10		776	M63 x 1.5		M63 x 1.5	18	85	69	22	18	411	50	280		242	
	1LT8 280	8		776	M63 x 1.5		M63 x 1.5	18	85	69	22	18	411	50	280		242	
280 M	1LT8 283	4		776	M63 x 1.5		M63 x 1.5	18	85	69	22	18	411	50	280		242	
	1LT8 283	6, 8, 10		776	M63 x 1.5		M63 x 1.5	18	85	69	22	18	411	50	280		242	
315 S	1LT8 310	4		781	M63 x 1.5	66	M63 x 1.5	22	95	74.5	25	20	416	55	280	387	242	242
	1LT8 310	6, 8, 10		781	M63 x 1.5	66	M63 x 1.5	22	95	74.5	25	20	416	55	280	387	242	242
315 M	1LT8 313	4, 6, 8, 10		781	M63 x 1.5	66	M63 x 1.5	22	95	74.5	25	20	416	55	280	387	242	242

Notes:

2nd shaft extension for direct coupling only

Bl = Minimum clearance for air inlet

(I) Terminal box for screwed gland DIN 46 320

(II) Terminal box with encapsulated cable gland as of shaft height 250 mm IM V1 available

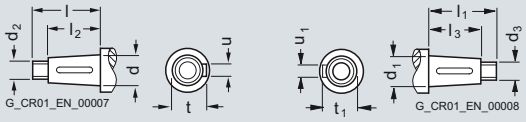
Center holes in the shaft extension DIN 332-DS
from d = 55 mm M12
from d = 60 up to d = 70 mm M16
up to d = 80 mm M20
from d = 90 mm M24

Dimension drawings for 1LT8 (continued)

1LT8 223 to 1LT8 313, type IM V1

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54

Conical shaft extension



Taper 1:10 Taper 1:10

Shaft height	Type	Number of poles	DIN IEC	d D	d_1 DA	d_2 –	d_3 –	l E	l_1 EA	l_2 –	l_3 –	t GA	t_1 GC	u F	u_1 FA
225 M	1LT8 223	4, 6, 8		60	55	M42 x 3	M36 x 3	140	110	105	82	61.4	56.4	16	14
	1LT8 224	4, 6, 8		60	55	M42 x 3	M36 x 3	140	110	105	82	61.4	56.4	16	14
250 M	1LT8 253	4, 6, 8, 10		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
	1LT8 254	4		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
	1LT8 254	6, 8, 10		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
280 S	1LT8 280	4, 6, 10		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
	1LT8 280	8		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
280 M	1LT8 283	4		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
	1LT8 283	6, 8, 10		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
315 S	1LT8 310	4		90	70	M56 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 310	6, 8, 10		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
315 M	1LT8 313	4, 6, 8, 10		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18

Notes:

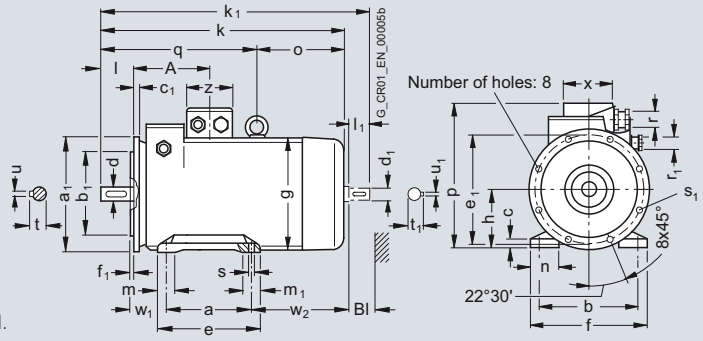
2nd shaft extension for direct coupling only

Conical shaft extensions DIN 1448

Dimension drawings for 1LT8 (continued)

1LT8 223 to 1LT8 313, type IM B35

With surface cooling, cooling method IC 0141, intermittent duty S3 IEC 60072, degree of protection IP54



Cyl. shaft extension for shaft height > 160 non-standard.

Shaft height	Type	Number of poles	DIN	a	a_1	b	b_1	Tolerance b_1	c	c_1	d	Tolerance d	d_1	Tolerance d_1
			IEC	B	P	A	N	–	HA	LA	D	–	DA	
225 M	1LT8 223	4, 6, 8		311	450	356	350	h6	25	16	60	m6	55	m6
	1LT8 224	4, 6, 8		311	450	356	350	h6	25	16	60	m6	55	m6
250 M	1LT8 253	4, 6, 8, 10		349	550	406	450	h6	28	18	70	m6	60	m6
	1LT8 254	4		349	550	406	450	h6	28	18	70	m6	60	m6
	1LT8 254	6, 8, 10		349	550	406	450	h6	28	18	70	m6	60	m6
280 S	1LT8 280	4, 6, 10		368	550	457	450	h6	40	22	80	m6	65	m6
	1LT8 280	8		368	550	457	450	h6	40	22	80	m6	65	m6
280 M	1LT8 283	4, 6, 8, 10		419	550	457	450	h6	40	22	80	m6	65	m6
315 S	1LT8 310	4		406	660	508	550	h6	44	22	90	m6	70	m6
	1LT8 310	6, 8, 10		406	660	508	550	h6	44	22	90	m6	70	m6
315 M	1LT8 313	4, 6, 8, 10		457	660	508	550	h6	44	22	90	m6	70	m6

Shaft height	Type	Number of poles	DIN	e	e_1	f	f_1	g	h	Tolerance h	k	k_1	l	l_1	m	m_1
			IEC	BB	M	AB	T	AC	H	–	L	LC	E	EA	BA	–
225 M	1LT8 223	4, 6, 8		368	400	413	5	390	225	–0.5	957	1081	140	110	75	75
	1LT8 224	4, 6, 8		368	400	413	5	390	225	–0.5	957	1081	140	110	75	75
250 M	1LT8 253	4, 6, 8, 10		412	500	471	5	440	250	–0.5	1072	1224	140	140	84	84
	1LT8 254	4		412	500	471	5	440	250	–0.5	1072	1224	140	140	84	84
	1LT8 254	6, 8, 10		412	500	469	5	490	250	–0.5	1166	1321	140	140	84	84
280 S	1LT8 280	4, 6, 10		431	500	522	5	490	280	–1.0	1201	1350	170	140	96	96
	1LT8 280	8		482	500	522	5	490	280	–1.0	1281	1430	170	140	96	138
280 M	1LT8 283	4, 6, 8, 10		482	500	522	5	490	280	–1.0	1281	1430	170	140	96	138
315 S	1LT8 310	4		520	600	590	6	550	315	–1.0	1363	1515	170	140	120	120
	1LT8 310	6, 8, 10		572	600	590	6	550	315	–1.0	1443	1595	170	140	120	172
315 M	1LT8 313	4, 6, 8, 10		572	600	590	6	550	315	–1.0	1443	1595	170	140	120	172

Dimension drawings for 1LT8 (continued)

1LT8 223 to 1LT8 313, type IM B35

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54

Shaft height	Type	Number of poles	DIN	n	o	p (I)	p (II)	q	r (I)	r (II)	r_1	s	s_1	t	t_1
			IEC	AA	–	HD	–	–	–	–	–	K	S	GA	GC
225 M	1LT8 223	4, 6, 8		75	329	525		628	M50 x 1.5		M50 x 1.5	19	18	64	59
	1LT8 224	4, 6, 8		75	329	525		628	M50 x 1.5		M50 x 1.5	19	18	64	59
250 M	1LT8 253	4, 6, 8, 10		84	427	601		645	M50 x 1.5		M50 x 1.5	24	18	74.5	64
	1LT8 254	4		84	427	601		645	M50 x 1.5		M50 x 1.5	24	18	74.5	64
	1LT8 254	6, 8, 10		84	420	663		746	M63 x 1.5		M63 x 1.5	24	18	74.5	64
280 S	1LT8 280	4, 6, 10		94	420	668		776	M63 x 1.5		M63 x 1.5	24	18	85	69
	1LT8 280	8		94	500	668		776	M63 x 1.5		M63 x 1.5	24	18	85	69
280 M	1LT8 283	4, 6, 8, 10		94	500	668		776	M63 x 1.5		M63 x 1.5	24	18	85	69
315 S	1LT8 310	4		126	582	750	710	781	M63 x 1.5	66	M63 x 1.5	28	22	95	74.5
	1LT8 310	6, 8, 10		126	662	750	710	781	M63 x 1.5	66	M63 x 1.5	28	22	95	74.5
315 M	1LT8 313	4, 6, 8, 10		126	662	750	710	781	M63 x 1.5	66	M63 x 1.5	28	22	95	74.5

Shaft height	Type	Number of poles	DIN	u	u_1	w_1	w_2	A	BI	x (I)	x (II)	z (I)	z (II)
			IEC	F	FA	C	CA	–	–	–	–	–	–
225 M	1LT8 223	4, 6, 8		18	16	149	371	331	40	212		207	
	1LT8 224	4, 6, 8		18	16	149	371	331	40	212		207	
250 M	1LT8 253	4, 6, 8, 10		20	18	168	426	342	45	212		207	
	1LT8 254	4		20	18	168	426	342	45	212		207	
	1LT8 254	6, 8, 10		20	18	168	524	411	50	280		242	
280 S	1LT8 280	4, 6, 10		22	18	190	483	411	50	280		242	
	1LT8 280	8		22	18	190	563	411	50	280		242	
280 M	1LT8 283	4, 6, 8, 10		22	18	190	512	411	50	280		242	
315 S	1LT8 310	4		25	20	216	583	416	55	280	387	242	242
	1LT8 310	6, 8, 10		25	20	216	663	416	55	280	387	242	242
315 M	1LT8 313	4, 6, 8, 10		25	20	216	612	416	55	280	387	242	242

Notes:

2nd shaft extension for direct coupling only

BI = Minimum clearance for air inlet

(I) Terminal box for screwed gland DIN 46 320

(II) Terminal box with encapsulated cable gland

Center holes in the shaft extension DIN 332-DS

from d = 55 mm M12

from d = 60 up to d = 70 mm M16

up to d = 80 mm M20

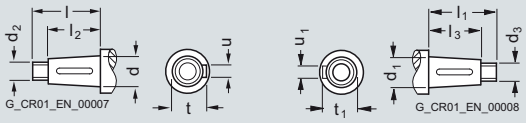
from d = 90 mm M24

Dimension drawings for 1LT8 (continued)

1LT8 223 to 1LT8 313, type IM B35

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54

Conical shaft extension



Taper 1:10 Taper 1:10

Shaft height	Type	Number of poles	DIN IEC	d D	d_1 DA	d_2 –	d_3 –	l E	l_1 EA	l_2 –	l_3 –	t GA	t_1 GC	u F	u_1 FA
225 M	1LT8 223	4, 6, 8		60	55	M42 x 3	M36 x 3	140	110	105	82	61.4	56.4	16	14
	1LT8 224	4, 6, 8		60	55	M42 x 3	M36 x 3	140	110	105	82	61.4	56.4	16	14
250 M	1LT8 253	4, 6, 8, 10		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
	1LT8 254	4		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
	1LT8 254	6, 8, 10		70	60	M48 x 3	M42 x 3	140	140	105	105	71.4	61.4	18	16
280 S	1LT8 280	4, 6, 10		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
	1LT8 280	8		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
280 M	1LT8 283	4, 6, 8, 10		80	65	M56 x 4	M42 x 3	170	140	130	105	81.2	66.4	20	16
315 S	1LT8 310	4		90	70	M56 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 310	6, 8, 10		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
315 M	1LT8 313	4, 6, 8, 10		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18

Notes:

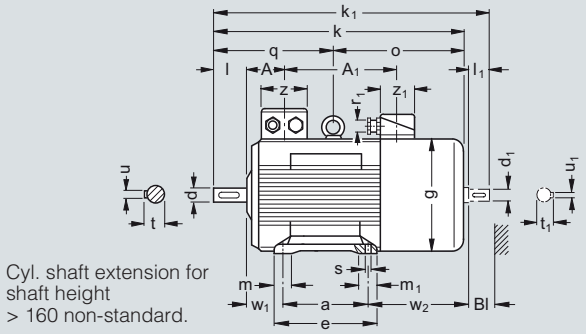
2nd shaft extension for direct coupling only

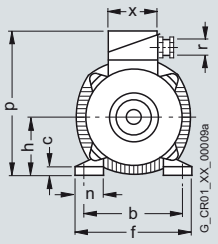
Conical shaft extensions DIN 1448

Dimension drawings for 1LT8 (continued)

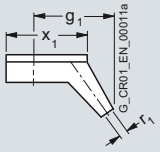
1LT8 314 to 1LT8 318, type IM B3

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54





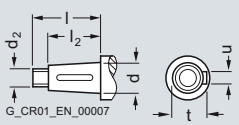
Terminal box with encapsulated cable gland



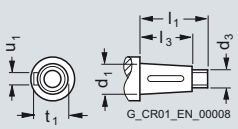
Shaft height	Type	Number of poles	DIN	a	b	c	d	Tolerance d	d_1	Tolerance d_1	e	f	g	g_1	h	Tolerance h	k	k_1	l	l_1	m	m_1	n	o
			IEC	B	A	HA	D	–	DA	–	BB	AB	AC		H	–	L	LC	E	EA	BA	–	AA	–
315 M	1LT8 314	4, 6, 8		457	508	44	90	m6	70	m6	573	590	610	370	315	–1.0	1644	1793	170	140	120	120	110	978
	1LT8 315	4, 6, 8		457	508	44	90	m6	70	m6	573	590	610	370	315	–1.0	1644	1793	170	140	120	120	110	978
315 L	1LT8 317	4, 6, 8		508	508	44	90	m6	70	m6	624	590	610	370	315	–1.0	1764	1913	170	140	120	120	110	1098
	1LT8 318	4		508	508	44	90	m6	70	m6	624	590	610	370	315	–1.0	1764	1913	170	140	120	120	110	1098

Shaft height	Type	Number of poles	DIN	p (I) B3	p (II) B3	q	r (I)	r (II)	r_1	s	t	t_1	u	u_1	w_1	w_2	A	A_1	Bl	x (I)	x (II)	x_1	z (I)	z (II)	z_1
			IEC	HD	–	–	–	–	–	K	GA	GC	F	FA	C	CA	–	–	–	–	–		–	–	
315 M	1LT8 314	4, 6, 8		802	762	666	M63 x 1.5	92	M63 x 1.5	28	95	74.5	25	20	216	810	230	675	55	315	422	212	296	296	207
315 M	1LT8 315	4, 6, 8		802	762	666	M63 x 1.5	92	M63 x 1.5	28	95	74.5	25	20	216	810	230	675	55	315	422	212	296	296	207
315 L	1LT8 317	4, 6, 8		802	762	666	M63 x 1.5	92	M63 x 1.5	28	95	74.5	25	20	216	879	230	795	55	315	422	212	296	296	207
315 L	1LT8 318	4		802	762	666	M63 x 1.5	92	M63 x 1.5	28	95	74.5	25	20	216	879	230	795	55	315	422	212	296	296	207

Conical shaft extension



Taper 1:10



Taper 1:10

Shaft height	Type	Number of poles	DIN IEC	d D	d_1 DA	d_2 –	d_3 –	l E	l_1 EA	l_2	l_3 –	t GA	t_1 GC	u F	u_1 FA
315 M	1LT8 314	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 315	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
315 L	1LT8 317	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 318	4		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18

Notes:

2nd shaft extension for direct coupling only

Conical shaft extensions DIN 1448

Bl = Minimum clearance for air inlet

(I) Terminal box for screwed gland DIN 46 320

(II) Terminal box with encapsulated cable gland

Center holes in the shaft extension DIN 332-DS

up to d = 80 mm M20

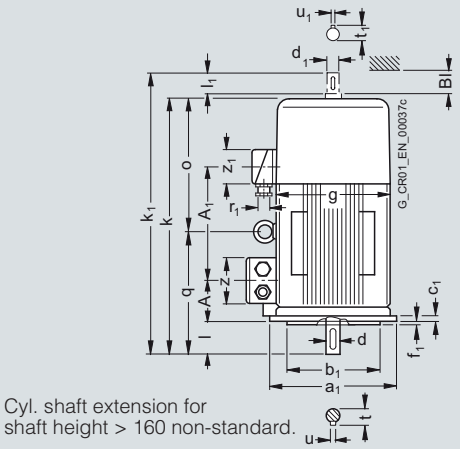
from d = 90 mm M24

1LT9, 1LT8 motors, shaft heights 100 L to 315 L

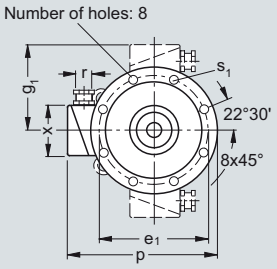
Dimension drawings for 1LT8 (continued)

1LT8 314 to 1LT8 318, type IM V1

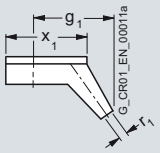
With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54



Cyl. shaft extension for shaft height > 160 non-standard.



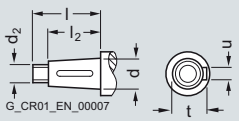
Terminal box with encapsulated cable gland



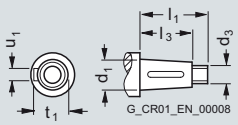
Shaft height	Type	Number of poles	DIN	a_1	b_1	Tolerance b_1	c_1	d	Tolerance d	d_1	Tolerance d_1	e_1	f_1	g	g_1	k	k_1	l	l_1	o	p (I)	p (II)
			IEC	P	N	–	LA	D	–	DA	–	M	T	AC		L	LC	E	EA	–	HD	–
315 M	1LT8 314	4, 6, 8		660	550	h6	22	90	m6	70	m6	600	6	610	370	1644	1793	170	140	978	817	777
	1LT8 315	4, 6, 8		660	550	h6	22	90	m6	70	m6	600	6	610	370	1644	1793	170	140	978	817	777
315 L	1LT8 317	4, 6, 8		660	550	h6	22	90	m6	70	m6	600	6	610	370	1764	1913	170	140	1098	817	777
	1LT8 318	4		660	550	h6	22	90	m6	70	m6	600	6	610	370	1764	1913	170	140	1098	817	777

Shaft height	Type	Number of poles	DIN	q	r (I)	r (II)	r_1	s_1	t	t_1	u	u_1	A	A_1	Bl	x (I)	x (II)	x_1	z (I)	z (II)	z_1
			IEC	–	–	–	–	S	GA	GC	F	FA	–	–	–	–			–	–	
315 M	1LT8 314	4, 6, 8		666	M63 x 1.5	92	M63 x 1.5	22	95	74.5	25	20	230	675	55	315	422	212	296	296	207
	1LT8 315	4, 6, 8		666	M63 x 1.5	92	M63 x 1.5	22	95	74.5	25	20	230	675	55	315	422	212	296	296	207
315 L	1LT8 317	4, 6, 8		666	M63 x 1.5	92	M63 x 1.5	22	95	74.5	25	20	230	795	55	315	422	212	296	296	207
	1LT8 318	4		666	M63 x 1.5	92	M63 x 1.5	22	95	74.5	25	20	230	795	55	315	422	212	296	296	207

Conical shaft extension



Taper 1:10



Taper 1:10

Shaft height	Type	Number of poles	DIN	d	d_1	d_2	d_3	l	l_1	l_2	l_3	t	t_1	u	u_1
			IEC	D	DA	–	–	E	EA	–	–	GA	GC	F	FA
315 M	1LT8 314	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 315	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
315 L	1LT8 317	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 318	4		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18

Notes:

2nd shaft extension for direct coupling only

Conical shaft extensions DIN 1448

Bl = Minimum clearance for air inlet

(I) Terminal box for screwed gland DIN 46 320

(II) Terminal box with encapsulated cable gland

Center holes in the shaft extension DIN 332-DS

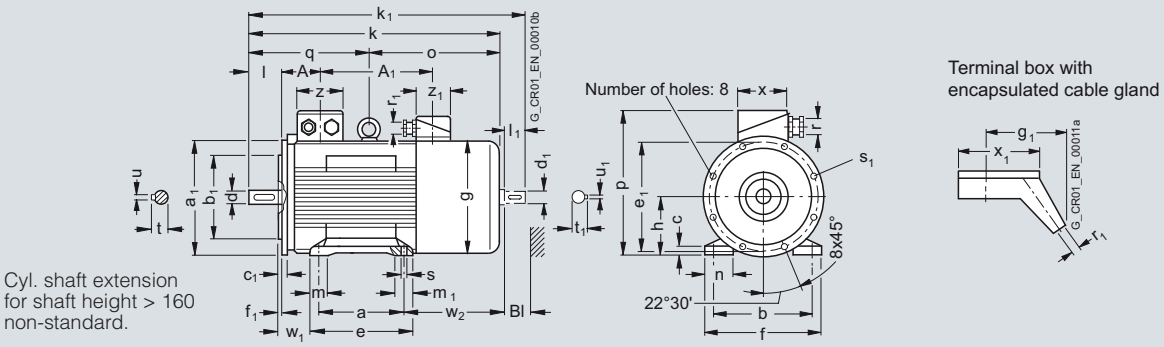
up to d = 80 mm M20

from d = 90 mm M24

Dimension drawings for 1LT8 (continued)

1LT8 314 to 1LT8 318, type IM B35

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54



Shaft height	Type	Number of poles	DIN	a	a_1	b	b_1	Tolerance b_1	c	c_1	d	Tolerance d	d_1	Tolerance d_1	e	e_1	f	f_1	g	g_1	h	Tolerance h
			IEC	B	P	A	N	–	HA	LA	D	–	DA	–	BB	M	AB	T	AC		H	
315 M	1LT8 314	4, 6, 8		457	660	508	550	h6	44	22	90	m6	70	m6	573	600	590	6	610	370	315	–1.0
	1LT8 315	4, 6, 8		457	660	508	550	h6	44	22	90	m6	70	m6	573	600	590	6	610	370	315	–1.0
315 L	1LT8 317	4, 6, 8		508	660	508	550	h6	44	22	90	m6	70	m6	624	600	590	6	610	370	315	–1.0
	1LT8 318	4		508	660	508	550	h6	44	22	90	m6	70	m6	624	600	590	6	610	370	315	–1.0

Shaft height	Type	Number of poles	DIN	k	k_1	l	l_1	m	m_1	n	o	p (I)	p (II)	q	r (I)	r (II)	r_1	s	s_1	t	t_1
			IEC	L	LC	E	EA	BA	–	AA	–	HD	–	–	–	–	–	K	S	GA	GC
315 M	1LT8 314	4, 6, 8		1644	1793	170	140	120	120	110	978	817	777	666	M63 x 1.5	92	M63 x 1.5	28	22	95	74.5
	1LT8 315	4, 6, 8		1644	1793	170	140	120	120	110	978	817	777	666	M63 x 1.5	92	M63 x 1.5	28	22	95	74.5
315 L	1LT8 317	4, 6, 8		1764	1913	170	140	120	120	110	1098	817	777	666	M63 x 1.5	92	M63 x 1.5	28	22	95	74.5
	1LT8 318	4		1764	1913	170	140	120	120	110	1098	817	777	666	M63 x 1.5	92	M63 x 1.5	28	22	95	74.5

Shaft height	Type	Number of poles	DIN	u	u_1	w_1	w_2	A	A_1	Bl	x (I)	x (II)	x_1	z (I)	z (II)	z_1
			IEC	F	FA	C	CA	–	–	–	–	–		–	–	
315 M	1LT8 314	4, 6, 8		25	20	216	810	230	675	55	315	422	212	296	296	207
	1LT8 315	4, 6, 8		25	20	216	810	230	675	55	315	422	212	296	296	207
315 L	1LT8 317	4, 6, 8		25	20	216	879	230	795	55	315	422	212	296	296	207
	1LT8 318	4		25	20	216	879	230	795	55	315	422	212	296	296	207

Notes:

2nd shaft extension for direct coupling only

Conical shaft extensions DIN 1448

Bl = Minimum clearance for air inlet

(I) Terminal box for screwed gland DIN 46 320

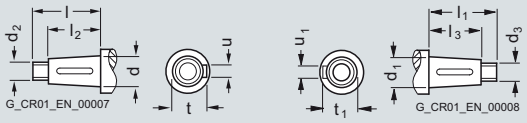
(II) Terminal box with encapsulated cable gland

Dimension drawings for 1LT8 (continued)

1LT8 314 to 1LT8 318, type IM B35

With surface cooling, cooling method IC 0141, intermittent duty
S3 IEC 60072, degree of protection IP54

Conical shaft extension



Taper 1:10 Taper 1:10

Shaft height	Type	Number of poles	DIN IEC	d D	d_1 DA	d_2 –	d_3 –	l E	l_1 EA	l_2 –	l_3 –	t GA	t_1 GC	u F	u_1 FA
315 M	1LT8 314	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 315	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
315 L	1LT8 317	4, 6, 8		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18
	1LT8 318	4		90	70	M64 x 4	M48 x 3	170	140	130	105	91.7	71.4	22	18

Notes:

Center holes in the shaft extension DIN 332-DS

up to d = 80 mm M20

from d = 90 mm M24

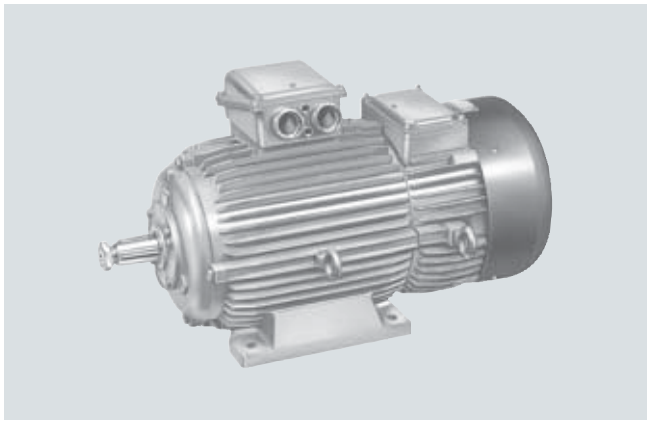
Spare parts

Type	Order No. Brush holder 1 set = 3 pcs per motor	Carbon brushes 1 set = 6 pcs per motor	Slip-ring assembly
1LT9 107	**1LY7 710**	**1LY8 810**	**1LY9 910**
1LT9 113 **1LT9 114**	**1LY7 711**	**1LY8 811**	**1LY9 911**
1LT9 133 **1LT9 134** **1LT9 135**	**1LY7 712**	**1LY8 812**	**1LY9 912**
1LT9 163 **1LT9 166**	**1LY7 713**	**1LY8 813**	**1LY9 913**
1LT9 186	**1LY7 714**	**1LY8 814**	**1LY9 914**
1LT9 206 **1LT9 207**	**1LY7 715**	**1LY8 815**	**1LY9 915**

Type	Number of poles	Order No. Box-type brush holder 1 set = 3 pcs	Carbon brushes 1 set = 6 pcs	Slip-ring assembly
1LT8 223 **1LT8 223** **1LT8 224**	4 6, 8 6, 8	**14487 01**	**24745 01** **01502 01** **01502 01**	**12302 01** **12302 01** **12302 01**
1LT8 253 **1LT8 254** **1LT8 254**	4, 6, 8, 10 4 6, 8, 10	**12275 01**	**50281 01** **50281 01** **50283 01**	**12286 01** **12286 01** **16527 01**
1LT8 280 **1LT8 283**	4, 6 4, 6	**12276 01**	**57441 01** **57441 01**	**16527 01** **16527 01**
1LT8 280 **1LT8 283**	8, 10 8, 10	**12275 01**	**50283 01** **50283 01**	**16527 01** **16527 01**
1LT8 310 **1LT8 313** **1LT8 310** **1LT8 313**	4, 6 4, 6 8, 10 8, 10	**12276 01**	**61869 01** **61869 01** **50285 01** **50285 01**	**16529 01** **16529 01** **16529 01** **16529 01**
1LT8 314 **1LT8 315** **1LT8 317** **1LT8 318**	4, 6, 8 4, 6, 8 4, 6, 8 4	**57402 01**	**57393 01** **57393 01** **57393 01** **57393 01**	**57703 01** **57793 01** **57793 01** **57793 01**

1LV9 motors, shaft heights 100 L to 200 L with disk brake

Overview



Hoisting gear motor 1LV9 with brake

1LV9 hoisting gear motors with an integral disk brake ensure a compact drive unit. The DC-operated single-disk brake is integrated in the motor and, in conjunction with the motor, creates a self-contained unit. The single-disk brake, which is designed as a holding brake, has thermal reserves and can execute emergency stops from full motor speed. Since it functions as a fail-safe brake, its spring energy remains fully effective even if the excitation voltage fails.

Technical data

Version

With the exception of the brake components, the 1LV9 motors are the same as the 1LT9 motors described in "Three-phase slip-ring motors 1LT8 and 1LT9" (as of Page 7/92).
The brakes are DC-operated. The required bridge rectifier is permanently built into the terminal box of the motor. The brake is fitted at the NDE of the motor, and the motor shaft extends through the brake. The rated braking torque and the air gap are set on delivery. The brake linings are asbestos-free.

Product range

The product range covers an output range from 1.5 kW to 29 kW at S3 - 40 % with braking torques of 60 Nm to 250 Nm.

For further data and information regarding

- Motor winding, tolerances
- Rating plates
- Slip-rings
- Brush holders, brushes
- Rolling-contact bearings
- Water drain holes
- Paint finish
- Output, effect of temperature and installation altitude
- Output in S2 duty
- Standstill heating for motors

refer to the 1LT9 motors in the section "Three-phase slip-ring motors 1LT8 and 1LT9" (as of Page 7/92).

Electrical design

Operating voltage

1LV9 hoisting gear motors with an integral disk brake are available from the catalog for the following standard voltages:

Motor voltage	Brake voltage
380 V 3 AC, 50 Hz	220 V 1 AC, 50/60 Hz
400 V 3 AC, 50 Hz	230 V 1 AC, 50/60 Hz
500 V 3 AC, 50 Hz	290 V 1 AC, 50/60 Hz
660 V 3 AC, 50 Hz	380 V 1 AC, 50/60 Hz
690 V 3 AC, 50 Hz	400 V 1 AC, 50/60 Hz
440 V 3 AC, 60 Hz	265 V 1 AC, 50/60 Hz

Terminal box, conductor connection

The connection cables for the integral disk brake are routed through the motor housing to separate terminals in the terminal box of the motor. The bridge rectifier for the brake is also located in the terminal box.

Thermistor protection

To protect the stator winding against excessive temperature rise, three or six temperature sensors for alarm and/or tripping can be fitted.

Mechanical design

Types of construction

The motors can be shipped in the following basic construction types:

- IM B3
- IM B5 and
- IM V1 with protective cover

Other construction types are available on request.

Degree of protection

The standard 1LV9 brake motors have degree of protection IP54. Like the 1LT motors, the motor component can also be shipped with degree of protection IP55.

Mounted tachometer

The brake motors can be shipped with a fitted DC tacho-generator which senses the speed and direction of rotation. It is fitted at the NDE of the motor.

Shaft extensions

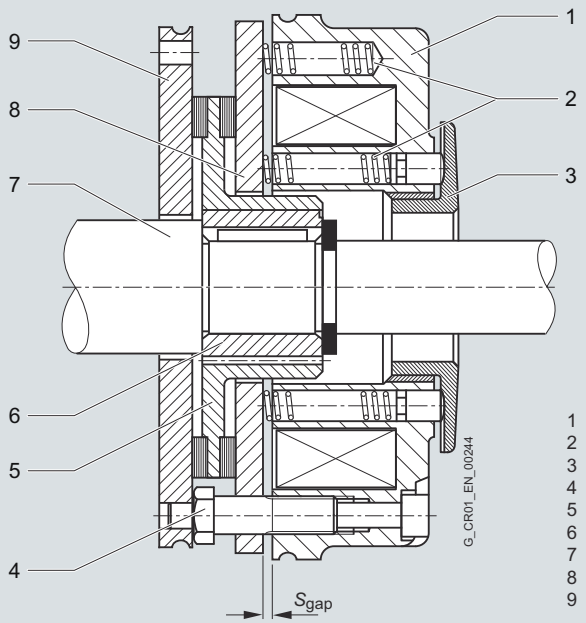
In their standard version, the motors are shipped as follows:

- 1LV9 up to shaft height 160: with a cylindrical shaft extension to DIN 748 [1)]
- 1 LV9 as of shaft height 180: with a conical shaft extension to DIN 1448 [2)]

Other shaft extensions (e.g. to DIN 42681) are available on request.

[1)] Conical shaft extension available at an additional cost.
[2)] Cylindrical shaft extension available at an additional cost.

Technical data (continued)



View of the standard fitted brake

Brake design

Braking torque setting

The braking torque is set to the rated torque by default. It can be changed by turning the setting ring (4). When the braking torque M_B is changed, all the closing and release times specified in the table "Operating values of the spring-operated brake with DC operation, rated supply voltage 1 AC 50/60 Hz" (Page 7/132) also change.

Mechanical brake release

To ensure that brakes can still be released even if the operating voltage fails, all the brakes can – if required – be equipped with a manual mechanical release device (specify order code K8. in the order). A manual mechanical release device cannot be retrofitted.

Thermistor protection

Thermistor protection is not required for the magnet coil in the brake. It can carry its rated current continuously without assuming a permissible high temperature.

Standstill heating

Standstill heaters are not provided for the standard fitted brakes.

Insulation

The insulation for the excitation winding in the brakes fulfills thermal class B (standard).

1LV9 motors, shaft heights 100 L to 200 L with disk brake

Technical data (continued)

Operating values of the spring-loaded disk brake with DC operation, rated supply voltage 1 AC 50/60 Hz

Motor Shaft height	Type	Disk brake Type	Braking torque M_{rated}	adjustable from	adjustable to	Work of friction per cycle	Closing time with DC/AC tripping	Release time	Power consumption	Moment of inertia of brake J
			Nm	Nm	Nm	J	ms	ms	W	kgm^2
100 L	1LV9 107- . . D. .	06.08.210	60	60	30	6500	40/200	160	52	0.561×10^{-3}
112 M	1LV9 113- . . D. .	06.08.210								
	1LV9 114- . . D. .	06.08.210								
132 M	1LV9 133- . . D. .	06.08.210	60	60	30	6500	40/200	160	52	0.561×10^{-3}
	1LV9 134- . . D. .	06.08.210								
	1LV9 135- . . D. .	06.08.210								
132 M	1LV9 133- . . A . .	07.08.210	100	100	50	11000	70/650	200	65	3.402×10^{-3}
	1LV9 134- . . A . .	07.08.210								
	1LV9 135- . . A . .	07.08.210								
160 M	1LV9 163- . . A . .	07.08.210	100	100	50	11000	70/650	200	65	3.402×10^{-3}
160 L	1LV9 166- . . A . .	07.08.210								
160 M	1LV9 163- . . B . .	09.08.210	250	250	125	40000	130/1400	310	75	16.915×10^{-3}
160 L	1LV9 166- . . B . .	09.08.210								
180 L	1LV9 186- . . B . .	09.08.210	250	250	125	40000	130/1400	310	75	16.915×10^{-3}
200 L	1LV9 206- . . B . .	09.08.210	250	250	125	40000	130/1400	310	75	16.915×10^{-3}
	1LV9 207- . . B . .	09.08.210								

Technical data (continued)

Environmental influences and special versions

Climate resistance

The brake motors can be used if the following conditions are fulfilled:

	Standard version	Version with enhanced corrosion protection
Climatic area	A and T to DIN 50019	H and M to DIN 50019
Climatic group	Moderate to IEC 721-2-1	Worldwide to IEC 721-2-1

The version with enhanced corrosion protection is also decontaminable. The brakes are designed as follows:

- Armature plate made of stainless steel

The data apply to the corrosion protection. The temperature limits for electrical machines must also be observed.

1LV9 motors, shaft heights 100 L to 200 L with disk brake

Selection and ordering data

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	Three-phase slip-ring motors 1LV9 shaft heights 100 L to 200 L	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1500 rpm (max. permissible operating speed 3000 rpm)											
Intermittent duty S3 – 15 %											
100 L	1200	2.5	19.8	1.9	6.4	24	2.05	85	0.007	**1LV9 107-4** ■■■■	48.5
112 M	1350	3.7	27.6	2.5	8.2	23	2.65	110	0.013	**1LV9 113-4** ■■■■	57
112 M	1300	5	36.7	2.3	11.7	27	3	140	0.014	**1LV9 114-4** ■■■■	59
132 M	1370	6.8	48	2.5	15	33	2.25	140	0.025	**1LV9 133-4** ■■■■	78
132 M	1390	8	55	2.7	17.1	31	3.15	170	0.033	**1LV9 134-4** ■■■■	89
132 M	1390	9.5	65	2.5	20.5	35	2.7	180	0.036	**1LV9 135-4** ■■■■	95
160 M	1395	13	89	2.4	27.6	47	2.2	180	0.065	**1LV9 163-4** ■■■■	150
160 L	1410	19.5	132	2.7	40.9	48	3.1	260	0.086	**1LV9 166-4** ■■■■	162
180 L	1440	27	182	2.5	55	61	2.43	270	0.171	**1LV9 186-4** ■■■■	243
200 L	1425	33	221	2.3	61	95	1.48	230	0.22	**1LV9 206-4** ■■■■	273
200 L	1430	40	267	2.5	76	92	1.69	270	0.26	**1LV9 207-4** ■■■■	288
Intermittent duty S3 – 25 %											
100 L	1245	2.3	17.7	2.2	5.7	20	2.45	85	0.007	**1LV9 107-4** ■■■■	48.5
112 M	1365	3.3	24	2.9	7.5	20	3.2	110	0.013	**1LV9 113-4** ■■■■	57
112 M	1325	4.5	32.4	2.6	10.5	23	3.5	140	0.014	**1LV9 114-4** ■■■■	59
132 M	1390	5.7	39.6	3	12.8	28	2.8	140	0.025	**1LV9 133-4** ■■■■	78
132 M	1400	7	47.8	3.1	15.1	26.5	3.8	170	0.033	**1LV9 134-4** ■■■■	89
132 M	1410	8.7	59	2.7	18.6	30.5	3.05	180	0.036	**1LV9 135-4** ■■■■	95
160 M	1410	11	74.5	2.9	24	40	2.6	180	0.065	**1LV9 163-4** ■■■■	150
160 L	1425	16.5	111	3.3	38	40	3.75	260	0.086	**1LV9 166-4** ■■■■	162
180 L	1445	23	154	2.9	48	54	2.89	270	0.171	**1LV9 186-4** ■■■■	243
200 L	1435	28	186	2.7	53	77	1.72	230	0.22	**1LV9 206-4** ■■■■	273
200 L	1440	34	226	2.9	64	78	2	270	0.26	**1LV9 207-4** ■■■■	288
Intermittent duty S3 – 40 %											
100 L	1290	2	14.9	2.6	5	17	2.9	85	0.007	**1LV9 107-4** ■■■■	48.5
112 M	1380	3	21	3.2	6.9	18	3.55	110	0.013	**1LV9 113-4** ■■■■	57
112 M	1350	4	28.3	3	9.5	19	4.25	140	0.014	**1LV9 114-4** ■■■■	59
132 M	1400	5	34.2	3.5	11.4	25	3.25	140	0.025	**1LV9 133-4** ■■■■	78
132 M	1410	6.3	42.7	3.5	13.7	24	4.25	170	0.033	**1LV9 134-4** ■■■■	89
132 M	1425	7.5	50	3.2	16.2	26	3.6	180	0.036	**1LV9 135-4** ■■■■	95
160 M	1425	10	57	3.2	23	36	2.9	180	0.065	**1LV9 163-4** ■■■■	150
160 L	1435	14.5	96.5	3.7	35	35	4.3	260	0.086	**1LV9 166-4** ■■■■	162
180 L	1450	20	133	3.3	43	46	3.39	270	0.171	**1LV9 186-4** ■■■■	243
200 L	1445	24	159	3.2	46	66	2.01	230	0.22	**1LV9 206-4** ■■■■	273
200 L	1445	29	192	3.4	56	66	2.36	270	0.26	**1LV9 207-4** ■■■■	288

For order number suffixes, see Page 7/140; for options, see Page 7/141

For ordering example, see Page 7/141.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	Three-phase slip-ring motors 1LV9 shaft heights 100 L to 200 L	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1500 rpm (max. permissible operating speed 3000 rpm)											
Intermittent duty S3 – 60 %											
100 L	1320	1.8	12.9	2.9	4.6	15	3.3	85	0.007	**1LV9 107-4** ■■■■	48.5
112 M	1400	2.6	18	3.8	6.1	16	4.3	110	0.013	**1LV9 113-4** ■■■■	57
112 M	1375	3.5	24.3	3.5	9.1	16	5	140	0.014	**1LV9 114-4** ■■■■	59
132 M	1410	4.5	30.5	3.9	10.5	22	3.7	140	0.025	**1LV9 133-4** ■■■■	78
132 M	1425	5.3	35.5	4.2	12	20	5.2	170	0.033	**1LV9 134-4** ■■■■	89
132 M	1430	6.6	41.1	3.7	15	23.5	4.2	180	0.036	**1LV9 135-4** ■■■■	95
160 M	1435	8.5	56.6	3.8	20	30	3.45	180	0.065	**1LV9 163-4** ■■■■	150
160 L	1445	12.5	82.6	4.4	33	30	5	260	0.086	**1LV9 166-4** ■■■■	162
180 L	1455	17.5	116	3.8	39	41	3.8	270	0.171	**1LV9 186-4** ■■■■	243
200 L	1450	21	138	3.7	44	57	2.33	230	0.22	**1LV9 206-4** ■■■■	273
200 L	1450	25	165	3.9	50	57	2.73	270	0.26	**1LV9 207-4** ■■■■	288
Intermittent duty S3 – 100 %											
100 L	1360	1.5	10.5	3.6	4.1	12	4.1	85	0.007	**1LV9 107-4** ■■■■	48.5
112 M	1410	2.2	15	4.5	5.6	13	4.9	110	0.013	**1LV9 113-4** ■■■■	57
112 M	1390	3	20.6	4.1	8.3	14	5.8	140	0.014	**1LV9 114-4** ■■■■	59
132 M	1420	4	26.9	4.4	9.5	19	4.25	140	0.025	**1LV9 133-4** ■■■■	78
132 M	1430	4.8	32	4.7	11.2	17.6	5.6	170	0.033	**1LV9 134-4** ■■■■	89
132 M	1440	5.5	37	4.5	13	19	5.2	180	0.036	**1LV9 135-4** ■■■■	95
160 M	1440	7.5	49.6	4.3	19	27	3.85	180	0.065	**1LV9 163-4** ■■■■	150
160 L	1450	11	72.4	5	32	27	5.6	260	0.086	**1LV9 166-4** ■■■■	162
180 L	1460	15	94	4.5	36	35	4.45	270	0.171	**1LV9 186-4** ■■■■	243
200 L	1460	18.5	121	4.2	37	50	2.66	230	0.22	**1LV9 206-4** ■■■■	273
200 L	1455	22	145	4.5	45	50	3.12	270	0.26	**1LV9 207-4** ■■■■	288

For order number suffixes, see Page 7/140; for options, see Page 7/141

For ordering example, see Page 7/141.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. –5 %
- Characteristic rotor resistance k: approx. +20 %

1LV9 motors, shaft heights 100 L to 200 L with disk brake

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	Three-phase slip-ring motors 1LV9 shaft heights 100 L to 200 L	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1000 rpm (max. permissible operating speed 2500 rpm)											
Intermittent duty S3 – 15 %											
100 L	880	1.8	19.5	2.8	6	15	2.7	80	0.011	**1LV9 107-6** ■■■■	48.5
112 M	930	2.5	25.7	2.5	7.3	19	2.4	90	0.019	**1LV9 113-6** ■■■■	57
112 M	870	3.8	43	2.1	10.8	23	2.9	115	0.019	**1LV9 114-6** ■■■■	57
132 M	850	5.2	58.4	2.1	13.8	34	1.85	110	0.033	**1LV9 133-6** ■■■■	78
132 M	900	6	64	2.4	15.7	31	2.2	130	0.039	**1LV9 134-6** ■■■■	89
132 M	870	7	77	2.2	19.5	38	2.1	140	0.047	**1LV9 135-6** ■■■■	95
160 M	930	9.5	98	2.2	28	34	2.9	180	0.097	**1LV9 163-6** ■■■■	150
160 L	920	13.5	142	2	31	36	4.2	260	0.131	**1LV9 166-6** ■■■■	162
180 L	930	21	216	2.1	45	58	2.3	230	0.21	**1LV9 186-6** ■■■■	243
200 L	940	28	285	2.2	57	69	2.1	255	0.26	**1LV9 207-6** ■■■■	254
Intermittent duty S3 – 25 %											
100 L	890	1.7	18.2	2.8	5.8	13.5	3	80	0.011	**1LV9 107-6** ■■■■	48.5
112 M	940	2.3	23.4	2.7	6.9	17	2.65	90	0.019	**1LV9 113-6** ■■■■	57
112 M	890	3.3	37.1	2.5	9.7	20	3.3	115	0.019	**1LV9 114-6** ■■■■	57
132 M	875	4.7	51.3	2.4	13.2	32	2	110	0.033	**1LV9 133-6** ■■■■	78
132 M	920	5.2	54	2.8	14.3	26	2.7	130	0.039	**1LV9 134-6** ■■■■	89
132 M	890	6.5	70	2.4	18.2	34	2.4	140	0.047	**1LV9 135-6** ■■■■	95
160 M	940	8	81	2.7	19	29	3.6	180	0.097	**1LV9 163-6** ■■■■	150
160 L	930	11.5	118	2.4	27	32	4.7	260	0.131	**1LV9 166-6** ■■■■	162
180 L	940	17.5	178	2.5	38	48	2.8	230	0.21	**1LV9 186-6** ■■■■	243
200 L	950	24	240	2.5	49	59	2.5	255	0.26	**1LV9 207-6** ■■■■	254
Intermittent duty S3 – 40 %											
100 L	900	1.5	16	3.1	5.6	12	3.55	80	0.011	**1LV9 107-6** ■■■■	48.5
112 M	950	2	20	3.2	6.4	15.5	3.25	90	0.019	**1LV9 113-6** ■■■■	57
112 M	910	3	32.9	2.8	9.2	18	3.7	115	0.019	**1LV9 114-6** ■■■■	57
132 M	900	4	42.7	2.9	12.1	26	2.45	110	0.033	**1LV9 133-6** ■■■■	78
132 M	930	4.5	46	3.3	13.2	22	3.1	130	0.039	**1LV9 134-6** ■■■■	89
132 M	910	5.5	58	2.8	15.8	26.5	3.05	140	0.047	**1LV9 135-6** ■■■■	95
160 M	950	7	70	3.1	17.4	25	4	180	0.097	**1LV9 163-6** ■■■■	150
160 L	940	10	102	2.8	24	27	5.6	260	0.131	**1LV9 166-6** ■■■■	162
180 L	950	15	151	2.9	34	41	3.2	230	0.21	**1LV9 186-6** ■■■■	243
200 L	955	20	200	3	42	49	3	255	0.26	**1LV9 207-6** ■■■■	254

For order number suffixes, see Page 7/140; for options, see Page 7/141

For ordering example, see Page 7/141.

Selection and ordering data (continued)

Shaft height	Rated speed	Rated output	Rated torque M_{rated}	M_k/M_{rated} ±10 %	Rated current I at 400 V	Rotor current i	Characteristic rotor resistance k	Rotor standstill voltage u	Moment of inertia J	Three-phase slip-ring motors 1LV9 shaft heights 100 L to 200 L	Weight approx.
	rpm	kW	Nm		A	A		V	kgm^2	Order No.	kg
Synchronous speed 1000 rpm (max. permissible operating speed 2500 rpm)											
Intermittent duty S3 – 60 %											
100 L	920	1.3	13.5	3.6	5.7	11	4.2	80	0.011	**1LV9 107-6** ■■■■	48.5
112 M	960	1.8	18	3.7	6.2	13.5	3.6	90	0.019	**1LV9 113-6** ■■■■	57
112 M	925	2.6	28	3.3	8.5	15	4.4	115	0.019	**1LV9 114-6** ■■■■	57
132 M	910	3.6	37.8	3.3	11.4	23	2.75	110	0.033	**1LV9 133-6** ■■■■	78
132 M	935	4.1	42	3.7	12.4	20	3.6	130	0.039	**1LV9 134-6** ■■■■	89
132 M	925	4.8	50	3.2	15	23	3.5	140	0.047	**1LV9 135-6** ■■■■	95
160 M	960	6	60	3.6	16.2	21	4.9	180	0.097	**1LV9 163-6** ■■■■	150
160 L	950	8.5	85	3.2	22	23	6.5	260	0.131	**1LV9 166-6** ■■■■	162
180 L	955	13	130	3.3	30	35	3.8	230	0.21	**1LV9 186-6** ■■■■	243
200 L	960	17.5	174	3.5	38	42	3.5	255	0.26	**1LV9 207-6** ■■■■	254
Intermittent duty S3 – 100 %											
100 L	935	1.1	11.2	4.3	5	9.2	4.9	80	0.011	**1LV9 107-6** ■■■■	48.5
112 M	965	1.5	15	4.5	5.7	11.5	4.1	90	0.019	**1LV9 113-6** ■■■■	57
112 M	940	2.2	23.3	4	8	13	5.1	115	0.019	**1LV9 114-6** ■■■■	57
132 M	920	3	31	4	11	18	3.5	110	0.033	**1LV9 133-6** ■■■■	78
132 M	940	3.5	35.6	4.4	11.6	18	4.4	130	0.039	**1LV9 134-6** ■■■■	89
132 M	940	4	40	3.8	14	18.5	4.4	140	0.047	**1LV9 135-6** ■■■■	95
160 M	965	5.5	54.5	4	15.2	20	5.2	180	0.097	**1LV9 163-6** ■■■■	150
160 L	960	7.5	74.6	3.7	20	21	7.2	260	0.131	**1LV9 166-6** ■■■■	162
180 L	960	11	109	3.9	27	30	4.4	230	0.21	**1LV9 186-6** ■■■■	243
200 L	965	15	148	4	35	36	4.1	255	0.26	**1LV9 207-6** ■■■■	254

For order number suffixes, see Page 7/140; for options, see Page 7/141

For ordering example, see Page 7/141.

At 460 V 3 AC, 60 Hz, the technical data change as follows:

- Speed: approx. +20 %
- Rated output: approx. +10 %
- Rotor standstill voltage: approx. +15 %
- Rotor current: approx. -5 %
- Characteristic rotor resistance k: approx. +20 %

1LV9 motors, shaft heights 100 L to 200 L with disk brake

Selection and ordering data (continued)

Order No. supplement

Position in the order number	1	2	3	4	5	6	7		8	9	10	11	12		
	1	**L**	**V**	**9**	**.**	**.**	**.**	**–**	**.**	■	■	■	■	**–**	**Z**
Shaft height															
Number of poles															
Version															
• Standard										**A**					
• With enhanced corrosion protection										**B**					
Design of the brake [3]															
• Disk brake 100 Nm											**A**				
• Disk brake 250 Nm											**B**				
• Disk brake 60 Nm											**D**				
Voltage and frequency															
50 Hz															
• 380 V												**1**			
• 400 V												**4**			
• 500 V												**3**			
• 660 V												**7**			
• 690 V												**6**			
60 Hz															
• 460 V												**8**			
Other voltage and/or frequency [1]												**9**			
Type															
• IM B3													**0**		
• IM B5													**1**		
• IM V1 (with protective cover)													**4**		
Special version [2]															**Z**

For ordering example, see Page 7/141.

[1] Option: Order code L1Y and plain text.

[2] Order No. supplement "**-Z**" only if ordering with order code and plain text, if required. Specify special versions with order code, see table on Page 7/141.

[3] Availability dependent on the shaft height as shown in the table on Page 7/134.

Selection and ordering data (continued)

Options

Additional identification codes for special 1LV9 motor versions

Version	For explanations see Page	Order No. supplement "**-Z**" with order code and/or plain text
Higher coolant temperatures or installation altitude on request	7/99	CT ... °C (round up to 5°) or installation altitude ... m above sea level (round up to 500 m) Specify required output
Motor protection by PTC thermistor [1] - With three embedded temperature sensors for alarm - With three embedded temperature sensors for tripping - With six embedded temperature sensors for alarm and tripping	7/130	**A10** **A11** **A12**
Non-standard cable entry Rotation of terminal box through 180°	7/93	**K85**
Terminal box, side, right Terminal box, side, left	7/93	**K09** **K10**
Second standard shaft extension [2]	7/94	**K16**
Radial seal at DE for flange-mounting motors [3]	7/96	**K17**
Reinforced bearing at DE	7/96	**K20**
Standstill heating - For 230 V - For 115 V	7/98	**K45** **K46**
Fitted tacho-generator GMP 1.0 s-4; IM B5	7/130	**G37**
Paint finish: - Standard paint finish in colors other than RAL 7030 - Special paint finish in RAL 7030 - Special paint finish in colors other than RAL 7030	7/98	**Y53** – and additional plain text: Standard paint finish RAL... **K26** **Y54** – and additional plain text: Special paint finish RAL...
Regreasing device	7/96	**K40**
Degree of protection IP55 for motor	7/130	**K49**
Manual brake release	7/131	**K86** Manual brake release 60 Nm **K87** Manual brake release 100 Nm **K88** Manual brake release 250 Nm

Ordering example

Selection criteria	Order No.											Order code
Hoisting gear motor with disk brake	**1LV9**											
Shaft height 160 L (10 kW at S3 – 40 %)		**166**										
6-pole, 1000 rpm				**6**								
Standard version					**A**							
Braking torque M_B = 250 Nm						**B**						
Rated voltage 3 AC, 50 Hz, 380 V							**1**					
Type IM B3								**0**				
Identification for special version										**Z**		
Order code for manual brake release 250 Nm												**K88**
Complete identification codes for required version of motor	**1LV9**	**166**	**–**	**6**	**A**	**B**	**1**	**0**	**–**	**Z**		
	K88											

[1] For appropriate tripping unit, see Catalog LV1.

[2] For motors as of shaft height 180 M in vertical construction types, the transmittable torque needs to be recalculated (please inquire).

[3] Not possible for construction type IM V3.

Dimension drawings

Binding dimensions

The dimensions specified for the construction types listed on the right are binding for all listed versions.

For motors	Dimensions	Version according to DIN
IM B3	a, b, h, s, w_1, d, l, t, u	42681
IM B5 IM V1	b_1, e_1, i_2, s_2, d, l, t, u	42948

In accordance with DIN 332, sheet 2, all shaft extensions have a centering thread (see table on right):

Shaft extension diameter	Thread
Up to 30 mm	M10
More than 30 up to 38 mm	M12
More than 38 up to 50 mm	M16
More than 50 up to 85 mm	M20

Fits

Flange dimension b_1, shaft extension dimension d, as well as keyway and featherkey dimensions t and u are as shown on the right:

Dimensions Dimension		Fit	Version according to DIN
b_1	Up to 230 mm	j6	7160
	More than 230 mm	h6	7160
d	Up to 11 mm	j6	7160
	More than 11 up to 50 mm	k6	7160
		m6	7160
	More than 50 mm		
t, u		–	6885, sheet 2

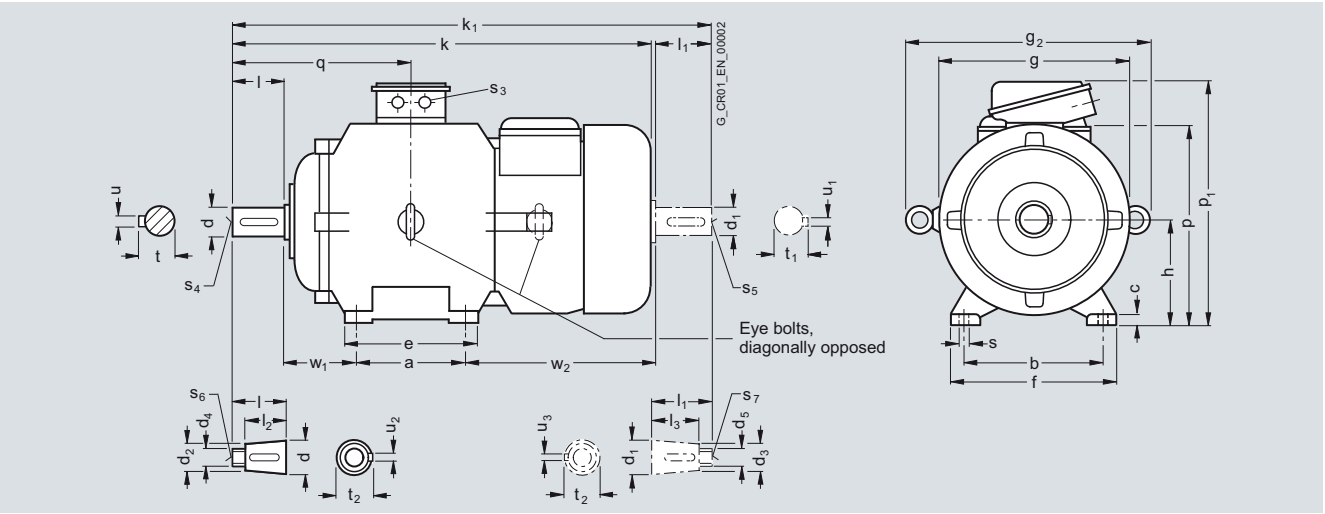
Tolerances

The tolerances for dimensions a, b, c_1, and h as specified on the right must be maintained:

Dimensions		Tolerances mm
a, b	Up to 250 mm	± 0,75
	More than 250 up to 500 mm	± 1,0
	More than 500 up to 700 mm	± 1,5
c_1	Up to 200 mm	± 0,25
	More than 200 up to 500 mm	± 0,5
	More than 500 mm	± 1,0
h	Up to 250 mm	– 0,5
	More than 250 mm	– 1,0

Dimension drawings (continued)

Type IM B3



For motor Shaft height	Type	DIN IEC	Dimensions in mm a B	b A	c HA	e BB	f AB	g AC	g_2	h H	k L	k_1 LC	p HB	p_1 HD	q	s 1) K	s_3 K	w_1 C	w_2 CA
100 L	1LV9 107		140	160	14	175	200	195	268	100	583	639	198	273	193	M10	2 x M25 x 1.5	63	326
112 M	1LV9 113		140	190	14	175	235	219	282	112	627.5	683.5	222	297	200	M10	2 x M25 x 1.5	70	364
	1LV9 114																		
132 M	1LV9 133		178	216	18	220	260	260	350	132	727	821	265	327	258	M10	2 x M32 x 1.5	89	394
	1LV9 134																		
	1LV9 135																		
160 M	1LV9 163		210	254	24	264	314	315	422	160	865	975	320	413	232	M12	2 x M40 x 1.5	108	467
160 L	1LV9 166		254			308					909	1019			345				
180 L	1LV9 186		279	279	26	310	350	350	456	180	1015	1155	360	450	370.5	M12	2 x M40 x 1.5	121	535
200 L	1LV9 206		305	318	30	365	400	388	512	200	1046	1186	394	496	395.5	M16	2 x M50 x 1.5	133	573
	1LV9 207																		

For motor			cyl. shaft extensions DE 3)					cyl. shaft extensions NDE				
Shaft height	Type	DIN IEC	d D 2)	l E 2)	t GA 2)	u F 2)	s_4	d_1 DA 2)	l_1 EA 2)	t_1 GA 2)	u_1 F 2)	s_5
100 L	1LV9 107		28	60	31	8	M10	24	50	27	8	M8
112 M	1LV9 113		28	60	31	8	M10	24	50	27	8	M8
	1LV9 114											
132 M	1LV9 133		38	80	41	10	M12	32	80	35	10	M12
	1LV9 134											
	1LV9 135											
160 M	1LV9 163		42	110	45	12	M16	38	80	41	10	M12
160 L	1LV9 166											
180 L	1LV9 186		48	110	51.5	14	M16	42	110	45	12	M16
200 L	1LV9 206		55	110	59	16	M20	42/48	110	45/51.5	12/14	M16
	1LV9 207											

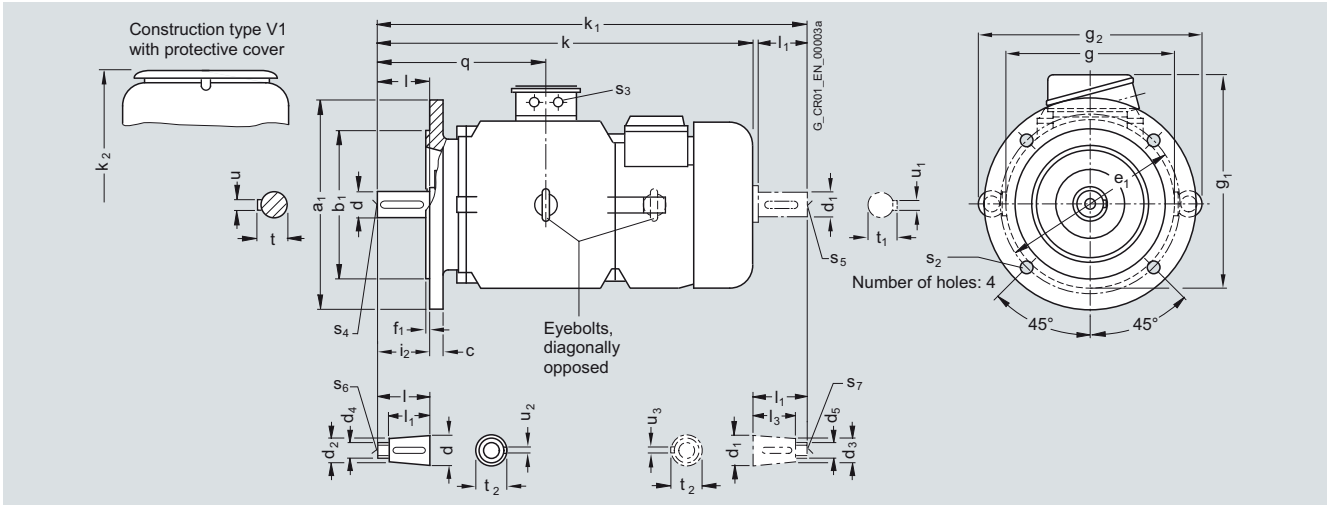
For motor			conical shaft extensions DE 4)								conical shaft extension NDE 5)							
Shaft height	Type	DIN IEC	d	d_2	d_4	l	l_2	t_2	u_2	s_6	d_1	d_3	d_5	l_1	l_3	t_3	u_3	s_7
180 L	1LV9 186		48	39.8	M30 x 2	110	82	48.9	12	M10								
200 L	1LV9 206		55	46.8	M36 x 3	110	82	56.4	14	M12								
	1LV9 207																	

1) Construction type IMV1 with protective cover.
2) Conical shaft extension for shaft heights 100 to 160 on request.
3) Designation defined for cylindrical shaft extensions only.
4) Cyl. shaft extension for shaft heights 180 and 200, non-standard.
5) On request.

1LV9 motors, shaft heights 100 L to 200 L with disk brake

Dimension drawings (continued)

Types IM B5 and IM V1



For motor Shaft height	Type	DIN IEC	Dimensions in mm a_1 B	b_1 A	c_1 LA	e_1 M	f_1 T	s_2 S	g AC	g_1	g_2	i_2 LE	k L	k_1 LC	k_2 [1] LM	q	s_3 K
100 L	1LV9 107		250	180	16	215	4	14	195	271	268	60	583	639	609	193	2 x M25 x 1.5
112 M	1LV9 113		250	180	16	215	4	14	219	295	282	60	628	683.5	654	200	2 x M25 x 1.5
	1LV9 114																
132 M	1LV9 133		300	230	20	265	4	14	260	325	350	80	727	821	757	258	2 x M32 x 1.5
	1LV9 134																
	1LV9 135																
160 M	1LV9 163		350	250	20	300	5	18	315	410	422	110	865	975	900	323	2 x M40 x 1.5
160 L	1LV9 166												909	1019	1048	345	
180 L	1LV9 186		350	250	20	300	5	18	350	445	456	110	1015	1155	1053	370.5	2 x M40 x 1.5
200 L	1LV9 206		400	300	20	350	5	18	388	485	512	110	1091	1231	1131	395.5	2 x M50 x 1.5
	1LV9 207																

For motor			cyl. shaft extensions DE [2]					cyl. shaft extensions NDE				
Shaft height	Type	DIN IEC	d D [3]	l E [3]	t GA [3]	u F [3]	s_4	d_1 DA [3]	l_1 EA [3]	t_1 GA [3]	u_1 F [3]	s_5
100 L	1LV9 107		28	60	31	8	M10	24	50	27	8	M8
112 M	1LV9 113		28	60	31	8	M10	24	50	27	8	M8
	1LV9 114											
132 M	1LV9 133		38	80	41	10	M12	32	80	35	10	M12
	1LV9 134											
	1LV9 135											
160 M	1LV9 163		42	110	45	12	M16	38	80	41	10	M12
160 L	1LV9 166											
180 L	1LV9 186		48	110	51.5	14	M16	42	110	45	12	M16
200 L	1LV9 206		55	110	59	16	M20	42/48	110	45/51.5	12/14	M16
	1LV9 207											

For motor			conical shaft extensions DE [4]								conical shaft extension NDE [5]							
Shaft height	Type	DIN IEC	d	d_2	d_4	l	l_2	t_2	u_2	s_6	d_1	d_3	d_5	l_1	l_3	t_3	u_3	s_7
180 L	1LV9 186		48	39.8	M30 x 2	110	82	48.9	12	M10								
200 L	1LV9 206		55	46.8	M36 x 3	110	82	56.4	14	M12								
	1LV9 207																	

[1] Through-hole for bolt.
[2] Designation defined for cylindrical shaft extensions only.
[3] Conical shaft extension for shaft heights 100 to 160 on request.
[4] Cyl. shaft extension for shaft height 180 and 200, non-standard.
[5] On request.

Spare parts

Motor type 1LV9	Order No. Brush holders 1 set = 3 pcs per motor	Carbon brushes 1 set = 6 units per motor	Slip-ring assembly
107	1LY7 710	1LY8 810	1LY9 910
113 **114**	1LY7 711	1LY8 811	1LY9 911
133 **134** **135**	1LY7 712	1LY8 812	1LY9 912
163 **166**	1LY7 713	1LY8 813	1LY9 913
186	1LY7 714	1LY8 814	1LY9 914
206 **207**	1LY7 715	1LY8 815	1LY9 915

Spring-loaded brake (complete brake)	
Brake with 60 Nm	Type 06.08.210
Brake with 100 Nm	Type 07.08.210
Brake with 250 Nm	Type 09.08.210

Notes

Crane components

Crane controllers 3SJ9

Overview

Rotatable crane controller 3SJ9 130

Cranes in modern production processes and large loading and unloading facilities must satisfy demanding and varied requirements. This applies not only to the mechanical and electrical equipment of the crane. Optimal working conditions must also be created for the crane drivers so that they can concentrate fully on the job in hand.

The crane controllers presented here satisfy this requirement. They support practical arrangement of switchgear to provide the crane driver with a clear overview of the complete working area of the crane and minimizes the physical strain. The crane controllers are designed to be installed in extremely small and compact crane driver cabs.

They not only provide a space for mounting the master controller, but also for pushbuttons and indicator lamps for controlling and monitoring the crane switch and the auxiliary circuits.

Rotatable crane controller 3SJ9 130

Ergonomically shaped housings of polyurethane foam are arranged on both sides of a comfortable, high-grade upholstered seat. Double master controllers 3SJ3, control and signaling devices as well as panel meters can be installed as standard in these housings.

Adjustable-height armrests are fitted recessed in the housings at the inner rear.

Advantages:

- Standard unit with maximum comfort
- Well-designed, self-contained unit
- Rotatable by 180° to one side and 90° to the other side on a base foot

The detailed description on the following pages also serves as a guide for configuring other crane controllers.

Rotatable crane controller, compact version

Rotatable crane controller, compact version [1)]

This more compact device offers a range of possible adjustments to the driver's seat; it provides a high degree of comfort due to the ergonomic design.

Rotatable crane controller with manual and/or motorized adjustment possibilities

Rotatable crane controller with manual and/or motorized adjustment possibilities [1)]

Manual adjustment:

- Horizontal and vertical seat area
- Adjustable inclination of the seat, backrest and armrests
- Weight adjustment for optimum spring action, horizontal and vertical control consoles

Motorized adjustment:

- Height adjustment of seat with control consoles at rear and/or front (inclination adjustment)
- Longitudinal adjustment of seat with consoles
- Selector pushbutton for motorized adjustment in the console, 24 V DC motor

[1)] On request

Design

Rotatable crane controller 3SJ9 130

The rotatable crane controller 3SJ9 130 comprises:

- A high-grade and comfortable upholstered seat, optionally with or without headrest and seatbelt
- Two ergonomically shaped housings made of polyurethane foam. This material is particularly pleasant to touch.
- Recessed armrests which are height adjustable.
- Rotating foot with horizontal cross-member duct with which the housings and the upholstered seat are connected. The unit can be rotated by 90° to the left and 180° to the right on its rotating foot.

The housings are divided. The upper part swings open to the front and the outer cover of the lower part can be removed entirely, so that the built-in equipment and all connections are easily accessible.

The top surfaces of the upper parts are inclined and therefore more easily viewed by the crane driver. This surface is intended for important fault indicators, operator signals and meters.

The upholstered seat is secured on a cover of the cross-member duct and can be tilted fully forward. Equipment installed in the cross-member duct can therefore be accessed without difficulty.

The rotatable crane controller can be supplied unwired or with completed internal wiring.

The rotatable crane controller can also be supplied with height adjustment, i.e. the cross-member duct with the side elements and upholstered seat is raised with respect to the rotating frame (on request).

The crane controller can also be supplied with motorized rotation. 24 V DC motor (on request).

Built-in elements

The following can be installed in each housing upper section:

On mounting surface E2 inclined within view in front of the switching lever:

- One or two panel meters, one LCD or eight indicator lamps (22 mm Ø) up to 75 mm max. mounting depth

On mounting surface E1 top of housing:

- One or two double master controllers 3SJ3
- Up to 24 control devices 3SB (22 mm Ø) on the surface behind the switching lever, if only one double master controller is installed
- Up to 15 control devices 3SB (22 mm Ø), if two double master controllers are installed
- Command switch (depending on the other built-in elements)
- Gooseneck microphone instead of two signaling devices
- Telephone in the rear area next to the armrests (can be installed recessed or positioned detached)

The following can be installed in each housing lower section:

- One terminal strip with terminals up to size 6
- One electronic terminal strip ET 200

Setpoint generator for variable-speed drives

Master controllers fitted with an analog or digital setpoint generator are needed for controlling variable-speed drives. The following can be fitted in the housings of the crane control seat:

- Digital master controller 3SJ3 with opto-electronic encoder (OEC)
- Master controller 3SJ3 with wire-wound potentiometer

Accessories

The following can also be fitted or supplied at extra cost:

- An adjustable-height headrest for the upholstered seat
- A seatbelt with two-point attachment or with automatic roll and three-point attachment

A highly flexible cable harness, connected to the cable strip, with free cable ends can be supplied for external wiring.

Wiring

For crane controllers with finished internal wiring, the connections of all integral equipment are made on a terminal strip with terminals up to size 6 or an electronic terminal strip ET 200.

The external wiring cables are routed from the terminal strip through the rotating foot into the cable floor of the crane cab. Due to the mechanical stress caused by rotation of the crane control seat, we recommend single-core non-sheathed cables 5DR7 053 for these connections. To prevent damage to the cables during rotation of the crane controller, they must be clamped and bunched in the cross-member duct before the transition to the rotating foot. The cable floor of the crane driver's cab must be at least 100 mm in depth.

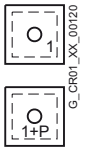
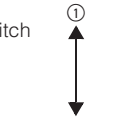
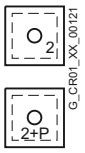
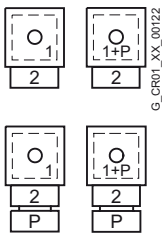
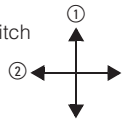
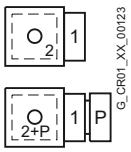
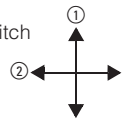
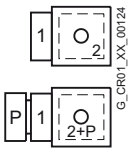
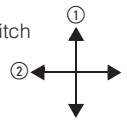
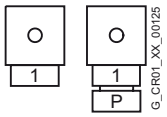
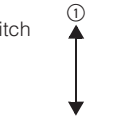
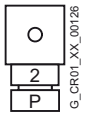
Crane controllers 3SJ9

Design (continued)

Mounting possibilities – Double master controllers and setpoint generators

Double master controllers 3SJ3, fitted with setpoint generators for variable-speed drives if required, can be installed in the two housings with the following switch arrangements.

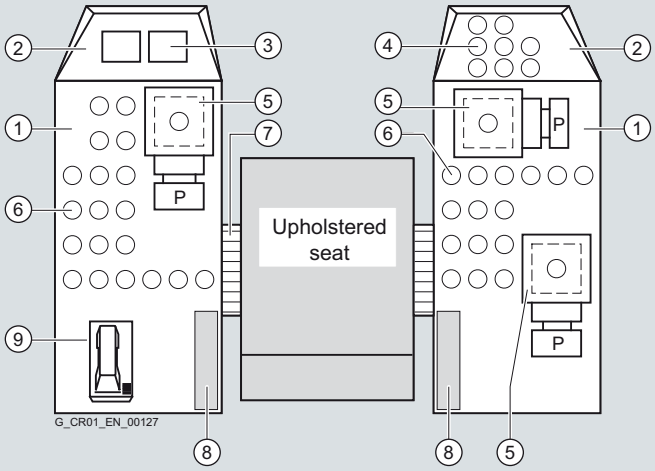
The full order numbers of the double master controllers are listed on Pages 8/21 and 8/23.

Double master switches View from above	Direction of motion	Order No.	Location of mounting surface	Surface mounting switches and setpoint generators
	Switch 	3SJ3...-...08 3SJ3...-...08-Z	08 C	Switch 1: 4 to 6 contact elements or Switch 1: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator.
	Switch 	3SJ3...-...12 3SJ3...-...12-Z	12 C	Switch 2: 4 to 6 contact elements or Switch 2: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator.
	Switch 	3SJ3...-...05 3SJ3...-...05-Z	05 C / E	Switches 1 and 2: 4 to 6 contact elements or Switch 1: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator. Switch 2: 4 to 6 contact elements or Switch 1: 4 to 6 contact elements Switch 2: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator. or Switches 1 and 2: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator.
	Switch 	3SJ3...-...06 3SJ3...-...06-Z	06 C / E	Switches 1 and 2: 4 to 6 contact elements or Switch 2: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator. Switch 1: 4 to 6 contact elements + setpoint generator Only an OEC can be fitted as the setpoint generator
	Switch 	3SJ3...-...07 3SJ3...-...07-Z	07 C / E	Switches 1 and 2: 4 to 6 contact elements or Switch 2: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator. Switch 1: 4 to 6 contact elements + setpoint generator Only an OEC can be fitted as the setpoint generator
	Switch 	3SJ3...-...15 3SJ3...-...15-Z	15 E	Switch 1: 4 to 6 contact elements or Switch 1: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator.
	Switch 	3SJ3...-...14-Z	14 E	Switch 2: 4 to 6 contact elements + setpoint generator An OEC or wire-wound potentiometer can be fitted as the setpoint generator.

P: Encoder/wire-wound potentiometer

Design (continued)

Mounting possibilities – Double master controllers and setpoint generators



1. Installation surface E1
2. Installation surface E2
3. Control panel instruments
4. Indicator lamps, Ø22 mm
5. Connected drive, double master controller 3SJ3
6. Signaling devices, Ø22 mm
7. Cross-member duct mounted on rotating foot as support for the upholstered seat and the housing
8. Arm rests, recessed, adjustable height
9. Phone

P Digital setpoint generator or wire-wound potentiometer

Mounting possibilities for master controllers and encoders in the crane controller

Technical data

Specifications acc. to IEC 60947-5-1: 2003

Degree of protection	IP54	IEC 60947-5-1 EN 60 947
Paint finish on metal parts	Anthracite grey RAL 9011	IEC 60529 DIN 40 050
Color shade of plastic housings and covers	Anthracite grey 614	
Permissible ambient temperature for operation during storage	–40 °C to +60 °C –50 °C to +60 °C	
Climatic stress	Damp heat, constant Damp heat, cyclic	DIN 68 Part 2-3,DIN IEC 6068 Part 2-30

Selection and ordering data

Rotatable crane controller	Version	Order No.	Order code	Weight without fitted parts approx. kg	Weight net approx. kg
Basic version	Rotating foot with cross-member duct, upholstered seat, 2 housings without connection terminals no fitted equipment IP54 degree of protection	**3SJ9 130-0A**	**–**	90	**–**
Special version	Headrest on upholstered seat	**–**	**K01**	–	1
	Seatbelt with 2-point attachment	**–**	**L01**	–	0.5
	Seatbelt with 4-point attachment braces belt	**–**	**L02**	–	1

Specify when ordering:

Add **-Z** to Order No. and specify order code.

For enquiries and orders, please copy "Inquiry and order sheets 1 to 3 (Pages 8/6 to 8/14)" and enclose them with the inquiry/order after filling them out.

Selection and ordering data (continued)

Inquiry and order sheet 1

Customer	Item	Order reference	Date

Rotatable crane controller

to IP 54 degree of protection 3SJ9 130-0A ☐

Order No. with -Z and order code

Head support	K01	☐
Standard seatbelt	L01	☐
Automatic belt	L02	☐

Built-in elements

Double master controller 3SJ3

Quantity	Order No.	
	3SJ3 ☐☐☐ - ☐☐☐☐☐ - ☐	
	3SJ3 ☐☐☐ - ☐☐☐☐☐ - ☐	
	3SJ3 ☐☐☐ - ☐☐☐☐☐ - ☐	
	3SJ3 ☐☐☐ - ☐☐☐☐☐ - ☐	

If add-on parts are to be mounted on the double master controllers -Z must be appended to the Order No.

Quantity	Add-on parts, e.g.	Order code	Order No.	
	OEC[1] - 8 Bit, PROFIBUS conn.	A03/B04	6GA4603-5AA00	
	OEC[1] - 8 Bit, digital	A05/B06	6GA4603-2AA00	
	OEC[1] - analog	A07/A08	6GA4603-3AA00	
	OEC[1] - analog	A09/A010	6GA4603-4AA00	
	Wire-wound potentiometer, non-linear	B01/B02	6KA9924-1	
	Wire-wound potentiometer, linear	B03/B04	6KA9924-2	
	Spring return	D01/D02		
	Switching gate	Y01		
	Friction brake	E01/E02		

Wiring

	without internal wiring	
	Internal wiring 1.5 mm^2, highly flexible	
	External wiring 1.5 mm^2 Highly flexible power lead with free outputs, single- end terminal connection	Length ☐ m

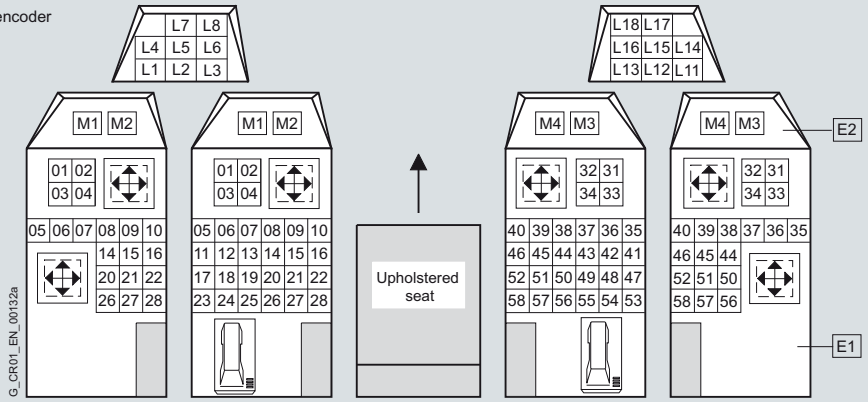
Installation of control and signaling devices Ø22

Quantity	Object	Type
	Pushbutton, 1 NO + 1 NC	3SB
	Mushroom pushbutton, 1 NO + 1 NC	3SB
	Knob switch, 1 NO + 1 NC	3SB
	CES safety lock, 1 NO + 1 NC	3SB
	Illuminated pushbutton, 1 NO + 1 NC	3SB
	Illuminated pushbutton with series element, 1 NO + 1 NC	3SB
	Indicator light	3SB
	Indicator light with series element	3SB
	Command switch, up to 3 contact blocks	

Miscellaneous mounting components

	Buzzer			
	Control panel instruments			
	Knee puschbutton	Left ☐	Right ☐	
	Microphone	Left ☐	Right ☐	
	Telephone	Left ☐	Right ☐	
	Electronic terminal block ☐		ET 200 ☐	

1) OEC: Opto-electronic encoder



Selection and ordering data (continued)

Notes on inquiry and order sheet 1

❶ Enter the name of the customer, order reference, article and date.

❷ Enter the quantity and check the box for the type required.

❸ Enter the quantity and full Order No. for the double master controller to be fitted (see "Selection and Ordering Data")

❹ Enter the quantity of additional parts to be built on to the double master controllers.

❺ Enter the quantity of control and signaling devices to be fitted.

❻ Enter the other devices to be installed. In the case of microphone and telephone, also check the box for the relevant side.

Panel meters are always fitted in mounting surface E2 (see inquiry and order sheet 3).

For a gooseneck microphone, two mounting locations for signaling devices are usually required.

A telephone is installed recessed on mounting surface E1, rear area next to the armrest, or left detached.

❼ Check whether the device is to be supplied without internal wiring or with finished internal wiring, and whether a cable harness for external wiring is to be supplied.

Inquiry and order sheet 1

❶ Customer | Item | Order reference | Date

❷ Rotatable crane controller
to IP 54 degree of protection — 3SJ9 130-0A ☐

Order No. with -Z and order code
Head support K01 ☐
Stanard seatbelt L01 ☐
Automatic belt L02 ☐

❸ Built-in elements

Double master controller 3SJ3

Quantity	Order No.	
1	3SJ3 022 - 4YY05 - Z	
1	3SJ3 020 - 5XA08 - Z	
	3SJ3 - -	
	3SJ3 - -	

If add-on parts are to be mounted on the double master controllers -Z must be appended to the Order No.

❹

Quantity	Add-on parts, e.g.	Order code	Order No.
2	OEC[1] - 8 Bit, PROFIBUS conn.	A03/B04	6GA4603-5AA00
1	OEC[1] - 8 Bit, digital	A05/B06	6GA4603-2AA00
	OEC[1] - analog	A07/A08	6GA4603-3AA00
	OEC[1] - analog	A09/A010	6GA4603-4AA00
	Wire-wound potentiometer, non-linear	B01/B02	6KA9924-1
		B03/B04	6KA9924-2
	Wire-wound potentiometer, linear		
	Spring return	D01/D02	-
	Switching gate	Y01	-
	Friction brake	E01/E02	-

❺ Installation of control and signaling devices Ø22

Quantity	Object	Type
3	Pushbutton, 1 NO + 1 NC	3SB
1	Mushroom pushbutton, 1 NO + 1 NC	3SB
	Knob switch, 1 NO + 1 NC	3SB
	CES safety lock, 1 NO + 1 NC	3SB
4	Illuminated pushbutton, 1 NO + 1 NC	3SB
	Illuminated pushbutton with series element, 1 NO + 1 NC	3SB
4	Indicator light	3SB
	Indicator light with series element	3SB
	Command switch, up to 3 contact blocks	

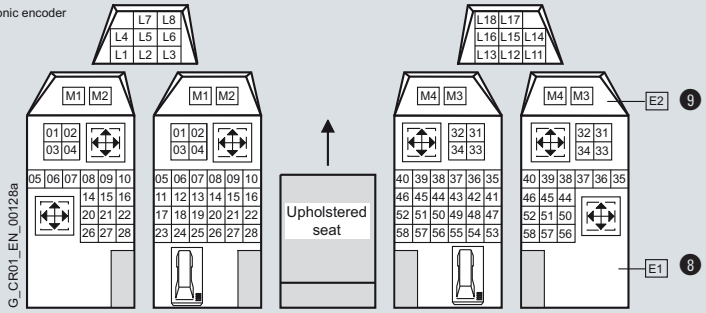
❻ Miscellaneous mounting components

	Buzzer			
3	Control panel instruments			
	Knee pushbutton	Left ☐	Right ☐	
	Microphone	Left ☐	Right ☐	
1	Telephone	Left ☒	Right ☐	
1	Electronic terminal block			ET 200 ☐

❼ Wiring

	Without internal wiring	
X	Internal wiring 1.5 mm², highly flexible	
X	External wiring 1.5 mm² Highly flexible power lead with free cable ends, terminated at one end	Length 6 m

1) OEC: Opto-electronic encoder



❽ Mounting option 1: One or two double master controllers 3SJ3 can be fitted per side element on mounting surface E1.

Fields 01 to 58 are intended for control and signaling devices of 22 mm diameter. The fields which can be occupied depend on the type of double master controller to be fitted, and are shown on inquiry and order sheets 3.1 and 3.2 (Pages 8/12 and 8/13).

❽ Mounting option 2: Up to eight indicator lamps of 22 mm diameter, or the following panel meters, can be fitted on mounting surface E2:

- 2 with 72 x 72 mm frame dimension or
- 1 with 96 x 96 mm frame dimension or
- 1 with 72 x 144 mm frame dimension or
- 1 LCD up to 72 x 144 mm frame dimension·
- Maximum mounting depth 75 mm. See inquiry and order sheet 3 (Page 8/10).

Selection and ordering data (continued)

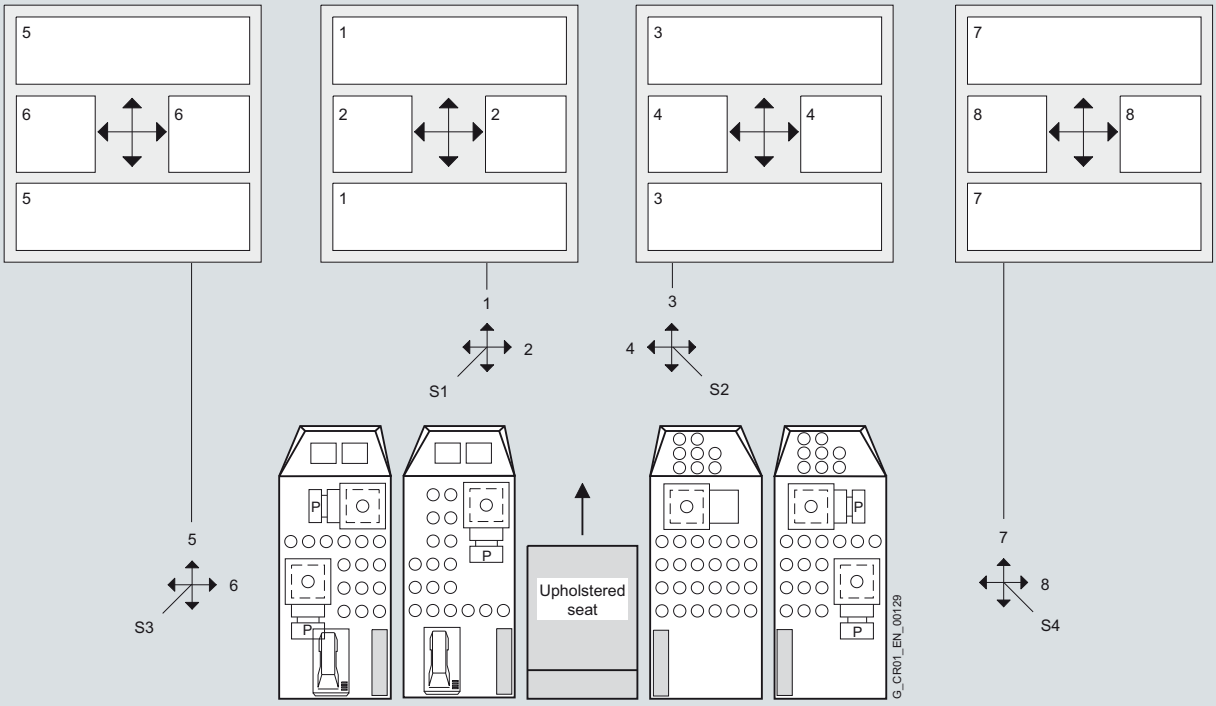
Inquiry and order sheet 2

Customer | Item | Order reference | Date

Versions and designations for double master controllers

Switch No.	Driving unit	Double master controller 3SJ3					Basic circuit diagram No.	Dest. code
		Version Order No.	Latching	Add-on part Order code	Circuit	Unit wiring diagram		
1								
2								
3								
4								
5								
6								
7								
8								

Location No.	Side panel	Signal encoder in switching lever/grip				Target code
		NO contact	NC contact	Pawl	Function	
S1	Left					
S2	Left					
S3	Right					
S4	Right					



Selection and ordering data (continued)

Notes on inquiry and order sheet 2

⑩ According to the directions of movement of the switching levers, enter the driving unit designations, data on the double master controller, circuit diagram and, in the case of wiring, the destination reference.

⑪ If a mechanical pushbutton, mechanical latch or capacitive enabling button is to be fitted in the ball handle of the switching lever, enter the function here and, in the case of wiring, also the destination reference.

⑫ The lettering of the labels for the drives should be entered in these field markings. The lettering can also be in a foreign language; in this case, please make the entry in the required language or provide the translation on a separate sheet.

A maximum of 20 characters are possible per field.

Inquiry and order sheet 2

Customer | Article | Order code | Date

Model and description of double master switches

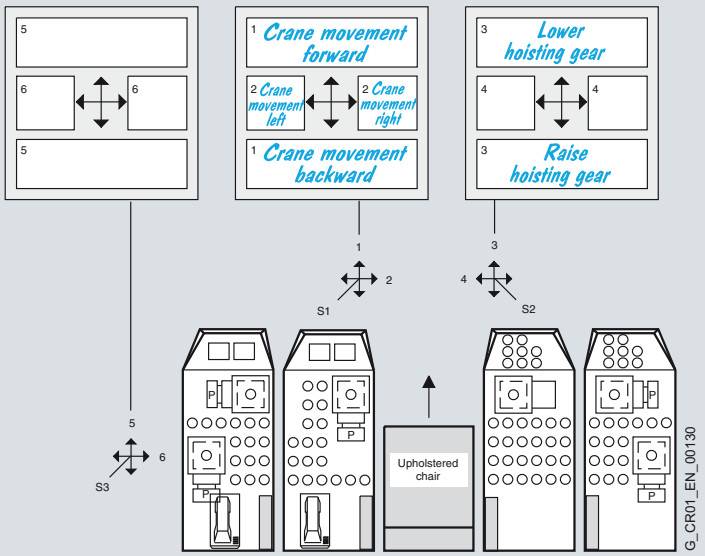
⑩

Switch no.	Driving unit	Duplex master controller 3SJ3					Basic circuit no.	Target code
		Model order no.	Latching	Extra part - abbr.- art. no.	Circuitry diagram no.	Unit wiring		
1	Crane chassis	3SJ3022-		A05+A06		MSP 210		1S1
2	Crane chassis	4YY05-Z				MSP 210		
3								
4								
5	Hoisting gear	3SJ3020-				MSP 220		1S2
6		5XA08-Z		A05				
7								
8								

⑪

Location no.	Side panel	Sensor in switching lever/handle				Target code
		NO contact	NC contact	Jack plug	Function	
S1	left	X			Warning signal	1A1
S2	left					
S3	right					
S4	right					

⑫



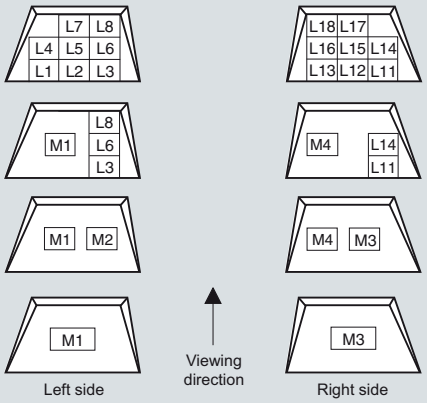
Selection and ordering data (continued)

Inquiry and order sheet 3

Customer | Item | Order reference | Date

Indicator lights, instruments, displays on installation surface E2

Mounting-location No. [1]	Panel instrument 72 x 72 mm Installation depth 75 mm	Panel instrument 72 x144 mm/ 96 x 96 mm Installation depth 75 mm	LCD-Display max. 72 x 144 mm Installation depth 75 mm	Knob switch 1 NO/1 NC	Illuminated puschbutton 1 NO/1 NC	Indicator light with series element 1 NO/1 NC	Indicator light	Indicator light with series element	Color	Operating voltage V	Labeling 2 x 10 letters each possible	Target code
Left side												
M1												
M2												
L1												
L2												
L3												
L4												
L5												
L6												
L7												
L8												
Right side												
M3												
M4												
L11												
L12												
L13												
L14												
L15												
L16												
L17												
L18												



Further details about the versions for built-in components M1 to M4

Mounting location	Type of instrument	Measuring range
M1		
M2		
M3		
M4		

G_CR01_EN_00131

Cannot be assigned

1) Check location.

8

Selection and ordering data (continued)

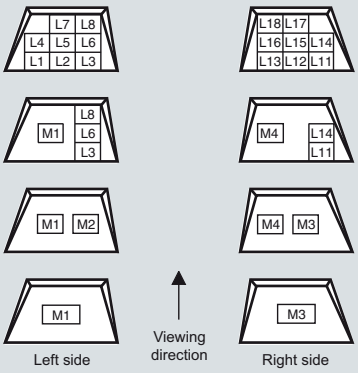
Notes on inquiry and order sheet 3

Inquiry and order sheet 3

Customer | Item | Order reference | Date

Indicator lights, instruments, displays on installation surface E2

Mounting location no.[1]	Panel instrument 72 x 72 mm installation depth 75 mm	Panel instrument 72 x 144 mm/ 96 x 96 mm installation depth 75 mm	LCD display max. 72 x 144 mm installation depth 75 mm	Knob. switch 1 NC/1 NO	Indicator button 1 NC/1 NO	Indicator button with series element 1 NC/1 NO	Indicator light	Indicator light with series element	Color	Operating voltage V	Labeling 2 x 10 letters each possible	Dest. code
Left side												
M1												
M2												
L1												
L2												
L3							X		rd	220	Fault	1F4
L4												
L5												
L6							X		gr	220	ON	1F4
L7												
L8												
Right side												
M3	X										Hoist	2F1
M4												
L11												
L12												
L13												
L14												
L15												
L16												
L17												
L18												



Further details about the versions for built-in components M1 to M4

Mounting location	Type of instrument	Measuring range
M1		
M2		
M3	Pointer type instrument 72 x 72	0 - 1000 A
M4	"	0 - 1000 A

G_CR01_EN_00133a

☐ Cannot be assigned

1) Check location.

The panel meters, LCD or signaling devices to be fitted on mounting surface E2 are entered on inquiry and order sheet 3.

Only devices with a mounting depth of up to 75 mm can be fitted on mounting surface E2. The following can optionally be fitted at locations M1 to M4:

- 2 panel meters 72 x 72 mm or
- 1 panel meter 96 x 96 mm or
- 1 panel meter 72 x 144 mm or
- 1 LCD up to 72 x 144 mm, whereby it is important to ensure that the maximum possible mounting depth is not exceeded.

Locations L1 to L18 are primarily intended for indicator lamps. If indicator lamps or illuminated pushbuttons with series elements are to be fitted, the maximum possible mounting depth must be observed here too.

The mixed mounting of indicator lamps and meters is also possible. One panel instrument 72 x 72 mm takes the space of four indicator lamps.

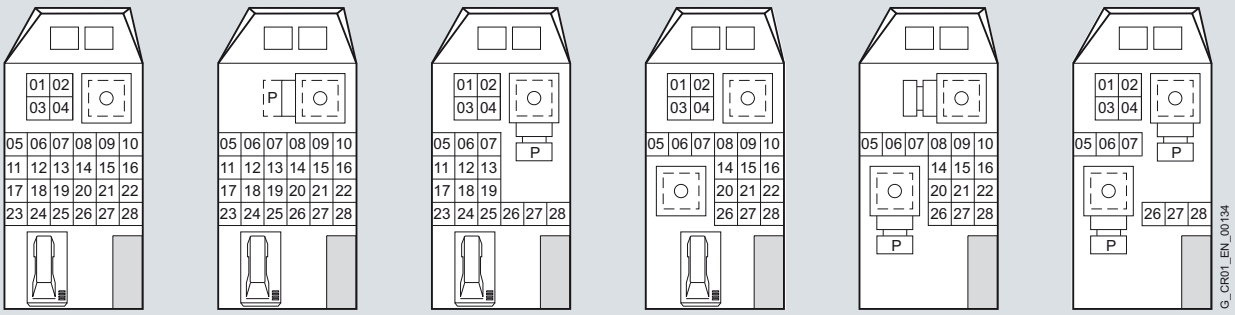
Selection and ordering data (continued)

Inquiry and order sheet 3.1

Customer | Item | Order reference | Date

Signaling devices on installation surface E1 - left side element

Mounting location Nr. 1)	Push-button 1 NO / 1 NC	Mush-room button 1 NO / 1 NC	Knob switch 1 NO / 1 NC	CES Safety lock 1 NO / 1 NC	Illuminated push-button 1 NO / 1 NC	Illuminated push-button with series element 1 NO / 1 NC	Illuminated light	Illuminated light with series element	Control switch to 3 contacts	2)	2)	Color	Operating voltage V	Labeling 2 x 10 letters each possible	Dest. code
01															
02															
03															
04															
05															
06															
07															
08															
09															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															
26															
27															
28															



1) Check location.
2) Other signaling devices acc. to catalog; for special installations include a sketch.

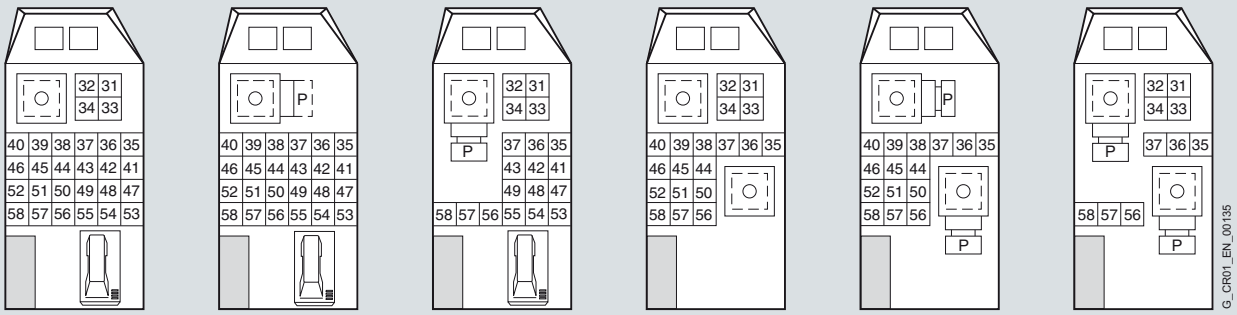
Selection and ordering data (continued)

Inquiry and order sheet 3.2

Customer | Item | Order reference | Date

Signaling devices on mounting surface E1- right side element

Mounting location No. [1]	Push-button 1 NO / 1 NC	Mushroom button 1 NO / 1 NC	Knob switch 1 NO / 1 NC	CES-Safety lock 1 NO / 1 NC	Illuminated push-button 1 NO / 1 NC	Illuminated push-button with series element 1 NO / 1 NC	Indicator light	Indicator light with series element	Control switch to 3 contacts	2)	2)	Color	Operating voltage V	Labeling 2 x 10 letters each possible	Dest. code
31															
32															
33															
34															
35															
36															
37															
38															
39															
40															
41															
42															
43															
44															
45															
46															
47															
48															
49															
50															
51															
52															
53															
54															
55															
56															
57															
58															



1) Check location.
2) Other signaling devices acc. to catalog; for special installations include a sketch

Selection and ordering data (continued)

Notes on inquiry and order sheets 3.1 and 3.2

Anfrage- und Bestellblatt 3.1

Kunde | Pos. | Auftragszeichen | Datum

Signalgeräte auf der Einbaufläche E1 - linkes Seitenteil

Einbauplatz Nr. 1)	Druckt. 1 S / 1 Ö	Pilzschlag 1 S / 1 Ö	Knebelschalter 1 S / 1 Ö	CES-Sicherheitsschloss 1 S / 1 Ö	Leuchttaster 1 S / 1 Ö	Leuchttaster mit Vorschaltglied 1 S / 1 Ö	Leuchtmelder	Leuchtmelder mit Vorschaltglied	Befehlsschalter bis 3 Schaltelemente	2)	2)	Farbe	Betriebsspannung V	Schildbeschriftung je 2 x 10 Buchstaben möglich	Zielzeichen
01															
02															
03															
04															
05		X										rt	220	Not - Aus	AO
06					X							gr	220	AC 50 Hz - Ein	IN1
07					X							gr	220	Heizung - Ein	IN2
08															
09															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
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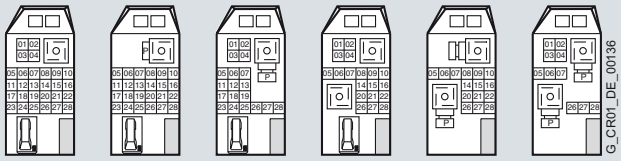
21															
22															
23															
24															
25															
26															
27															
28															



G_CR01_DE_00136

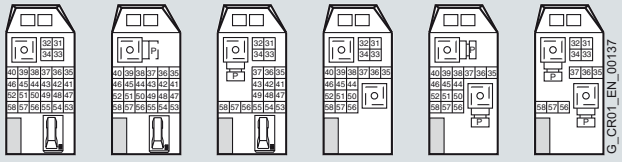
1) Einbauplatz ankreuzen.
2) Weitere Meldegeräte nach Katalog; bei Sondereinbauten bitte Skizze beifügen.

Inquiry and order sheet 3.2

Customer | Article | Order code | Date

Signal scanners on installation surface E1 - right page

Location no. 1)	Push-button 1 NO / 1 NC	Mush-room-head emergency push-button 1 NO / 1 NC	Knob-operated momentary contact control switch 1 NO / 1 NC	CES safety interlock 1 NO / 1 NC	Illuminated push-button 1 NO / 1 NC	Illuminated push-button w. series element 1 NO / 1 NC	Indicator light	Indicator light with series element	Control switch up to 3 switching elements	2)	2)	Color	Operating voltage V	2 x 10 letters possible on each label	Target code
31	X											bk	220	De - En	1G1
32															
33															
34															
35															
36															
37															
38															
39															
40					X							gr	220	HG - On	2G1
41															
42															
43															
44															
45															
46							X					rd	220	HG - Fault	2G4
47															
48															
49															
50															
51															
52															
53															
54															
55															
56															
57															
58															



G_CR01_EN_00137

1) Check location
2) Other signaling devices acc. to catalog; for special installations include a sketch.

The control and signaling devices specified on order sheet 1 are assigned to a mounting location in inquiry and order sheets 3.1 (left side element) and 3.2 (right side element) by marking a location.

The numbers in column 1 are identical to the field numbers of the mounting locations given in the diagrams under the table.

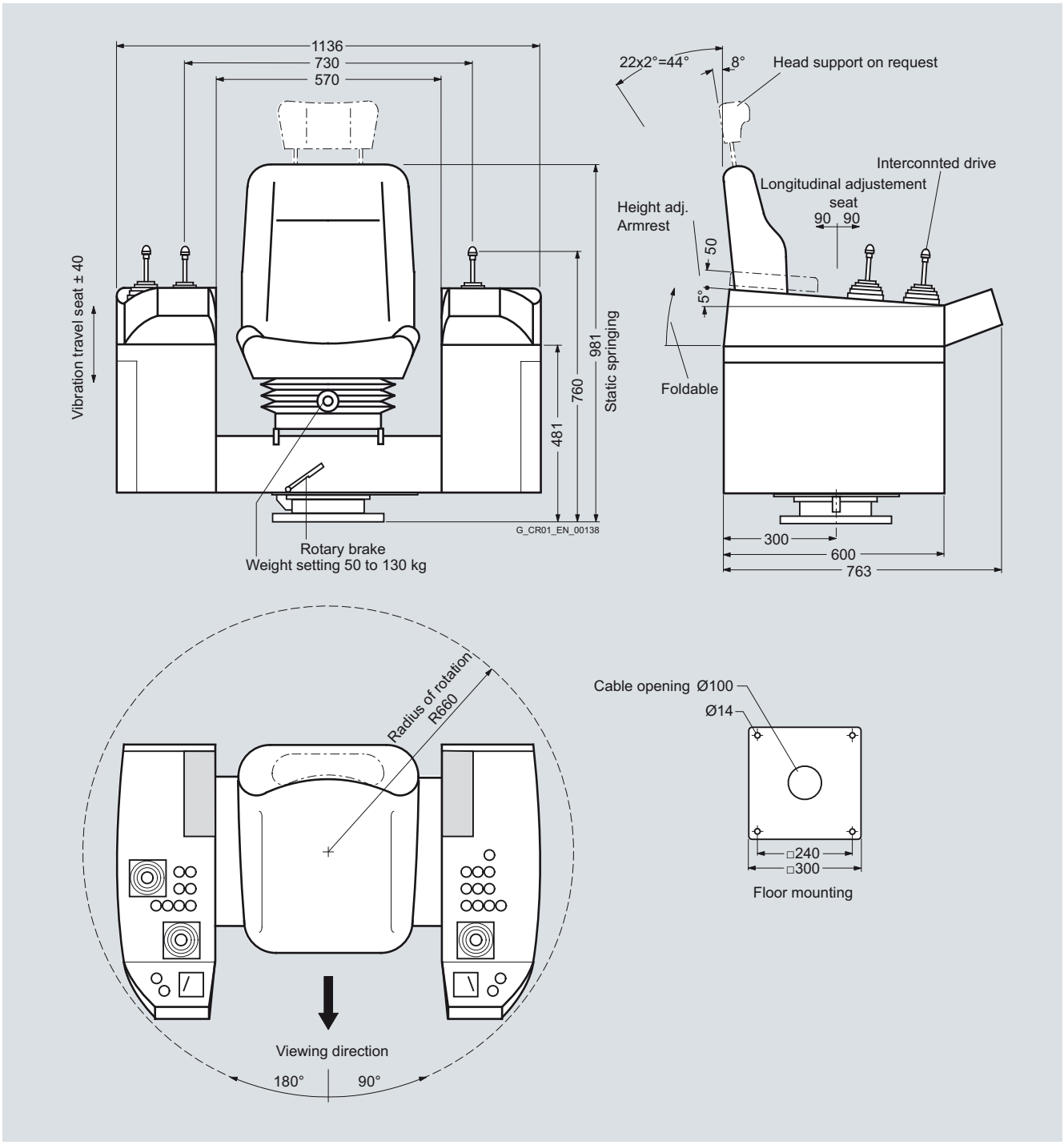
If a gooseneck microphone is to be fitted, mounting locations 05 and 11 or 35 and 41 are used for the purpose (unless indicated otherwise).

The mounting locations that can be occupied by signaling devices depend on the double master controllers installed and setpoint generators fitted. The possibilities are clearly indicated under the tables.

A telephone is usually installed recessed next to the armrest. The telephone can also be left detached.

Buzzers or other audible signaling devices are fitted in the interior of the housing lower section.

Dimension drawings



Dimension drawing crane controller 3SJ9

8

Double master controllers 3SJ3

Overview

Double master controller 3SJ3

The drive motors of hoisting gear installations are controlled by cam switches (master controllers). One driving unit is controlled by a master controller and two driving units are controlled by a double master controller. Both of these can be easily and reliably operated. They have switching elements that are actuated by cam discs.

A strongly emphasized zero detent and, if required, easily sensed detent positions for transition to field weakening mode support reliable switching even under physically stressful operating conditions.

Design of double master controller 3SJ3

- Built-in switch for one or two directions of movement for crane controllers
- The switching elements are available in two versions:
  - With gold-plated contacts, ideally suited for low voltages (≤ 30 V) and currents (≤ 10 mA).
  - With silver contacts for voltages and currents up to 250 V AC, 16 A, AC-12
- Pushbutton functions in the switching lever
- Opto-electronic encoders (digital master controllers) can be fitted
- Analog setpoint generators can be fitted

Applications

Double master controllers are built-in devices with IP00 degree of protection. They are suitable for installation in:

- Crane control seats, control stands and control consoles
- Stationary and portable consoles
- Remote and floor-control units

They are suitable for switching auxiliary circuits of up to 250 V AC at AC-12. The double contact principle and gold-plated switching contacts also ensure reliable switching at low voltages and currents.

Design

Installation

The double master controller is screwed onto the upper cover plate of the mounting space from the exterior with four screws. The plate on which the switch is secured should have a thickness of 2 to not more than 4 mm.

The mounting opening is sealed with bellows. These have a molded seal at the bottom fold which is clamped between the cover and the housing.

The bellows are made of highly flexible neoprene and resist oil, acids, caustic solutions, sea water, ozone and UV radiation.

Drive block

The drive block has a switching lever and an internal articulated-shaft mechanism, with which two drive axes can be actuated independently or jointly.

The drive axes are offset by 90°. Each drive axis can be actuated from each switching position of the other axis.

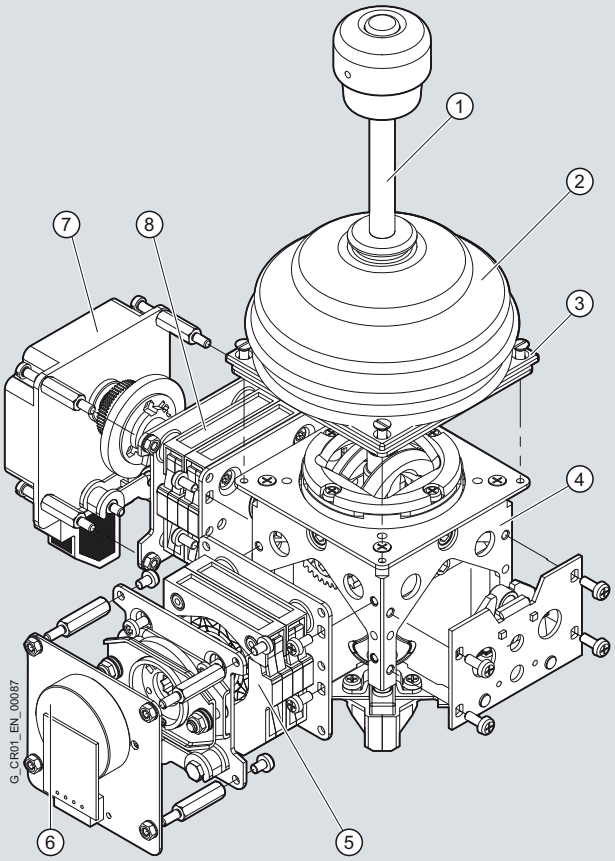
The switches for surface mounting on the side are driven via gear segments and spur gears; the switch fitted to the base is driven via bevel gears.

At the drive block, surface mounting switches can be fitted to one or both mounting surfaces of each drive axis. A surface mounting switch can also be fitted to the floor surface on which one of the two drive axes acts.

The detent disc is part of the surface mounting switch and has an emphasized zero detent.

The drive block is available in two different versions:

- Standard version:
  Service life 10 x 10^6 switching operations
- Rugged version:
  Service life 20 x 10^6 switching operations.

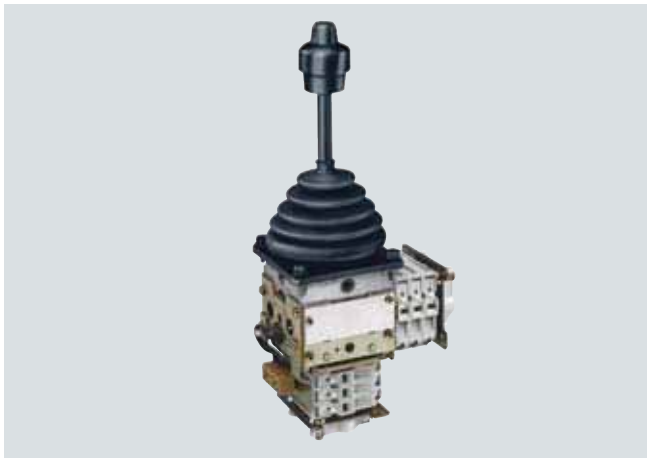


1 Switching lever with ball grip
2 Bellows
3 Front panel
4 Drive block
5 Surface mounting switch
6 Potentiometer
7 OEC encoder
8 Surface mounting switch

Construction of double master controller 3SJ3

Double master controllers 3SJ3

Design (continued)



3SJ3 with pushbutton in the black ball grip

3SJ3 with ball grip, e.g. enabling button

3SJ3 with handle

Switching lever

The switching levers are available in various versions:

- Black ball grip with and without pushbutton function
- Ball grip with enabling pushbutton (mechanical by keeping the upper half of the grip pressed down)
- Ball grip with signal pushbutton (by raising the lower half of the grip)
- Ball grip with mechanical zero position locking (by raising the lower half of the grip)
- Handle with and without pushbutton or switch

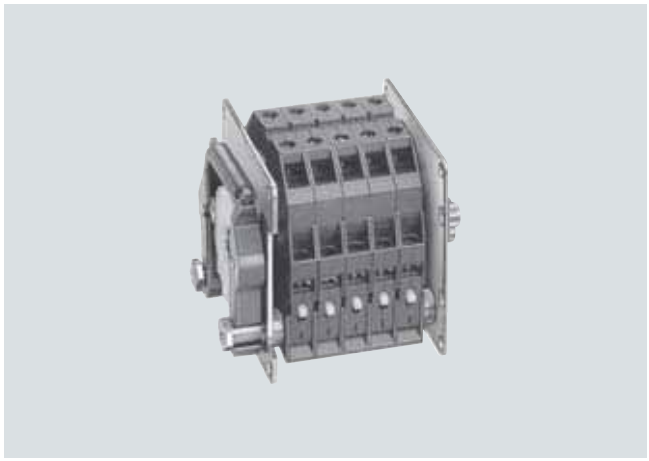
A pushrod that is moved by the switching lever actuates a microswitch located inside the drive block. To allow the microswitch to be actuated from each switching position, the pushrod has a ball segment at the lower end. The zero position locking is also actuated via the pushrod.

The pushrod travels largely wear-free in a gate with two guide rollers.

The lever excursion is restricted to 40° on each side. The stop plate can be replaced or exchanged for a special switching gate.

In addition to the switching levers mentioned above, rod and ball handles are available with many additional functions.

Design (continued)



Surface mounting switch

Surface mounting switch with wire-wound potentiometer

Surface mounting switch with OEC encoder

Surface mounting switch

The surface mounting switch is assembled from contact blocks each with 2 contacts which are snap-fitted on a support.

The contact blocks have special double contacts with highly reliable contacts and are available in two versions:

- With gold-plated switching contacts for currents ≤ 0.2 A and voltages ≤ 30 V (particularly suitable for use in electronic controllers)
- With silver contacts for currents up to 16 A and voltages up to 250 V AC

The switching status indicators on the contact blocks indicate the switching status of the individual contacts.

The conductors are connected to spring-loaded terminals.

Cam disc

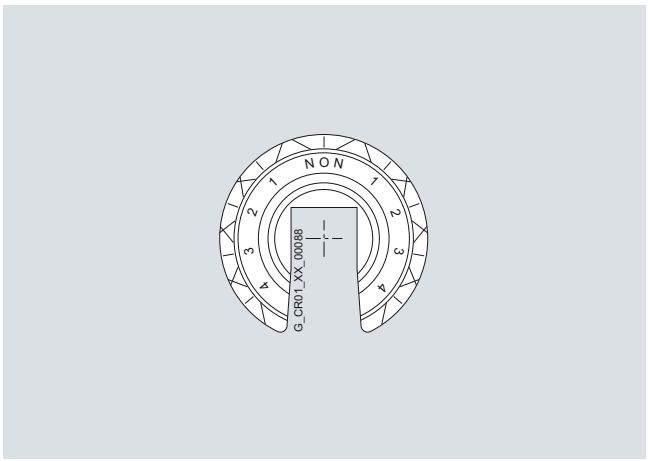
A cam disc is assigned to each contact. The cam discs are clamped onto the camshaft with cup springs. After removal of the double contact block, they can easily be replaced using a wire hook supplied with each switch.

The cam discs are marked on one side with "N" for non-overlapping contacting and on the other side with "U" for overlapping contacting.

With the programs cut at the factory, the "N" marking always points to the drive side.

The cam discs have markings allowing the switching program to be cut with a fine saw and file.

The cam discs must be seated on the switching shaft in such a way that the same marking is always seen in the viewing direction.



Cam disc for double master controller 3SJ3

8

Double master controllers 3SJ3

Design (continued)

Spring return

Spring returns can be fitted to the opposite mounting surface of the switch for auto return of the switching lever.

The spring return is assembled on a baseplate and comprises two levers and one compression spring. When the switching lever is operated, the spring is tensioned by the roll lever. The spring return is available as a single part and can be retrofitted.

Friction brake

A mechanical friction brake can be installed to achieve greater friction force. The detents for zero position, end of control range or field weakening are then machined into the brake disc.

Fitting encoders

On variable-speed drives, digital encoders or potentiometers are used to preset the setpoint. For this purpose, the following devices can be fitted on the detent side of the surface mounting switch without intermediate gearing, with maximum resolution of the angle of rotation:

- Opto-electronic encoder (OEC) 6GA4 603-.AA00 with linear characteristic for digital setpoints and non-linear characteristic for analog setpoints
- Wire-wound potentiometer 6KA9924-. with linear or non-linear characteristic.

The direct installation without intermediate gearing ensures that there is no backlash or hysteresis in the actuation.

Technical data

Version		**Standard version**	**Rugged version**	**Standard version**	**Rugged version**
Type		**3SJ3 0**	**3SJ3 1**	**3SJ3 5**	**3SJ3 6**
Contacts		**6 A contact 250 V AC, AC-12**		**16 A contact 250 V AC, AC-12**	
		Gold-plated contacts for electronics		**Silver contacts**	
Rated insulation voltage U_i	V AC V DC	250 250	250 250	250 250	250 250
Test voltage	kV	2.5	2.5	2.5	2.5
Rated voltage U_e	V AC	250	250	250	250
Rated operating current I_e AC-15, DC-13 at • 250 V AC • 24 V DC • 48 V DC	 A A A	 2 1 0.5	 2 1 0.5	 4	 4
Short-circuit protection (without welding effect) • DIAZED fuses, operating class gL • Circuit-breakers with G characteristic	 A A	 6 6	 6 6	 16 16	 16 16
Mechanical life		10×10^6	20×10^6	10×10^6	20×10^6
Maximum switching frequency	Cycles/h	1000			
Conductor cross-sections • Finely stranded with end sleeve • Solid	 mm^2 mm^2	 2 x 0.5 to 1.5 2 x 1 to 2.5		 2 x 0.5 to 1.5 2 x 1 to 2.5	
Pushbutton in the switching lever					
Rated voltage U_e **Rated current I_e**/AC-15 at 250 V AC **Life of the microswitch** (1 changeover contact)	V A Operating cycles	250 2 10×10^6		250 2 10×10^6	
Degree of protection to IEC 60529 DIN 40 050		IP00		IP00	
Permissible ambient temperature • During operation • During storage	 °C °C	 –20 ... +60 –50 ... +80	 –40 ... +60 –50 ... +80	 –20 ... +60 –50 ... +80	 –40 ... +60 –50 ... +80
Climate resistance		Damp heat, constant DIN IEC 68 Part 2-3 Damp heat, cyclic DIN IEC 68 Part 2-30		Damp heat, constant DIN IEC 68 Part 2-3 Damp heat, cyclic DIN IEC 68 Part 2-30	
Creepage distances and clearances to IEC 60947-1; 2.5.46.51		Overvoltage category III, pollution severity 3		Overvoltage category III, pollution severity 3	
Regulations		IEC 60947-5-1 EN 60 947 DIN VDE 0660-200		IEC 60947-5-1 EN 60 947 DIN VDE 0660-200	
Approvals		CSA-LR 18831-5M		CSA-LR 18831-5M	

Selection and ordering data

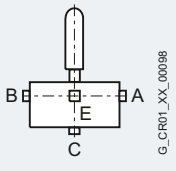
Double master controller 3SJ3

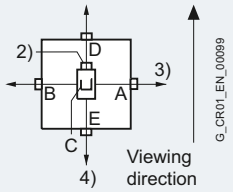
Version	Number of contacts		Standard version Order No.	Approx. weight kg
Surface mounting switch [1]	①	②	①②	
With gold-plated contacts for currents ≤6 A, for electronics	–	4	3SJ3 002-■A■■	1.17
	–	6	3SJ3 003-■A■■	1.21
[1] Master controllers with up to 12 contacts as well as other circuits available on request	4	–	3SJ3 020-■■A■■	1.17
	4	4	3SJ3 022-■■■■	1.47
	6	–	3SJ3 030-■■A■■	1.21
	6	6	3SJ3 033-■■■■	1.55
With reinforced silver contacts for currents up to 16 A	–	4	3SJ3 502-■A■■	1.17
	–	6	3SJ3 503-■A■■	1.21
[1] Master controllers with up to 12 contacts as well as other circuits available on request	4	–	3SJ3 520-■■A■■	1.17
	4	4	3SJ3 522-■■■■	1.47
	6	–	3SJ3 530-■■A■■	1.21
	6	6	3SJ3 533-■■■■	1.55

Switching lever	With ball grip	5
	With ball grip with pushbutton	4
	With ball grip with enabling button	1
	With ball grip with signaling button	6
	With ball grip for mech. zero position locking	7

Circuits		Number of contacts	
	"csak", "csk" for variable-speed drives with field weakening stage (arrangement No. NEP 126 2866)	6	S S
	Variable-speed drives without field weakening (arrangement No. NEP 126 2867)	6	T T
	Variable-speed drives with field weakening stage (engaged) and OEC (arrangement No. MSP 220)	4	X X
	Variable-speed drives without field weakening stage, with OEC (arrangement No. MSP 210)	4	Y Y
	With contact arrangement as required: Additional order codes: **"J0Y"** for surface mounting switch ①, **"K0Y"** for surface mounting switch ②, please also enclose contact arrangement sketch (see form on Page 8/24) and indicate the corresponding surface mounting switch ① or ② in the order text.	up to 12	Z Z

Assignment of mounting surfaces to direction of movement of the switching lever



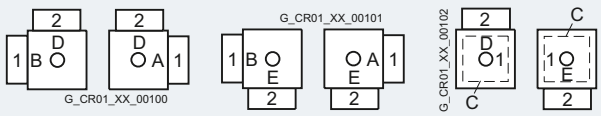


[2] Switching lever

[3] Lateral movement: Mounting surfaces D, E

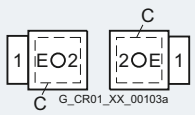
[4] Longitudinal movement: Mounting surfaces A, B, C

Direction of movement for Switch ② / Switch ①



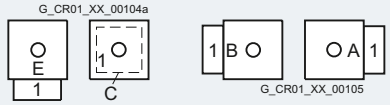
02 00 03 01 04 05

Direction of movement for Switch ② / Switch ①



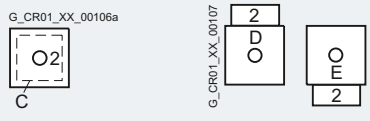
07 06

Direction of movement Switch ①



15 08 11 10

Direction of movement Switch ②



12 13 14

Double master controllers 3SJ3

Selection and ordering data

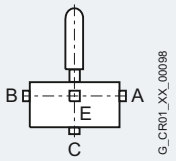
Double master controller 3SJ3

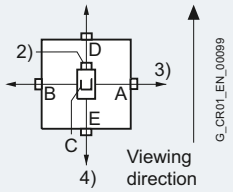
Version	Number of contacts ①	②	Rugged version Order No. ①②	Approx. weight kg
Surface mounting switch [1]				
With gold-plated contacts for currents ≤6 A, for electronics	–	4	**3SJ3 102-■A■■**	1.47
	–	6	**3SJ3 103-■A■■**	1.51
[1] Master controllers with up to 12 contacts as well as other circuits available on request	4	–	**3SJ3 120-■■A■■**	1.47
	4	4	**3SJ3 122-■■■■**	1.77
	6	–	**3SJ3 130-■■A■■**	1.21
	6	6	**3SJ3 133-■■■■**	1.81
With reinforced silver contacts for currents up to 16 A	–	4	**3SJ3 602-■A■■**	1.47
	–	6	**3SJ3 603-■A■■**	1.51
[1] Master controllers with up to 12 contacts as well as other circuits available on request	4	–	**3SJ3 620-■■A■■**	1.47
	4	4	**3SJ3 622-■■■■**	1.77
	6	–	**3SJ3 630-■■A■■**	1.21
	6	6	**3SJ3 633-■■■■**	1.85

Switching lever	With ball grip	**5**
	With ball grip with pushbutton	**4**
	With ball grip with enabling button	**1**
	With ball grip with signaling button	**6**
	With ball grip for mech. zero position locking	**7**

Circuits		Number of contacts	
	"csak", "csk" for variable-speed drives with field weakening stage (arrangement No. NEP 126 2866)	6	**S S**
	Variable-speed drives without field weakening (arrangement No. NEP 126 2867)	6	**T T**
	Variable-speed drives with field weakening stage (engaged) and OEC (arrangement No. MSP 220)	4	**X X**
	Variable-speed drives without field weakening stage, with OEC (arrangement No. MSP 210)	4	**Y Y**
	With contact arrangement as required: Additional order codes: **"J0Y"** for surface mounting switch ①, **"K0Y"** for surface mounting switch ②, please also enclose contact arrangement sketch (see form on Page 8/24) and indicate the corresponding surface mounting switch ① or ② in the order text.	up to 12	**Z Z**

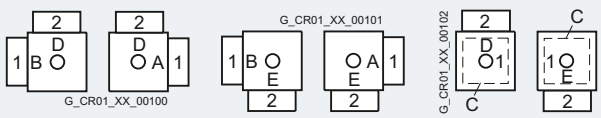
Assignment of mounting surfaces to direction of movement of the switching lever





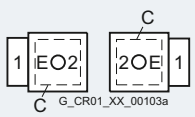
[2] Switching lever
[3] Lateral movement: Mounting surfaces D, E
[4] Longitudinal movement: Mounting surfaces A, B, C

Direction of movement for Switch ② / Switch ①



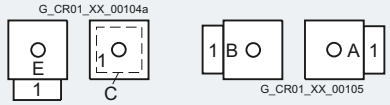
02 00 03 01 04 05

Direction of movement for Switch ② / Switch ①



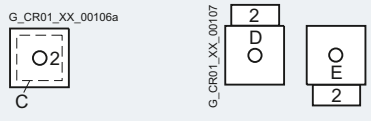
07 06

Direction of movement Switch ①



15 08 11 10

Direction of movement Switch ②



12 13 14

Selection and ordering data

Add-on parts

(Detailed information on opto-electronic encoders and wire-wound potentiometers can be found on Page 8/25)

Add-on parts	Order No.	Order code (the Order No. must be supplemented with **-Z**)
Opto-electronic encoder (8 bits, digital) On surface mounting switch 1: on surface mounting switch 2:	**6GA4 603-2AA00**	 **A05** [1] **A06** [1]
Opto-electronic encoder (8 bits, PROFIBUS) On surface mounting switch 1: on surface mounting switch 2:	**6GA4 603-5AA00**	 **A11** [2] **A12** [3]
Opto-electronic encoder (analog ±10 V quadratic characteristic) On surface mounting switch 1: on surface mounting switch 2:	**6GA4 603-3AA00**	 **A07** [4] **A08** [4]
Opto-electronic encoder (analog ±20 mA quadratic characteristic) On surface mounting switch 1: on surface mounting switch 2:	**6GA4 603-4AA00**	 **A09** [4] **A10** [4]
Non-linear wire-wound potentiometer On surface mounting switch 1: on surface mounting switch 2:	**6KA9 924-1**	 **B01** **B02**
Linear wire-wound potentiometer On surface mounting switch 1: on surface mounting switch 2:	**6KA9 924-2**	 **B03** **B04**
Spring return On surface mounting switch 1: on surface mounting switch 2:	–	 **D01** **D02**
Friction brake On surface mounting switch 1: on surface mounting switch 2:	–	 **E01** **E02**
Gate as required	–	**Y01** and enclose sketch of contact arrangement

Ordering example 1: Master switch for hoisting winch (variable-speed drive, 4 contacts)

Selection data	Order No.	Order codes
Master controller 3SJ3, standard version Surface mounting switch 1, standard circuit acc. to equipment diagram MSP 220, with latched field-weakening stage	**3SJ3 020-■■A■■**	
Switching lever with ball grip	**5**	
Contact arrangement No. MSP 220 for surface mounting switch 1 (see Page 8/24)	**X**	
Arrangement of surface mounting switch on mounting surface (mounted below)	**0 8**	
Special version	**-Z**	
Opto-electronic encoder 8 bits, digital, mounted [2]		**A05**
Complete order specification for the master controller	**3SJ3 020- 5 X A 0 8 -Z** **A05**	

Ordering example 2: Double master controller for crane and traveling overhead hoist (variable-speed drives, 4 contacts each)

Selection data	Order No.	Order codes
Double master controller 3SJ3, standard version mounting switch 1, standard circuit acc. to equipment diagram MSP 210 mounting switch 2, standard circuit acc. to equipment diagram MSP 210	**3SJ3 022-■■■■■**	
Switching lever with ball grip, with pushbutton	**5**	
Contact arrangement No. MSP 210 for surface mounting switch 1 (see Page 8/24)	**Y**	
Contact arrangement No. MSP 210 for surface mounting switch 2 (see Page 8/24)	**Y**	
Arrangement of surface mounting switch on mounting surface (mounted below on left side)	**0 7**	
Special version	**-Z**	
Opto-electronic encoder 8 bits, with PROFIBUS, mounted on surface mounting switch 1 [3]		**A11**
Opto-electronic encoder 8 bits, digital, mounted on surface mounting switch 2 [4]		**A06**
Complete order specification for the master controller	**3SJ3 022- 5 Y Y 0 7 -Z** **A11+A06**	

Note:
Connecting cables from the encoder to the terminal strip/electronic terminal strip and, where applicable, between the encoders must be ordered separately (see Pages 8/28 and 8/31).

[1] Additional connecting cable 3SX4175
[2] Additional connecting cables 3SX4235 and 3SX4236
[3] Additional connecting cable 3SX4237
[4] Additional connecting cable 3SX4232

Double master controllers 3SJ3

Circuit diagrams

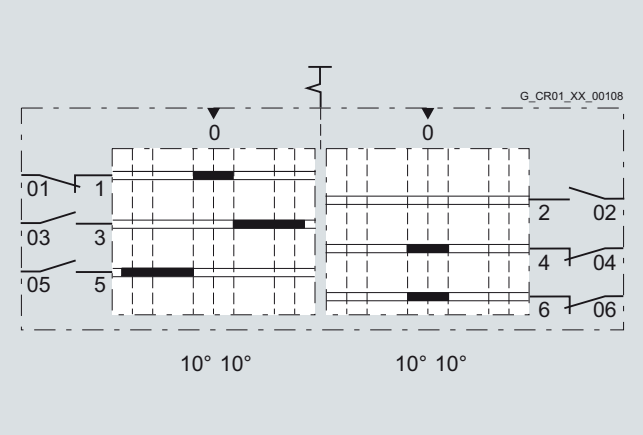
In accordance with DIN 40 713, the graphical symbols that the equipment circuit diagrams contain only provide information on the type, connection and mode of operation of devices, but not on their type of construction.

The symbol for a closed contact is as follows:

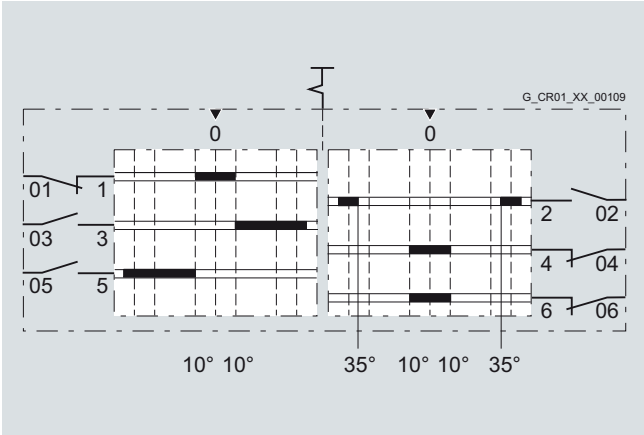
====▮====

The contacts assigned for the arrangement of the switching cams indicate the switching state in the 0 position.

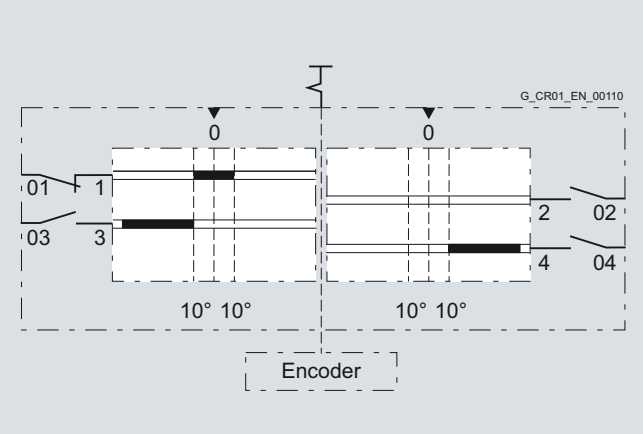
If the switching shaft (camshaft) is turned to the right, the switching program shown to the left of the zero position is effective.



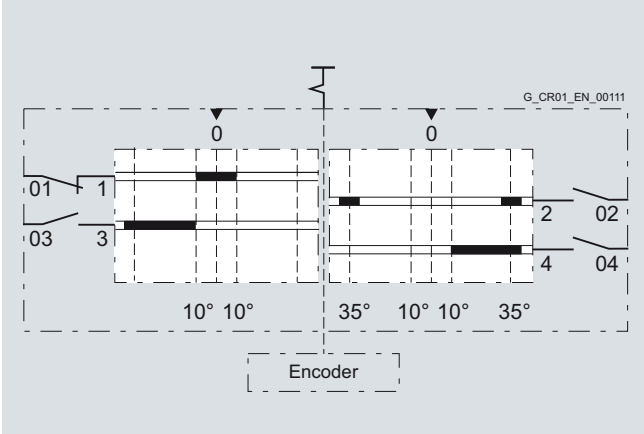
Arrangement No. **NEP 126 2867**
Circuits for variable-speed drives without field weakening (with 3 zero contacts)



Arrangement No. **NEP 126 2866**
Circuits "csak", "csk" and for variable-speed drives with engaged field weakening stage (with 3 zero contacts)



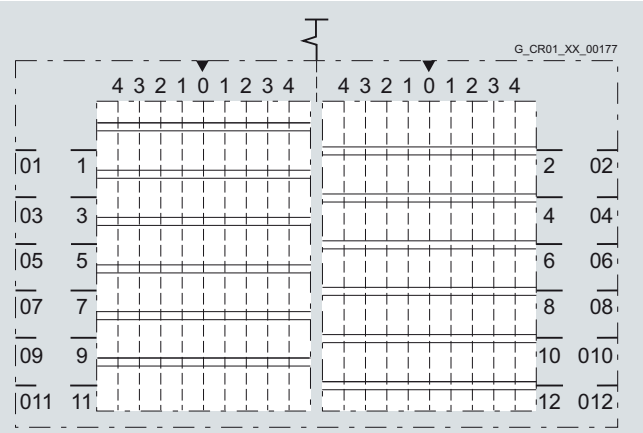
Arrangement No. **MSP 210**
Circuits for variable-speed drives without field weakening



Arrangement No. **MSP 220**
Circuits for variable-speed drives with engaged field weakening

Special arrangements

Switch arrangements that deviate from the standard arrangements above can be included in a sketch in accordance with the template below and enclosed with the inquiry/order.



8

Opto-electronic encoder 6GA4 603, digital

Overview

The opto-electronic encoder 6GA4603 for digital setpoints is available in two versions:

- Version with binary outputs for connection to an electronic terminal strip
- Version with an output for a PROFIBUS connection

The opto-electronic 8 bit encoder (OEC) becomes a digital master controller when it is assembled with two contact blocks (4 switching contacts) of a double master controller 3SJ3. Of these 4 switching contacts, 1 contact is required for monitoring the 0 position and 2 contacts are required for specifying the direction of motion. The fourth contact can be used if required for engaging at 35 degrees for transition to the field weakening zone.

The OEC must be supplied with 24 V DC either from the controlling device or from a separately installed power supply. Connecting cables are required for connecting the OEC to a terminal strip / electronic terminal strip (see Page 8/28).

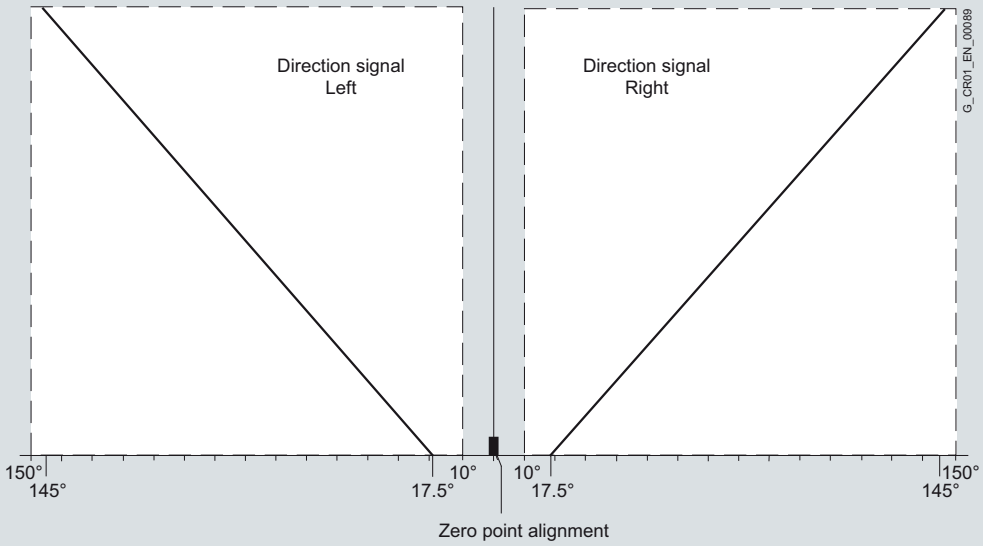
Technical data

Order No.		6GA4 603-2AA00	6GA4 603-5AA00
Type		OEC 2-2-1	OEC 4-2-1-2
Coding		Binary	Binary
Characteristic curve		Linear	Linear
Power supply	V DC	18 ... 30	18 ... 30
Current consumption	mA	150	110
Binary output		Push-pull output stage 24 V DC, 10 mA	PROFIBUS DP DIN 19245 Part 3 up to 12 Mbaud transmission rate ID No. 045C H The PROFIBUS address can be set via two rotary switches. Setting range: 1-99
Temperature range	°C	–20 ... +60	–20 ... +60
Service life	Operating hours	80000	80000
Connection		DSUB 15 with strain relief	DSUB 9 with strain relief
Degree of protection		IP54	IP54
Weight, approx.	kg	0.41	0.82

Accessories

For connecting cables, see Page 8/28.

Characteristics



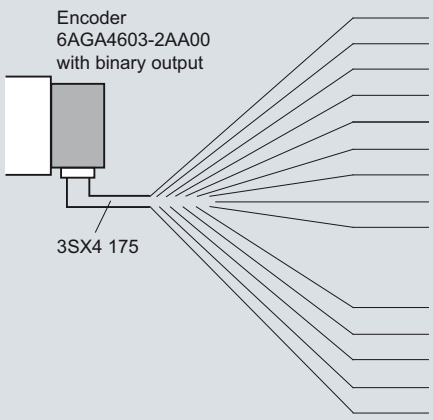
Output characteristic of the opto-electronic encoder for digital master controllers

8

Connection system
Opto-electronic encoder 6GA4 603, digital

Overview

Connection diagram for opto-electronic encoder (OEC 2) with binary output

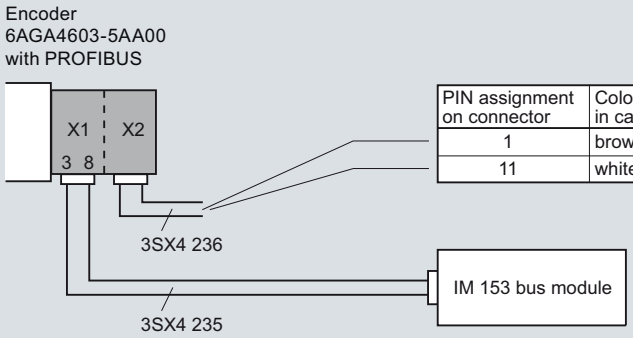


PIN assignment on the Sub D connector	Color of conductor in cable	Function
1	–	not assigned
2	brown	D6 active-high 24 V DC
3	green	D5 active-high 24 V DC
4	yellow	D4 active-high 24 V DC
5	gray	D3 active-high 24 V DC
6	pink	D2 active-high 24 V DC
7	blue	D1 active-high 24 V DC
8	black	Ground 0 V
9	red	10 V to 30 V DC supply
10	–	not assigned
11	–	not assigned
12	violet	Direction left, active-high
13	gray pink	Direction right, active-high
14	red blue	D8 active-high 24 V DC
15	pastel green	D7 active-high 24 V DC
–	brown green	Shield

Terminal block or ET200 electrical terminal strip

G_CR01_EN_00090

Connection diagram for opto-electronic encoder (OEC 4) with PROFIBUS DP



PIN assignment on connector	Color of conductor in cable	Function
1	brown	V_B 24 V
11	white	Ground 0 V

Terminal block

G_CR01_EN_00091

Note:
For encoders with PROFIBUS:

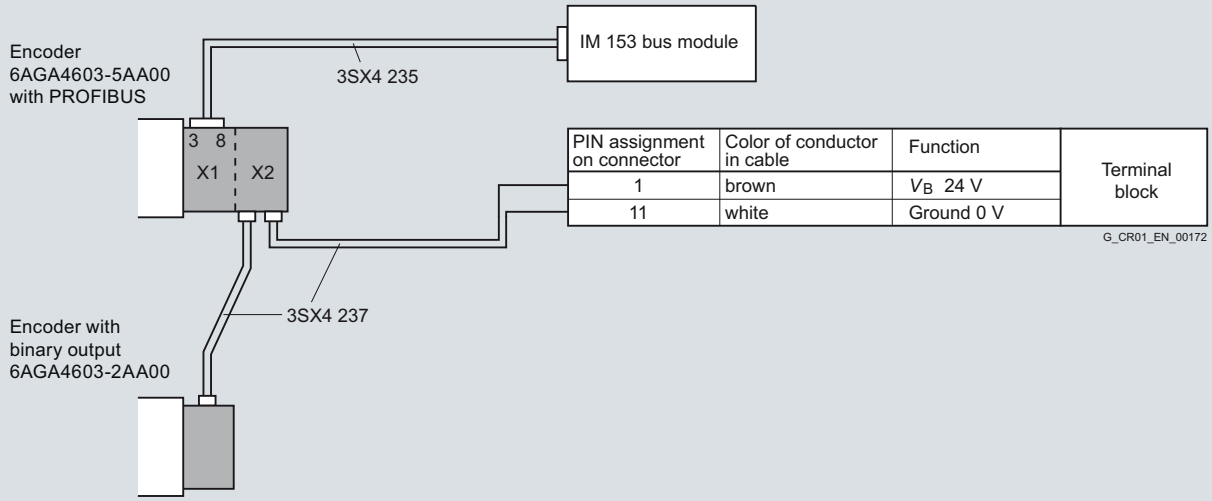
- The contacts of the master controller(s) are not routed over PROFIBUS.

Overview (continued)

Connection diagram for 2 encoders (OEC 2, OEC 4)
e.g. for double master controller with PROFIBUS DP

For a double master controller with one mounted opto-electronic encoder, one encoder (OEC 4) with a PROFIBUS connection can be connected to one switch and one encoder (OEC 2) with a binary output can be connected to the second switch.

The latter is connected to the second interface of the encoder over PROFIBUS as shown in the connection diagram below. This interface converts the binary signals into a PROFIBUS signal. The solution is less expensive than two encoders (OEC 4) with PROFIBUS.



Note:
The encoder (OEC 4) with PROFIBUS can only be connected with one bus module; connection of an additional encoder (OEC 4) with PROFIBUS is not possible.

8

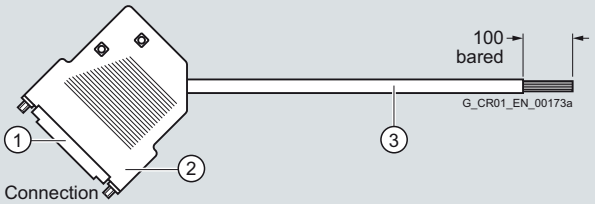
Mounting components for double master controller 3SJ3

Connection system
Opto-electronic encoder 6GA4 603, digital

Overview

The following connecting cables are required:

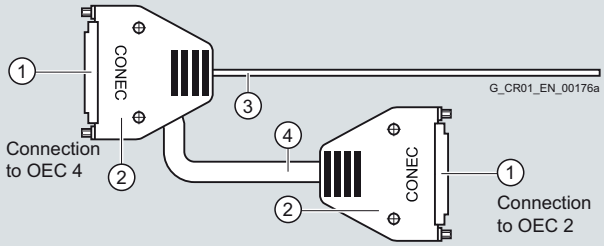
Cable for connecting the encoder (OEC 2) to a digital binary output



1. Sub-D connector
2. Sub-D housing
3. Connecting lead LIY (C) Y, 14 x 0.25 mm² / 2 m

Connecting cable for digital OEC 2: 3SX4 175

Connecting cable between encoder (OEC 4) with PROFIBUS and encoder (OEC 2) with binary output as well as for connecting the power supply

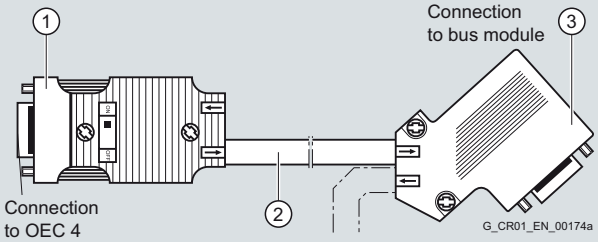


1. Sub-D plug connector
2. Housing type CONEC
3. Connecting lead LIY (C) Y, 2 x 0.25 mm² / 2 m
4. Connecting lead LIY (C) Y, 16 x 0.25 mm² / 0.45 m

Cable for connecting OEC 4 to OEC 2: 3SX4 237

Cable for connecting the encoder (OEC 4) to PROFIBUS

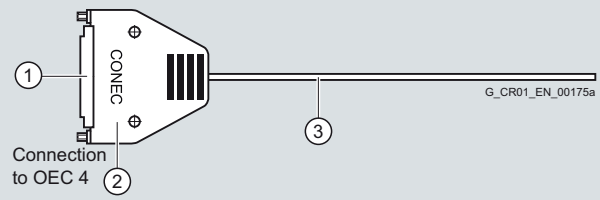
a) Bus cable between encoder and bus module



1. Sub-D connector SUBCON-PLUS-PROFIBUS for PROFIBUS up to 12 Mbit/s
2. Highly flexible fieldbus cable (DIN 19245 Part 3 and EN 50170) 1 x 2 x 0.64 mm² / 2 m
3. Sub-D connector SUBCON-PLUS-PROFIBUS for PROFIBUS up to 12 Mbit/s

Connecting cable for OEC 4 PROFIBUS (bus cable): 3SX4 235

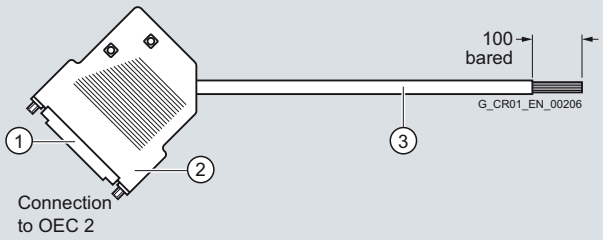
b) Cable for encoder power supply



1. Sub-D plug connector
2. Housing type CONEC
3. Connecting lead LIY (C) Y, 2 x 0.25 mm² / 2 m

Connecting cable for OEC 4 PROFIBUS (power supply): 3SX4 236

Cable for connecting the analog encoder (OEC 2)



1. Sub-D connector
2. Sub-D housing
3. Connecting lead LIY (C) Y, 7 x 0.25 mm² / 2 m

Connecting cable for analog OEC 2: 3SX4 232

The ordering data for the cables can be found on Page 8/31

Overview

The following opto-electronic encoders (OEC) for analog setpoints are available for direct connection of the setpoint generator to the control unit or to replace the magnetoresistive potentiometer 6KA9110-3B.

- Encoder (OEC 2) analog with output ± 10 V
- Encoder (OEC 2) analog with output ± 20 mA

The encoders can be ordered with linear, quadratic or progressive characteristics (see the output characteristics).

The encoders with linear or progressive characteristics must be specified with plain text in the order. The price corresponds to that of the encoder with a quadratic characteristic.

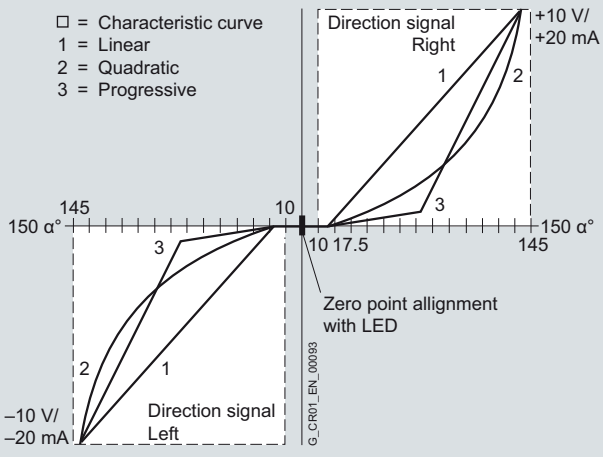
Technical data

Order No.		6GA4 603-3AA00	6GA4 603-4AA00
Type		OEC 2-3-2-2	OEC 2-3-2-6
Coding		6 bit Gray code	6 bit Gray code
Characteristic curve		Quadratic (2)	Quadratic (2)
Power supply	V DC	18 ... 36	18 ... 36
Current consumption	mA	150	150
Output		±10 V	±20 mA
Required load			max. 500 Ω, 2 %
Temperature range	°C	–20 ... +60	–20 ... +60
Service life	Operating hours	50000	50000
Connection		Female sub D connector DA 15 with strain relief	Female sub D connector DA 15 with strain relief
Degree of protection		IP54	IP54
Weight, approx.	kg	0.35	0.35

Accessories

Order No.		3SX4 232
Connector pin assignment	Power supply	+24 V
	Ground	0 V
	Output	±10 V/±20 mA
Core color	Power supply	Red
	Ground	Black
	Output	Green
Length	m	1.5 m
Weight, approx.	kg	0.2

Characteristics



Output characteristic of the opto-electronic encoder for analog setpoints

8

Wire-wound potentiometer 6KA9 924

Overview

The wire-wound potentiometer has a "zero region" at its midpoint (master controller zero position). The version with the non-linear characteristic curve supports precise operation of the drive at low speeds.

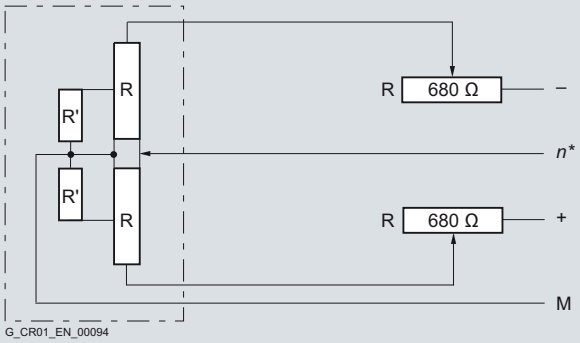
The wire-wound potentiometer must be powered by the control unit via two adjustable alignment resistors or supplied externally with a regulated DC voltage.

Other resistance values are available on request.

Technical data

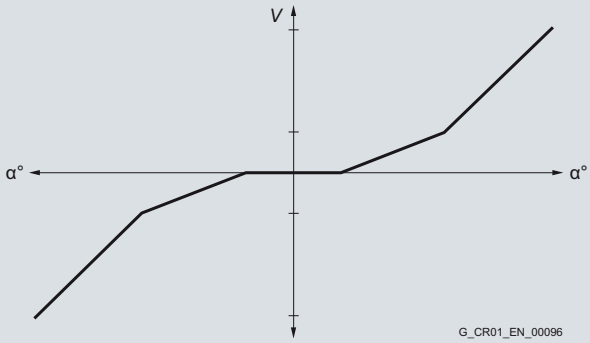
Order No.		6KA9 924-1	6KA9 924-2
Type		T 178	T 130
Current-carrying capacity (20 °C)	W	2.5	2.5
Linearity error	%	0.3	0.3
Resistance tolerance	%	1	1
Total resistance	kΩ	2 x 1.4	2 x 2
Weight, approx.	kg	0.070	0.068
Characteristic		Non-linear	Linear
Mech. service life	Cycles	10^7	10^7

Integration



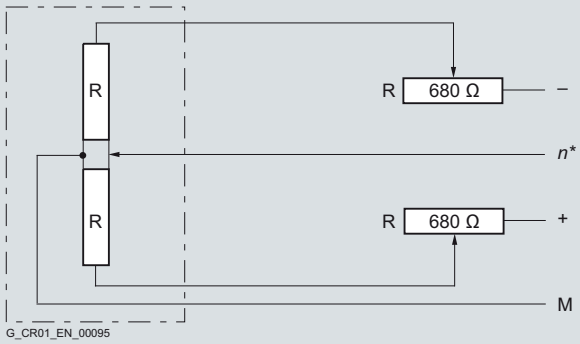
*n** Speed setpoint

Circuit diagram of the non-linear wire-wound potentiometer



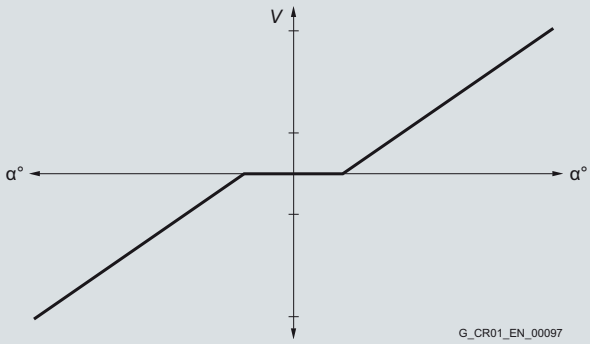
V Voltage
α Angle of rotation

Characteristic of the non-linear wire-wound potentiometer



*n** Speed setpoint

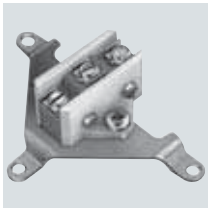
Circuit diagram of the linear wire-wound potentiometer



V Voltage
α Angle of rotation

Characteristic of the linear wire-wound potentiometer

Accessories/spare parts

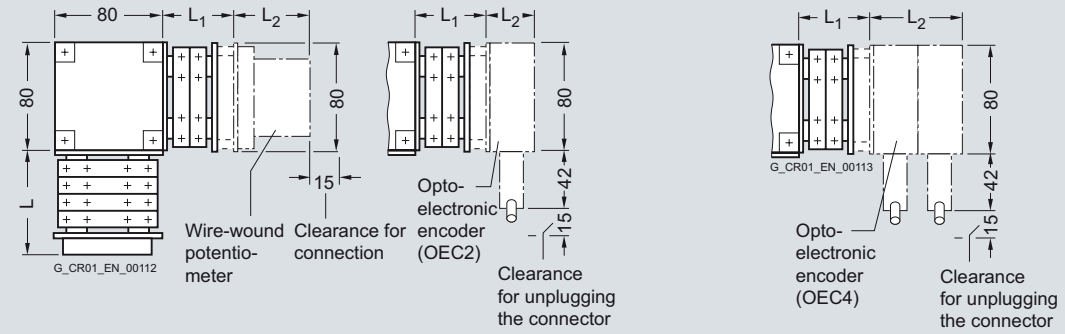
		Version			Order No.	Approx. weight kg
Accessories for switching lever						
 Detent disc 3SX4 142	**Drive block with switching lever**	Standard version			**3SX4 157-■AA■■** [1]	0.75
		Rugged version			**3SX4 158-■AA■■** [1]	1.05
	Surface mounting switch	With 4 contacts	≤ 6 A (E) [2]	Without arrangement	**3SX4 152-0A**	0.38
				With arrangement	**-0■** [3]	
			≤ 16 A	Without arrangement	**-1A**	
				With arrangement	**-1■** [3]	
		With 6 contacts	≤ 6 A (E) [2]	Without arrangement	**3SX4 153-0A**	0.42
				With arrangement	**-0■** [3]	
 Microswitch 3SX4 136			≤ 16 A	Without arrangement	**-1A**	
				With arrangement	**-1■** [3]	
	Contact block	With 2 contacts ≤ 2 A with gold-plated contacts (E) [2]			**3SX4 144**	0.03
		With 2 contacts ≤ 4 A with silver contacts			**3SX4 144-1**	0.03
	Cam discs	(1 set = 12 items)			**3SX4 145**	0.1
	Wire hook	For pulling the cam disc			**3SX4 146**	0.005
	Bellows				**3SX4 103**	0.1
	Microswitch	With mounting parts			**3SX4 136**	0.05
	Spring return				**3SX4 138**	0.12
	Friction brake				**3SX4 171**	0.12
	Detent disc 4 – 0 – 4				**3SX4 142**	0.012
	Detent spring	(1 set with 3 items of various strength)			**3SX4 143**	0.005
	Detent lever	(1 set = 2 items)			**3SX4 172**	0.02
	Opto-electronic encoder	8 bit, digital (OEC 2 digital)			**6GA4 603-2AA00**	0.35
		8 bit, PROFIBUS (OEC 4)			**6GA4 603-5AA00**	0.35
		8 bit, ±10 V, quadratic characteristic (OEC 2 analog)			**6GA4 603-3AA00**	0.35
		8 bit, ±20 mA, quadratic characteristic (OEC 2 analog)			**6GA4 603-4AA00**	0.35
	Wire-wound potentiometer	Linear			**6KA9 924-2**	0.06
		Non-linear			**6KA9 924-1**	0.07
	Connecting cable	For OEC 2 digital, 2 m			**3SX4 175**	0.2
		For OEC 4 PROFIBUS (bus cable), 2 m			**3SX4 235**	0.3
		For OEC 4 PROFIBUS (power supply), 2 m			**3SX4 236**	0.2
		For connecting OEC 4 to OEC 2, 0.45 m			**3SX4 237**	0.3
		For OEC 2 analog, 2 m			**3SX4 232**	0.2

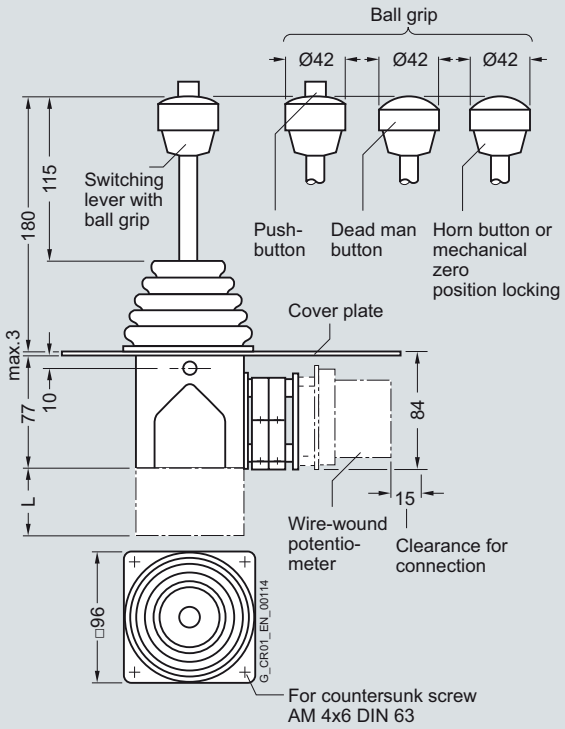
[1] Order No. suffixes as for double master controller 3SJ3: Insert Order No. suffixes for the switching lever or grip according to Page 8/21 and for assignment of mounting surfaces to directions of movement of the switching lever according to Page 8/21.

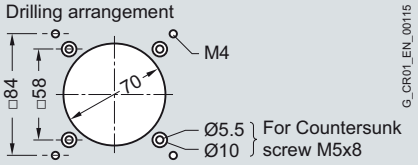
[2] E = suitable for electronics

[3] For switches with arrangement: Insert Order No. suffix for the arrangement (see Page 8/21) and specify switch serial number.

Dimension drawings



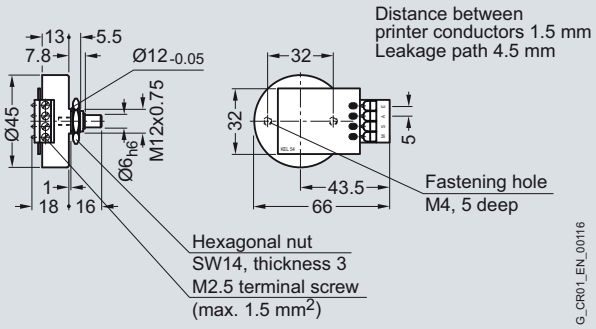




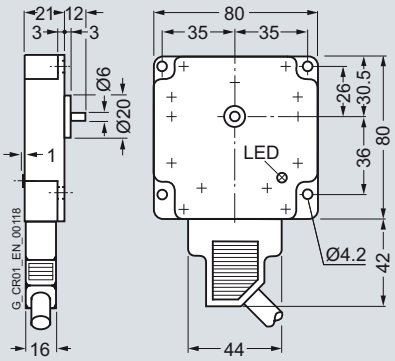
Double master controller 3SJ3

Type	Number of contacts	Surface mounting switch	Analog setpoint generators		Digital setpoint encoders Opto-electronic encoder	
			Wire-wound potentiometer	Opto-electronic encoder	8 bit version	PROFIBUS
		Dimension L_1	L_2	L_2	L_2	L_2
3SJ3	4	54	30	26	26	47
	6	66.5	30	26	26	47

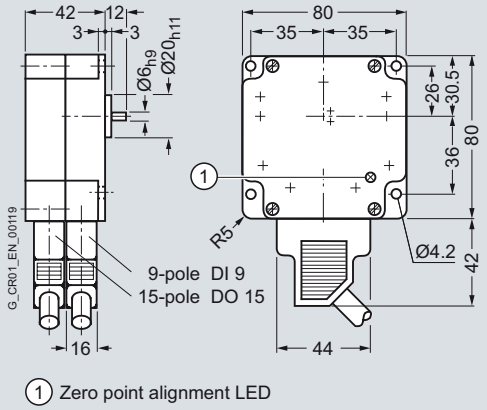
Dimension drawings



Wire-wound potentiometer 6KA9 924-2



Opto-electronic encoder 6GA4 603-2AA00, -3AA00, -4AA00



Opto-electronic encoder 6GA4 603-5AA00

8

Notes

Services and documentation

9

Overview

Our understanding of an application is the customer-specific solution of an automation task based on standard hardware and software components. In this respect, industry knowledge and technological expertise are just as important as expert knowledge about how our products and systems work. We are setting ourselves this challenge with more than 160 application engineers at 20 locations in 13 countries.

Application centers

We currently have application centers in:

- Germany:
  Head Office Erlangen and 6 German regions, e.g. in Munich, Nuremberg, Stuttgart, Mannheim, Frankfurt, Chemnitz, Cologne, Bielefeld, Bremen, Hanover, Hamburg
- Italy: Bologna, Milan
- USA: Atlanta
- China: Beijing, Shanghai
- France: Paris
- Turkey: Istanbul
- India: Mumbai
- Switzerland: Zurich
- United Kingdom: Manchester
- Brazil: Sao Paulo
- Japan: Tokyo, Osaka
- The Netherlands: The Hague
- Denmark: Ballerup

These application centers specialize in the use of SIMOTION/SINAMICS. You can therefore rely on automation and drive specialists for implementing successful applications. By involving your personnel at an early stage in the process, we can provide a solid basis for rapid knowledge transfer, maintenance and further development of your automation solution.

Advice on applications and implementation

We offer a variety of consultation services to help you find the optimum solution for the SIMOTION/SINAMICS application you want to implement.

The quotation phase includes

- Clarification of technical questions
- Discussion of machine concepts and customer-specific solutions
- Selection of suitable technology and
- Suggestions for implementation.

A technical feasibility study is also performed at the outset. In this way, difficult points of the application can be identified and solved early on. We can also configure and implement your application as a complete solution including control cabinet from a single source.

During the implementation phase a number of proven standards can be applied. This saves engineering costs.

The system can be commissioned by experienced, competent personnel, if required. This saves time and trouble.

If servicing is required, we can support you on site or via teleservice. For further information about servicing, please see "Service and Support".

On-site application training

Training for the implemented applications can also be organized and carried out on site. This training for machine manufacturers and their customers does not deal with individual products, but the entire hardware and software system (for example, automation, drives and visualization).

From an initial concept to successful installation and commissioning: We can provide complete support for SIMOTION/SINAMICS! Contact your Siemens representative.

For additional information, refer to:
www.siemens.com/motioncontrol/apc
→ Standard Applications-Selection
→ Cranes

Faster and more applicable know-how: Crane-specific training courses regarding the use of SIMOCRANE

SITRAIN® – Siemens Training for Automation and Industrial Solutions – provides you with comprehensive support in solving your tasks.

Training by the market leader in automation and plant engineering enables you to make independent decisions with confidence. Especially where the optimum and efficient use of products and plants are concerned.

First-class know-how which pays off directly: In optimum cargo handling services, more precise and safer motion control of the load as well as faster troubleshooting and reduced downtimes. In other words, higher profits and lower costs.

Achieve more with SITRAIN

- Shorter times for commissioning, maintenance and service
- Optimized cargo handling procedures
- Reliable engineering and commissioning
- Minimized downtimes for the crane system
- Flexible adaptation of the crane system to market requirements
- Compliance with quality standards in production
- Increased employee satisfaction and motivation
- Shorter familiarization times following changes in technology and staff

Contact

Visit our Internet site at:

www.siemens.nl/training/cranes

or let us advise you personally. You can request our latest training catalog from:

Siemens Training NL
Tel.: + 31 (70) 333-3900

E-mail: siemens.training.nl@siemens.com

SITRAIN highlights

Top trainers

Our trainers are skilled specialists with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

Practical experience

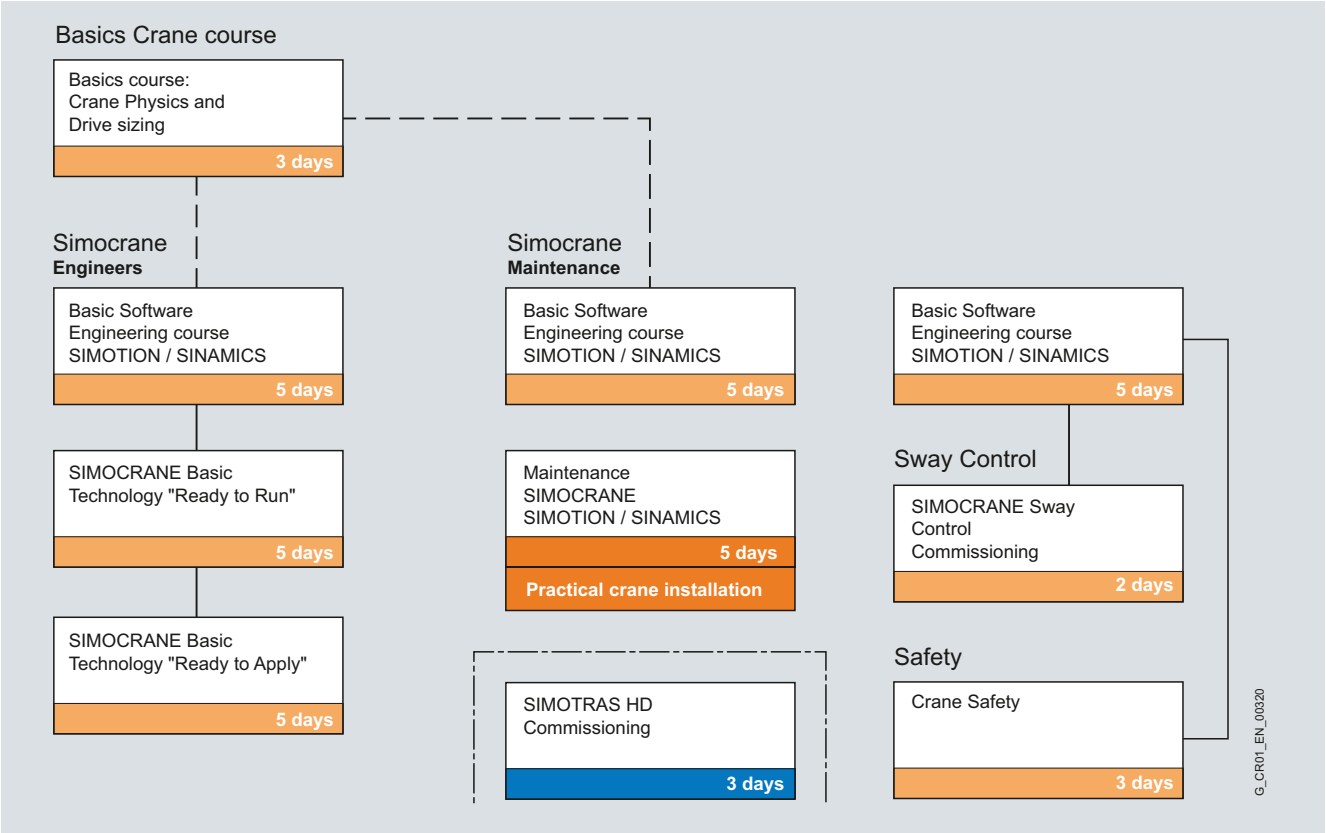
The practical experience of our trainers enables them to teach theory effectively. But since theory has its grey areas, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you methodically on state-of-the-art training equipment. This training approach will give you all the confidence you need.

Customized training

In our training centers at Zoetermeer in The Netherlands and Shanghai in China we offer an extensive, modular, graded training program for OEMs, system integrators and crane operators.

In our training courses on the topics of configuration, engineering, service, and maintenance we place considerable emphasis on application-oriented, crane-specific training. In all courses theoretical learning is combined with practical exercises on crane-specific demo equipment. All courses are conducted in English.

Cranes: SIMOCRANE/SIMOTION/SINAMICS



Basics Course: Crane Physics and Drive Dimensioning (CR-Basics)

Target group

Sales engineers, business developers, HW/SW engineering personnel

Objectives

This course teaches participants to understand the crane's mechanical system and its demand for physical quantities such as power, torque, speed, acceleration etc. It provides general understanding of AC motor theory as well as AC converter power electronics. It enables the participants to dimension the complete electrical drive systems for cranes.

Prerequisites

Preconditional to this course is a degree in electrical engineering.

Contents

The course content is:

- Mechanical crane system, drum, gearbox, pulley, load, hoisting and lowering. Calculation of physical quantities such as speed, power, torque, acceleration and deceleration
- Brakes: drum brake and disc brake for hoisting gear, built-on holding brakes for travel gear. Safety aspects. Dimensioning of brakes.
- AC motor theory
- AC motor dimensioning: intermittent duty, overload capability, thermal derating. Overview of Siemens motor range for crane applications
- AC converter theory. SINAMICS S120/G120 product family. Power infeed concepts with BLM, SLM, ALM or AC/AC power modules. Application manuals: drive selection, common mode oscillation and their effect on motor windings
- SINAMICS dimensioning, physical aspects

Standard duration

3 days

Note:
The crane-specific SIMOCRANE training is only available in English!

Basic Software Engineering SIMOTION/SINAMICS (CR-SICR1)

Target group

Crane engineers

Objectives

This practical course guides participants in working with SIMOTION and SINAMICS as a basis for the use of the SIMOCRANE Basic Technology software package. This course is a prerequiste for the course "Commissioning of SIMOCRANE Basic Technology". Handling of SIMOCRANE Basic Technology for ready-to-run solutions will be part of that training.

Prerequisites

Preconditional to this course is basic knowledge of SIMATIC S7, frequency controllers and crane technology.

Contents

The course content is:

Day 1

- **Drive dimensioning/configuration**

  New platform, basic configurations, system components, communication, SINAMICS features, SINAMICS dimensioning, Safety Integrated, service concept, comparison between MASTERDRIVES and SINAMICS.

  Motor dimensioning for crane applications is not part of this course!
  This topic is handled in "Crane Control Basics Course; CR-BASICS"
- **Crane technology & application - increasing productivity**

  Overview of basic technology, sway control, skew control, vehicle positioning, collision prevention, profile scanning, optimized trajectory, position control, applications
- **Cabling and wiring guidelines for cranes**

  Background, selection of load side components, dimensioning of cable cross-sections, power cable selection, installation of control cables

Day 2 - 5

- **SINAMICS & SIMOTION**

  SINAMICS and SIMOTION overview

  Introduction to SCOUT/STARTER engineering tools

  Communication between SINAMICS & SIMOTION & PLC & PG with PROFIBUS/Ethernet
- **Practical exercises with crane training sets**

  Use of the SCOUT engineering tool for an STS project

  SINAMICS details and how to configure a DO (drive object)

  Use of the control panel in SINAMICS

  Information on the CompactFlash card

  The basics of the trace and function generator

  SIMOTION details and introduction to the programming language DCC to understand the principles

  The basic use of variables, system - global - local how to configure a TO (technology object) and use the control panel in SIMOTION

  Introduction to the programming language's MCC to understand the principles

  Firmware and licenses

  Saving the project to CF card

  The basic use of data sets

  The CX32

  Overview of SIMOCRANE Basic Technology, with demonstration program

Standard duration

5 days

Note:
The crane-specific SIMOCRANE training is only available in English!

SIMOCRANE Basic Technology "Ready-to-Run" (CR-SICR2)

Target group

Crane SW engineers, commissioning engineers who have to commission SIMOCRANE Basic Technology (standard Ready-to-Run solution)

Objectives

This practical course guides participants in working with the standard application software - "Ready-to-Run" solution of the SIMOCRANE Basic Technology package. The software structure and the range of functions will be introduced in detail. The procedure for commissioning of standard applications (e.g. STS Crane) is the focus of this course. It is not the goal of this course to adapt the programs. For such "Ready-to-apply" users, the next course: SIMOCRANE Basic Technology "Ready-to-Apply" is required.

Prerequisites

The following prerequisites are required:

Basic knowledge of SIMATIC S7,
Basic knowledge of frequency converters,
Basic knowledge of crane technology,
Basic knowledge of SIMOTION and SINAMICS (S120)
(we recommend the course "Basic Software Engineering SIMOTION/SINAMICS (CR SICR1), or DR-SNS-SI and MC-SMO-SYS)

Contents

The course content is:

Day 1:

- **Standard application SW – Structure and functions**
  Overview of SIMOTION & SINAMICS S120
  Overview of SIMOCRANE Basic Technology
  Introduction to standard application SW
  Configuration, communication (S7 – SIMOTION – SINAMICS), SW structure, function modules,
  Crane DCC library

Day 2:

- **Commissioning of SINAMICS, with practice**
  Setpoint channel
  Stationary & turning measurement
  Speed controller optimization

Day 3 – 4:

- **Commissioning of SIMOTION, with practice**
  Function module (on Technology Object)
  Axis type settings
  Position controller optimization
  Crane technology (in Drive Control Chart)
  Setpoint channel
  Master switch, start pulse,
  Sequential control (in Motion Control Chart)
  Structure of the program
  Introduction of the different operating modes

Day 5:

- **Service (diagnostics and trouble-shooting)**
  Diagnostics with examples
  Trace
  Trouble-shooting
  Analysis in SIMOTION/SINAMICS
  Introduction of the IT commissioning tool
- **Practical exercises with crane training kits**

Standard duration

5 days

Note:
The crane-specific SIMOCRANE training is only available in English!

SIMOCRANE Basic Technology "Ready to Apply" (CR-SICR3)

Target group

Crane SW engineers, commissioning engineers who have to engineer SIMOCRANE Basic Technology (Ready-to-Apply for their own adaptation).

Objectives

The goal of this course is to adapt the standard software "Ready to Run" for a special crane application, which is known as "Ready to Apply", e.g. when certain cranes use more or less motions and/or functions than in the standard application.

Prerequisites

Mandatory: SIMOCRANE Basic Technology "Ready to Run" (CR-SICR2)

Contents

The course content is:

Review of key points: Programming ST, MCC, DCC and software structure

On the basis of the standard project, add one new axis, for example, one main drive → two main drives

On the basis of the standard project, delete one existing axis, for example, two trolleys (STS) → one trolley

Add a new function module, for example, a slewing gear to RMG

- **Axis changeover**
  Case 1: Standard solution - more TOs on one x DO (boom and trolley share one drive)
  Case 2: Applicative solution - more TO Config. (boom shared with Trolley 1 and Trolley 2)
- **Communication**
  More PZD S7 ↔ SIMOTION D (application address area)
  More signals: SIMOTION D ↔ SINAMICS
  Change address area
- **How to use onboard I/O for flying referencing**
  Configuration
  Communication
  Connection
- **Miscellaneous**
  Delete one CX32
  Change FB , e.g. extending input/output communication for SINAMICS and SIMOTION
  Extending script files
  Change motor data set
  Changing the configuration to sensorless vector control
- **Practical exercises with crane training kits**

Standard duration

5 days

Note:
The crane-specific SIMOCRANE training is only available in English!

Crane: SINAMICS/SIMOTION/SIMOCRANE Maintenance (CR-MAINT)

Target group

Maintenance supervisor, maintenance technicians of container terminals, ports, steel mills. Technical personnel from crane builders and service companies involved in the crane control system service and maintenance.

Objectives

This practical course guides participants in working with SINAMICS infeeds, inverters, motors and brakes with the actual ratings found on modern cranes.

Due to the special configuration of the training system, 2 motors with their original rating can be operated at full speed, voltage and current. For 1 motor, typical loading will be simulated using the second motor as a load simulator. A full-sized Bubenzer disk brake is installed to practise tuning the drive for correct brake setting and release.

Handling of infeed and inverter faults is practised to the extent of component level repair and system recovery.

The SINAMICS infeed and inverters are controlled from a SIMATIC S7-400 via PROFIBUS just as on the real crane control system.

The SIMOCRANE Crane Management System is available on the training system.

Prerequisites

Prerequisite to this course is knowledge of SINAMICS and SIMOTION and basic application of SIMOCRANE as gained in the CR-SICR1 course.

Basic knowledge of SIMATIC S7.

Contents

The course content is:

- SIMATIC S7-400
- Setup communication to the SIMATIC S7 PLC and check the proper functioning of the PLC
- Restore the original program to the PLC
- PROFIBUS communication
- Troubleshooting PROFIBUS communication, understanding how PROFIBUS is working and how it is implemented on a crane
- DRIVE-CliQ communication
- Check the DRIVE-CliQ connections, use the topology in SCOUT to do this. Understand the DRIVE-CliQ rules for cranes
- Ethernet communication
- Troubleshooting Ethernet communication, understanding how Ethernet is working and how it is implemented on a crane
- SINAMICS CU320 Control Unit
- SINAMICS infeed AIM and ALM
- SINAMICS Motor Modules, Sensor Modules, etc.
- SIMOTION
- Functions of the modules. How to troubleshoot the modules. What to do in the case of replacing a module
- Basic application of SIMOCRANE
- Functionality of SIMOCRANE, how to troubleshoot. How to use the software tools, STARTER, SCOUT and SIMATIC manager
- SIMOCRANE - CMS Crane Management System
- How to use the system
- Ground fault detection in IT network with Bender sensing module
- How to use and test the Bender sensing module
- Simulation and monitoring realistic drive loading
- Exercises and troubleshooting on the full-size system
- SINAMICS fault handling and repair
- Use of the test box for diagnostics. Replace components
- Demo with SIMOSEC switchgear

Standard duration

5 days

Note:
The crane-specific SIMOCRANE training is only available in English!

SIMOCRANE Sway Control Commissioning (CR-SICRSWC)

Target group

Crane SW engineers, commissioning engineers who have to commission SIMOCRANE Basic Technology along with SIMOCRANE Sway Control or standalone Sway Control.

Objectives

This practical course guides participants in working with the Sway Control System as a basis for the use of the SIMOCRANE Sway Control package. This training is a prerequisite for commissioning of the SIMOCRANE Sway Control product.
The training for the SIMOCRANE Sway Control product is designed for the following product families:

- SIMOCRANE CeSAR
- SIMOCRANE SC SIMOTION

Prerequisites

The following prerequisites are required:

- Basic knowledge of SIMATIC S7,
- Basic knowledge of frequency controllers,
- Basic knowledge of crane technology,
- Basic knowledge of SIMOTION and SINAMICS (S120)
- We recommend the course: Basic Software Engineering SIMOTION/SINAMICS (or DR-SNS-SI and MC-SMO-SYS)

Contents

The course content is:

Day 1:

- **Various sway systems**

  Survey, selection of Sway Control, basic configurations, system components, communication, diagnostics tool, features, Safety Integrated, positioning, trim-list-skew, manual/automatic operation, unload on the fly

  Preparation of the PLC program

Day 2:

- **Commissioning**

  Commissioning tool CeCOMM overview
  Introduction of functions
  Communication
  Checking of pre-conditions
  How to configure the PROFIBUS interface
  Optimizing the sway controller
  Adjusting the camera
  Introduction of commissioning/instruction manual
  The basic use of parameters

- **Practical exercises with the crane model**

Notes

Course location is Magdeburg in Germany.
Minimum 2 persons and maximum 4 persons.

Standard duration

2 days

Note:
The crane-specific SIMOCRANE training is only available in English!

Crane Safety (CR-SAFETY)

Target group

Crane control system design engineers

Objectives

This course teaches participants how to work practically with the current safety standards such as ISO 12100, ISO 14121 and IEC 60204-32 and how to apply these standards to the engineering of control circuits using Siemens control components.

The focus will be on hard-wired safety circuits. But design requirements resulting from IEC 13849, IEC 62061 for safety-related programmable electronic control systems will also be covered.

Prerequisites

The following prerequisites are required:

- Basic knowledge of SIMATIC S7,
- Basic knowledge of frequency converters,
- Basic knowledge of crane technology,
- Basic knowledge of SIMOTION and SINAMICS (S120)
- We recommend the course: Basic Software Engineering SIMOTION/SINAMICS
- Preconditional to this course is a degree in electrical engineering.

Contents

The course content is:

- Relevance of risk assessment for the entire crane (including mechanical system) as per ISO 12100 (safety of machinery - basic concepts - general principles of design) and ISO 14121 (safety of machinery risk assessment)
- Discussion of a sample risk assessment as normally prepared by a machine builder
- Basic requirements for the electrical control system as per IEC 60204-32 (2008)
- Function of crane supply switch, crane disconnect switch and crane switch
- Typical implementations of hoist control safety systems
- Typical implementations of travel (bridge, trolley, gantry) control safety systems
- Behavior of control system in the event of failures. Fulfilling redundancy and diversity requirements
- Introduction of SIGUARD safety components
- Implications of applying ISO 13849 and IEC 62061 (safety of machinery – functional safety of safety-related electrical, electronic and programmable electronic control systems)
- Guidelines for the application of hard-wired and programmable safety-related control systems

Notes

Official hard copies of ISO 12100, ISO 14121 and IEC 60204-32 will be part of the course documentation.
If you want to join the waiting list, please book for this date. As soon as we have a date we will inform you.
Then you can decide if you want to be on this course or if you want to stay on the waiting list.

Standard duration

3 days

Note:
The crane-specific SIMOCRANE training is only available in English!

SIMOTRAS HD Commissioning (CR-SIMOTRA)

Target group

Commissioning, engineering and maintenance engineers

Objectives

This theoretical and practical course guides participants in working with SIMOTRAS HD, a microprocessor-controlled converter for speed control of slip-ring motors with stator phase-angle control and electronic phase reversal.

Prerequisites

Prerequisite to this course is a basic knowledge of AC drives with slip-ring motors

Contents

Day 1:

- **System overview, basic AC drives with slip-ring motors**

  SIMOTRAS HD functionality in comparison with older types SIMOTRAS H and SIMOTRAS HE

  Basic information about AC drives with slip-ring motors (closed-loop control, open-loop control, torque-speed diagrams, calculation example)

  Control panels, electronic boards, connections, overview of SIMOTRAS HD training unit

  Standard application and function descriptions

Day 2:

- **Drive-specific controls, commissioning, exercises**

  Integrated drive-specific (crane) control

  Exercises: Quick start setup

  Exercises: Step by step start-up

Day 3:

- **Fault diagnostics, drive monitor, PROFIBUS communication**

  Exercises: Drive recordings with drive monitor

  Measurement and tests with training unit

  PROFIBUS DP communication with SIMATIC S7 automation system

  Exercises: Drive control with SIMATIC S7

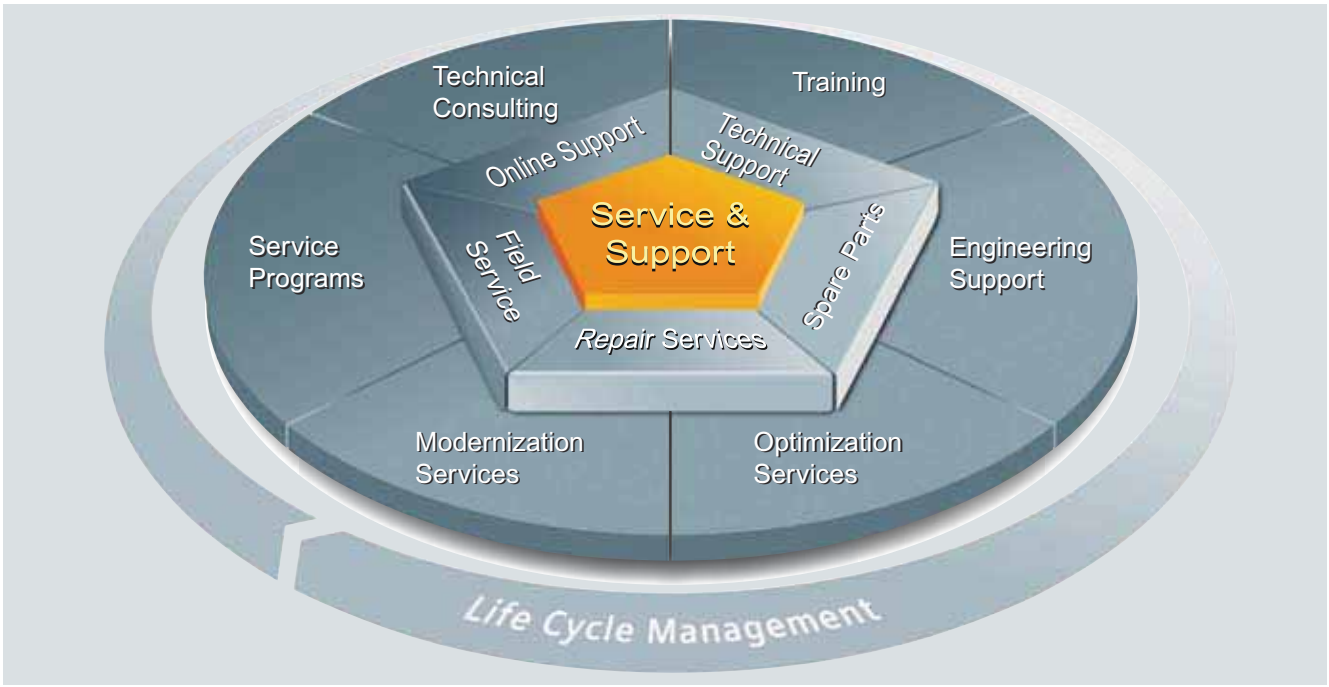
- **Practical exercises with SIMOTRAS HD training set**

Standard duration

3 days

Note:
The crane-specific SIMOCRANE training is only available in English!

The unmatched complete service for the entire life cycle



For machine constructors, solution providers and plant operators: The service offering from Siemens Industry, Automation and Drive Technologies includes comprehensive services for a wide range of different users in all sectors of the manufacturing and process industry

To accompany our products and systems, we offer integrated and structured services that provide valuable support in every phase of the life cycle of your machine or plant - from planning and implementation through commissioning as far as maintenance and modernization.

Our Service & Support accompanies you worldwide in all matters concerning automation and drives from Siemens. We provide direct on-site support in more than 100 countries through all phases of the life cycle of your machines and plants.

You have an experienced team of specialists at your side to provide active support and bundled know-how. Regular training courses and intensive contact among our employees - even across continents - ensure reliable service in the most diverse areas.

Online Support

The comprehensive online information platform supports you in all aspects of our Service & Support at any time and from any location in the world.

www.siemens.com/automation/service&support

Technical Consulting

Support in planning and designing your project: From detailed actual-state analysis, definition of the goal and consulting on product and system questions right through to the creation of the automation solution.

Technical Support

Expert advice on technical questions with a wide range of demand-optimized services for all our products and systems.

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Training

Extend your competitive edge - through practical know-how directly from the manufacturer.

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The unmatched complete service for the entire life cycle

Engineering Support

Support during project engineering and development with services fine-tuned to your requirements, from configuration through to implementation of an automation project.

Field Service

Our Field Service offers you services for commissioning and maintenance - to ensure that your machines and plants are always available.

Spare parts

In every sector worldwide, plants and systems are required to operate with constantly increasing reliability. We will provide you with the support you need to prevent a standstill from occurring in the first place: with a worldwide network and optimum logistics chains.

Repairs

Downtimes cause problems in the plant as well as unnecessary costs. We can help you to reduce both to a minimum - with our worldwide repair facilities.

Optimization

During the service life of machines and plants, there is often a great potential for increasing productivity or reducing costs. To help you achieve this potential, we are offering a complete range of optimization services.

Modernization

You can also rely on our support when it comes to modernization - with comprehensive services from the planning phase all the way to commissioning.

Service programs

Our service programs are selected service packages for an automation and drives system or product group. The individual services are coordinated with each over to ensure smooth coverage of the entire life cycle and support optimum use of your products and systems.

The services of a Service Program can be flexibly adapted at any time and used separately.

Examples of service programs:

- Service contracts
- Plant IT Security Services
- Life Cycle Services for Drive Engineering
- SIMATIC PCS 7 Life Cycle Services
- SINUMERIK Manufacturing Excellence
- SIMATIC Remote Support Servicess

Advantages at a glance:

- Reduced downtimes for increased productivity
- Optimized maintenance costs due to a tailored scope of services
- Costs that can be calculated and therefore planned
- Service reliability due to guaranteed response times and spare part delivery times
- Customer service personnel will be supported and relieved of additional tasks
- Comprehensive service from a single source, fewer interfaces and greater expertise

Contact information is available in the Internet at:
www.siemens.com/automation/partner

Overview

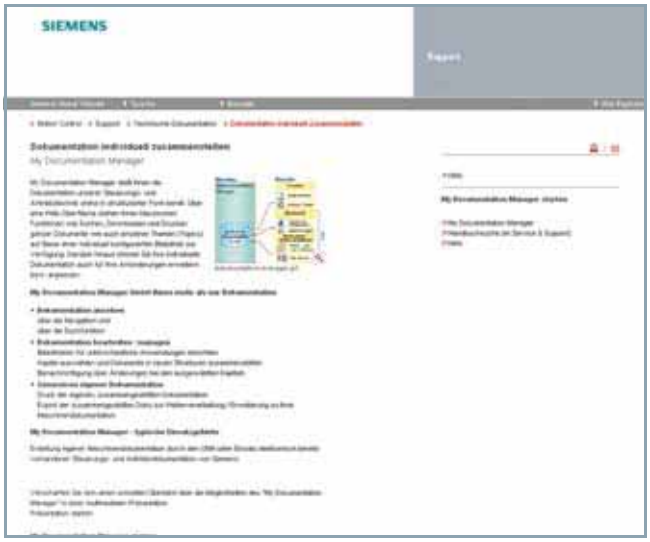
SPARESonWeb – Online spare parts catalog

SPARESonWeb is a web-based tool for selecting the spare parts available for the SINAMICS system. After you have registered and entered the serial number and Order No., the spare parts available for the relevant unit are displayed.

The delivery state for specific orders can be displayed for all shipped SINAMICS products.

http://workplace.automation.siemens.com/sparesonweb

Overview



Compile customized documentation

My Documentation Manager – Customizing information

My Documentation Manager offers all Motion Control customers an innovation with extended usability: Machine manufacturers and end customers are not only able to assemble their own customized technical documents for a specific product or system, they can also generate complete libraries with individually configured contents. The content that matches your topic can be found from the full range of I IA&DT documentation stored under Service & Support using the operator interface and assembled using Drag & Drop into application-based libraries, generated and even combined with your own documentation. The self-generated collections can be saved in the commonly used RTF and PDF formats or even in XML format.

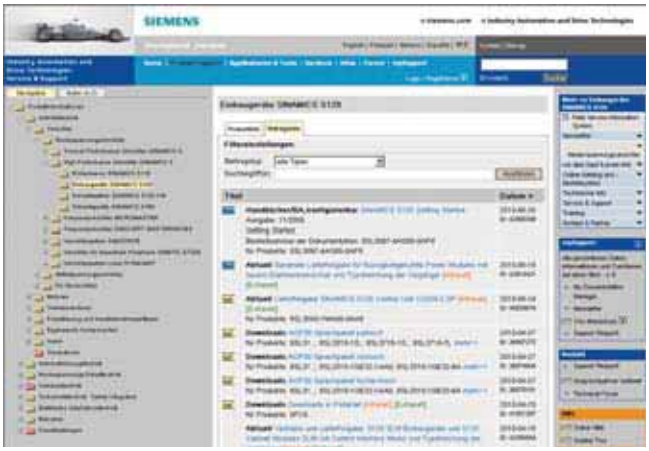
You must register for Configure and Generate/Manage (the existing login can be used, e.g. Industry Mall www.siemens.com/industrymall)

Benefits

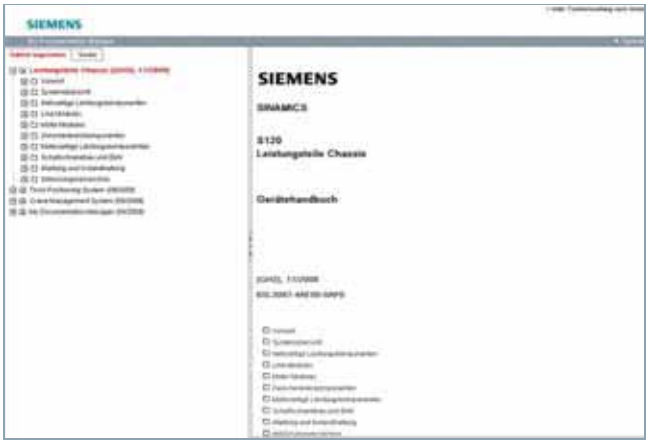
- Display
  View, print or download standard documents or personalized documents
- Configure
  Transfer standard documents or parts of them to personalized documents
- Generate/manage
  Produce and manage personalized documents in the formats PDF, RTF or XML

Design

My Documentation Manager is the web-based system to generate personalized documentation based on standard documents. It is part of the Service & Support Portal.



Search in the Service & Support portal



Document in My Documentation Manager

Function

Opening My Documentation Manager

There are two ways to open My Documentation Manager:

- Search in the Service & Support Portal
  www.siemens.com /automation/service&support
  Appropriate manuals are designated as "configurable". My Documentation Manager opens by clicking on "Display and configure". The selected document is displayed as the current document.
- Using the direct link from the Service & Support portal
  www.automation.siemens.com /docconf/
  After logon/registration, the online help is displayed as the current document.

Further information

You can find further information on the Internet at:

www.siemens.com/mdm

Overview

A high-quality programmable control or drive system can be used to maximum effect only if the user is aware of the performance of the products used as a result of intensive training and good technical documentation.

This is becoming more important due to the shorter innovation cycles of modern automation products and the convergence of electronics and mechanical engineering.

Comprehensive documentation is available for SIMOTION and the SINAMICS S120 drive system, including the Operating Manual, Programming Manual or Configuration Manual, as well as the Commissioning Manual.

Information is available in the following formats:

- Paper version, printed copy
- PDF file available on Internet as DOConWEB application with 'search all documents' function
  www.siemens.com/automation/doconweb

You can find additional information on the Internet at:
www.siemens.com/motioncontrol/docu

Information and documentation relating to SIMOTION are available in the form of:

- Windows Help in conjunction with the SCOUT engineering system
- Documentation (PDF) on the product CD ROM
- Documents/documentation at:
  http://support.automation.siemens.com/WW/view/en/10805436/133300

Applications

Explanations regarding manuals:

- **Equipment Manual/Configuration Manual**
  containing all necessary information about the intended use of the components of a system, e.g. technical data, interfaces, dimension drawings, characteristics and possible applications.
  Phases of use: Cabinet configuration/setup, circuit diagram configuration/drawing.
- **Commissioning Manual**
  containing all information relevant to commissioning after installation and wiring. It also contains all safety and warning notices relevant to commissioning in addition to overview drawings.
  Phases of use: Commissioning of components that have already been connected, configuration of system functions.
- **List Manual**
  containing all parameters, function diagrams, and faults/alarms for the product/system as well as their meanings and setting options. It contains parameter data and fault/alarm descriptions with functional correlations.
  Phases of use: Commissioning of components that have already been connected, configuration of system functions, fault cause/diagnosis.
- **Getting Started**
  providing information about getting started for the first-time user as well as references to additional information. It contains information about the basic steps to be taken during commissioning. The information in the other documentation should be carefully observed for all of the other work required.
  Phases of use: Commissioning of components that have already been connected.
- **Function Manual Drive Functions**
  containing all the relevant information about individual drive functions: Description, commissioning and integration in the drive system.
  Phases of use: Commissioning of components that have already been connected, configuration of system functions.

General documentation

Selection and ordering data

Description	Order No.
Catalog PM 21 · 2011	
• German	**E86060-K4921-A101-A2**
• English	**E86060-K4921-A101-A2-7600**
• French	**E86060-K4921-A101-A2-7700**
• Italian	**E86060-K4921-A101-A2-7200**
Catalog ST 70 · 2009	
• German	**E86060-K4670-A101-B2**
• English	**E86060-K4670-A101-B2-7600**
• French	**E86060-K4670-A101-B2-7700**
• Italian	**E86060-K4670-A101-B2-7200**
• Spanish	**E86060-K4670-A101-B2-7800**
Catalog ST 80/ST PC · 2010	
• German	**E86060-K4680-A101-B7**
• English	**E86060-K4680-A101-B7-7600**
• French	**E86060-K4680-A101-B7-7700**
• Italian	**E86060-K4680-A101-B7-7200**
• Spanish	**E86060-K4680-A101-B7-7800**
Decentralizing with PROFIBUS DP	**ISBN 3-89578-074-X**

Description	Order No.
User/manufacturer documentation	
DOConCD SINAMICS S120 User and Manufacturer Documentation on CD-ROM with Help Tool Edition: 11/2009 Languages: English, German	**6SL3097-2CA00-0YG6**

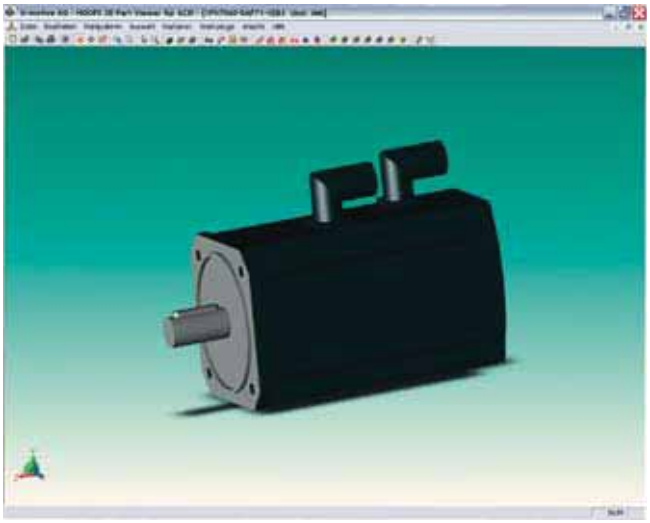
Further information

Please send any queries or suggestions to:

docu.motioncontrol@siemens.com

Overview

CAD CREATOR –
Dimension drawing and 2D/3D CAD generator



Thanks to the user-friendly operator interface of the CAD CREATOR, it is easy to configure controls, drives and motors. With the support of the CAD CREATOR, product-specific dimension drawings and 2D/3D CAD models can be created quickly. The CAD CREATOR assists the machine manufacturer's designers, offer drafting engineers and project engineers.

Benefits

- Provision of dimension drawings as 2D/3D-CAD models in mm and inches
- Display of CAD models and dimension drawings by integrated viewers
- Support for all general geometry interfaces STEP, IGES, Parasolid, SAT, VDA, and for special interfaces such as Ideas, NX, Solid Edge, Pro/Engineer, Autocad, Inventor, Mechanical Desktop, Catia and Solidworks
- Multilingual operator interface in English, French, German, Italian and Spanish
- Dimension drawings and 2D/3D CAD models for
  - Motors
    - 1FT6/1FT7/1FK7 synchronous motors
    - 1FE1 built-in synchronous motors
    - 1FW3 torque motors
    - 1FW6 built-in torque motors
    - 1FT6/1FT7/1FK7/1FK7 DYA geared motors
    - 1PH8 synchronous/asynchronous motors
    - 1PH7/1PH4/1PL6/1PM4/1PM6 asynchronous motors
    - 2SP1 motor spindles
    - 1FN3 linear motors
  - SINAMICS S120
    - Control Units
    - Power Modules (booksize/chassis)
    - Line Modules (booksize/chassis)
    - Line-side components
    - Motor Modules (booksize/chassis)
    - DC link components
    - Additional system components
    - Load-side power components
    - Encoder system connection
    - Connection system MOTION-CONNECT

Benefits (continued)

- SINUMERIK solution line
  - CNC controls
  - Operator components for CNC controls
- SIMOTION
  - SIMOTION D
  - SIMOTION C

The CAD CREATOR offers a variety of options for configuring, but also different methods of searching for a product:

- According to order number
- According to technical description

After successful configuration of the product, the dimension drawings (2D/3D CAD models) are displayed with the integrated viewer and made available for export.

Selection and ordering data

Description	Order No.
CAD CREATOR Dimension drawing and 2D/3D CAD generator on DVD-ROM Languages: English, French, German, Italian, Spanish	**6SL3075-0AA00-0AG0**

Further information

The CAD CREATOR is available on DVD-ROM and as an Internet application.

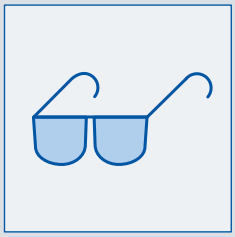
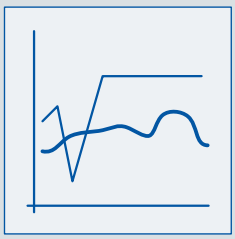
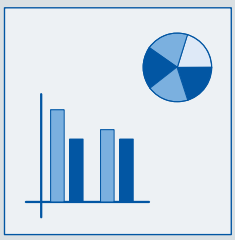
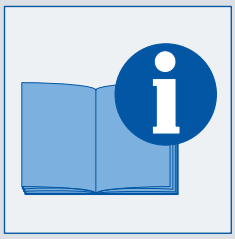
You can find additional information on the Internet at:
www.siemens.com/cadcreator

Notes

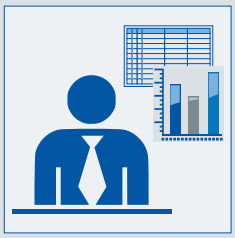
SIMOCRANE symbols
Appendix

10

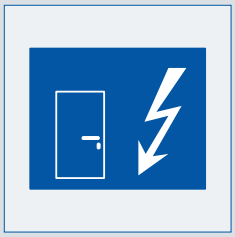
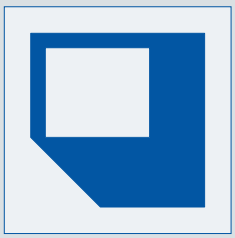
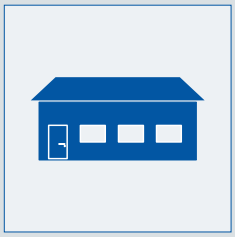
Functions of the crane management system

Function	Symbol	Description of functions
Status display		• Graphical visualization of crane, components and subsystems • Settings of operating parameters for crane operation
Condition monitoring		• Recording of highly dynamic operating variables • Monitoring of limit values
Error diagnostics		• Alarm/event reporting with archiving • Calling up contextual information • Error analysis functions
Measured value acquisition		• Long-term recording of operating values • Graphical or tabular representation and evaluation
Operating data acquisition and reporting		• Acquisition of operating data, operating hours and counter values • Reporting
Reference information		• Fast access to plant-related sources of information
Maintenance functions		• Maintenance messages and instructions

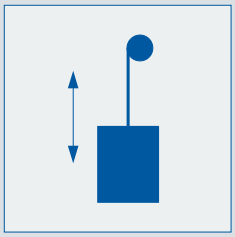
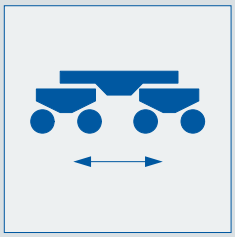
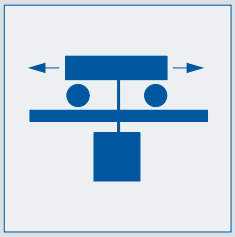
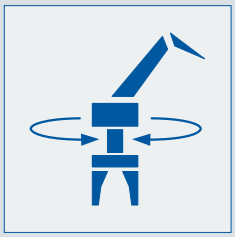
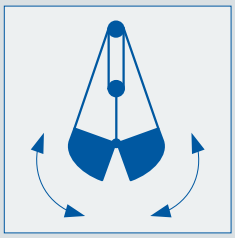
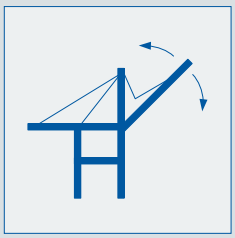
User groups

Function	Symbol	Description of functions
Crane driver		• Crane driver directly on the crane • Restricted operator authorizations in crane management system
Crane driver (remote)		• Crane driver at remote control desk • Restricted operator authorizations in crane management system
Maintenance technician		• Maintenance or service technician for crane systems • Extended operator authorizations in crane management system (detailed diagnostics)
Administrator		• System administrator (IT) • Unrestricted operator authorizations in crane management system
Operator		• Plant operators • Restricted operator authorizations in crane management system • Creation of evaluations and reports
Remote service		• Maintenance or service technician for crane systems with remote access • System specialist with remote access

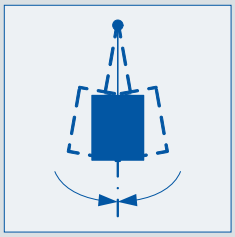
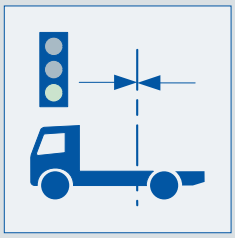
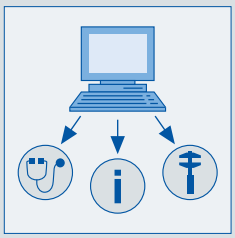
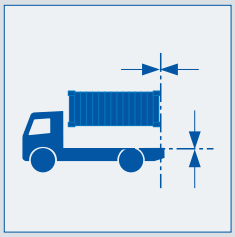
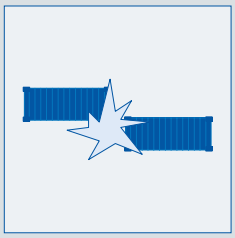
Installation locations

Function	Symbol	Description of functions
Electrical room		• Installation location for the complete drive and control technology on a crane
Crane driver cabin		• Moveable or permanently installed crane driver cabin
Maintenance building		• Building/location of service and maintenance technician at a terminal
Administration center		• Terminal administration • Central control room with logistics systems • Central server landscape and IT administration

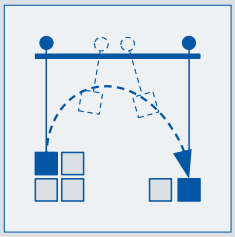
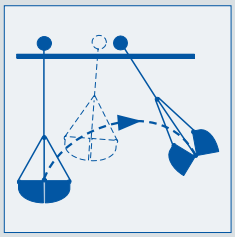
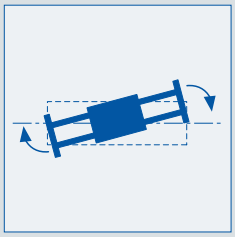
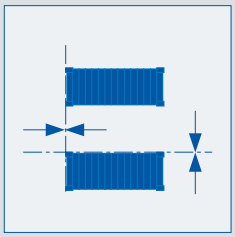
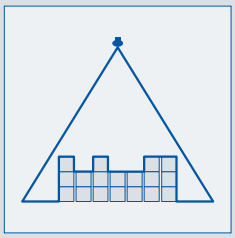
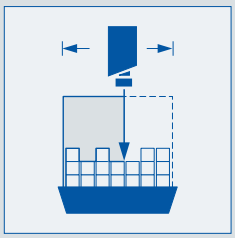
Crane drives and drive axes

Function	Symbol	Description of functions
Hoist		• Hoisting axis for container cranes
Gantry		• Gantry axis for cranes of different types
Trolley		• Traversing axis for the trolley of cranes of different types
Slewing gear		• Slewing gear axis for slewing luffing cranes and similar types
Grab		• Holding and closing gear for grab cranes
Boom		• Drive axis for the crane boom-hoist for STS or ship unloading cranes

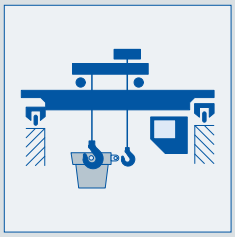
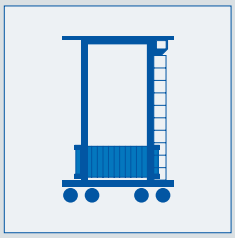
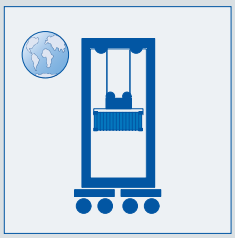
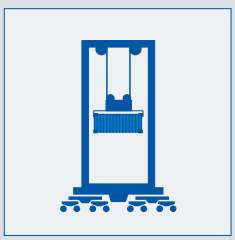
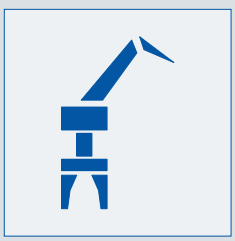
Extended technological functions and products

Function	Symbol	Description of functions
SIMOCRANE Sway Control Systems		• Automatic sway control for cranes of different types
SIMOCRANE Truck Positioning		• Positioning system for trucks hitched to trailers in container terminals
SIMOCRANE CMS		• Crane management system • Status display • Diagnostics • Information
Position control		• Automatic picking up of a load (container) from a truck • Automatic lowering of a load (container) onto a truck • Application-specific function with the use of SIMOCRANE products Truck Positioning and the SIMOCRANE Sway Control System
Collision Detection Stack		• Collision protection in the stacking area of container terminals
Collision Detection ASC		• Collision protection for automatic stacking cranes at container terminals
Collision Detection STS		• Collision protection crane – ship with STS cranes • Avoidance of damage to crane or ship

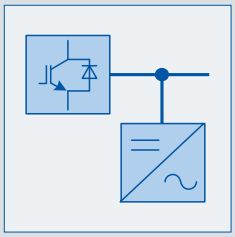
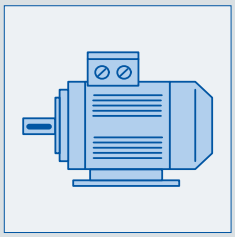
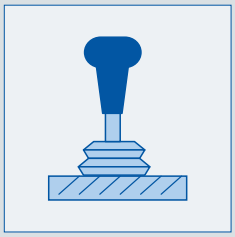
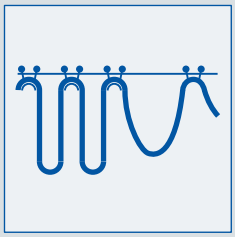
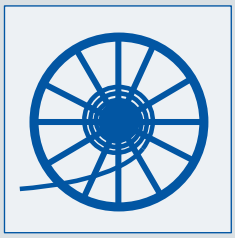
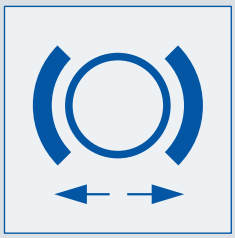
Extended technological functions and products (continued)

Function	Symbol	Description of functions
Automatic travel		• Automatic or semi-automatic loading and unloading for container cranes • This function is derived from a function of "SIMOCRANE Sway Control Systems"
On-the-fly unloading		• On-the-fly unloading of bulk material to grab cranes
Skew control		• Automatic control of the load angle on a ship to shore crane (STS) • The presence of the corresponding mechanical components is a prerequisite for this function • This function is derived from a function of "SIMOCRANE Sway Control Systems"
Position control (stack)		• Automatic positioning
Profile scanning		• Automatic detection of the height profile of a container stack in the "stack" • Prerequisite for fully automatic crane operation in the stacking area and for avoiding collisions
Bay scanning		• Automatic acquisition of the height profile of a container stack on the ship • Prerequisite for automatic mode in conjunction with SIMOCRANE Sway Control Systems

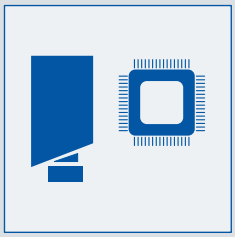
Crane types

Function	Symbol	Description of functions
Ladle crane		• Ladle crane in steelworks
Straddle carrier		• Mobile transport crane in container terminals
RTG (ECO RTG)		• **R**ubber **T**ired **G**antry • Mobile, rubber-tired stacking crane • ECO RTG • Energy-efficient and diesel-powered RTG with hybrid drive system and reload function
GSU		• **G**rab **S**hip **U**nloader • Grab ship unloading crane for handling bulk material in the harbor area
STS		• **S**hip **T**o **S**hore crane • Container handling in the harbor area • Cargo handling between ship and terminal
RMG		• **R**ail **M**ounted **G**antry • Rail-mounted stacking crane in the container terminal • This type of crane is frequently used as an automated stacking crane (ASC)
SLC		• Slewing luffing crane

Subsystems and components

Function	Symbol	Description of functions
Converter		• Frequency converter for three-phase motors
Motor		• Motor for the hoisting gear, gantry, trolley, slewing gear etc.
Master switch		• Control instrument at crane driver's seat
Cable trailing		• Trailing cable system for moving crane components • Example: Container crane trolley
Cable drum		• Cable drum for the main supply cable of electrically supplied cranes
Brake		• Brakes for the different drive axes of a crane

Subsystems and components (continued)

Function	Symbol	Description of functions
Refurbishment		• Service for the modernization and conversion of older crane systems
CeSAR		• Controller-supported Sway Control System

Overview

Many of the products in this catalog comply with UL or CSA requirements and are labeled with the corresponding approval designation.

All of the approvals, certificates, declarations of conformity, test certificates, e.g. CE, UL, Safety Integrated etc. have been performed with the associated system components as they are described in the catalogs and configuration manuals.

The certificates are only valid if the products are used with the described system components, are installed according to the installation guidelines and are used for their intended purpose.

In other cases, the vendor of these products is responsible for arranging that new certificates are issued.

UL: Underwriters Laboratories
(independent public testing institution in North America)

Test symbol:

- **UL** for end products, tested by UL in accordance with the UL standard
- **cUL** for end products, tested by UL in accordance with the CSA standard
- **cULus** for end products, tested by UL in accordance with the UL and CSA standards
- **UR** for mounting parts in end products, tested by UL in accordance with the UL standard
- **cUR** for mounting parts in end products, tested by UL in accordance with the CSA standard
- **cURus** for mounting parts in end products, tested by UL in accordance with the UL and CSA standards

Test standards:

- SIMOTION: Standard UL 508
- SINAMICS: Standard UL 508C
- Motors: Standard UL 547

Product category/file No.:

- SIMOTION: E164110
- SINAMICS: E192450
- Motors: E93429

TUV: TUV Rheinland of North America Inc.
Independent non-profit-making organization in North America
National recognized testing laboratory (NRTL)

Test symbol:

- **cTUVus** Tested by TUV in accordance with the UL and CSA standards

CSA: Canadian Standard Association
Independent public testing institution in Canada

Test symbol:

- **CSA** Tested by CSA in accordance with the CSA standard

Test standard:

- Standard CAN/CSA-C22.2/No. 0-M91/No. 14-05/No. 142-M1987

Appendix
Contacts at Industry Automation and Drive Technologies

Your personal contact partner and further information on cranes can be found at:
www.automation.siemens.com/mcms/mc/en/mechanicalengineering/crane-solutions/Pages/crane-solutions.aspx

Siemens Internet addresses:

The latest information about SIMOTION products, product support, and FAQs can be found on the Internet at www.siemens.com/simotion.

Information on product support can be found on the Internet at http://support.automation.siemens.com/WW/view/en/10805436/130000.

The latest information about SINAMICS products, product support, and FAQs can be found on the Internet at www.siemens.com/sinamics.

The latest information about SIMOCRANE products, product support, and FAQs can be found on the Internet at http://support.automation.siemens.com/WW/view/en/10807397/130000.

Application notes:

Available on the Internet at http://intranet.automation.siemens.com/mcms/mc/en/services/technicalconsulting/application-support-production-machines/standard-applicationsselection/Pages/standard-applications-selection.aspx.

Siemens I DT Application Support Cranes
e-mail: applications.cranes.aud@siemens.com
(mailto:applications.cranes.aud@siemens.com)

Training:

We also offer introductory courses to help you familiarize yourself with SIMOCRANE Basic Technology. You will find further information at www.siemens.nl /training/cranes.

If you have any additional questions please contact your local Siemens sales person.

Siemens Industry Automation and Drive Technologies in the WWW

A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

Siemens Industry Automation and Drive Technologies has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

www.siemens.com/industry

you will find everything you need to know about products, systems and services.

Product Selection Using the Offline Mall of Industry

Detailed information together with convenient interactive functions:
The Offline Mall CA 01 covers more than 80 000 products and thus provides a full summary of the Siemens Industry Automation and Drive Technologies product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives.
All information is linked into a user interface which is easy to work with and intuitive.

After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the Offline Mall CA 01 can be found in the Internet under

www.siemens.com/automation/ca01

or on DVD.

Software licenses

Overview

Software types

Software requiring a license is categorized into types.
The following software types have been defined

- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.
Data generated with engineering software and executable programs can be duplicated for your own use or for use by third-parties free-of-charge.

Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.
The duplication of the runtime software and executable files generated with the runtime software for your own use or for use by third-parties is subject to a charge.
You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.
Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types

Siemens Industry Automation & Drive Technologies offers various types of software license:

- Floating license
- Single license
- Trial license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed.
The concurrent user is the person using the program. Use begins when the software is started.
A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software. The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per device, per axis, per channel, etc.
One single license is required
for each type of use defined.

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Certificate of License

The Certificate of License (CoL) is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated. The delivery versions

- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.
The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous version, proves that the new software is licensed.
A separate upgrade must be purchased for each original license of the software to be upgraded.

ServicePack

ServicePacks are used to debug existing products. ServicePacks may be duplicated for the use as prescribed according to the number of existing original licenses.

License key

Siemens Industry Automation & Drive Technologies supplies software products with and without license keys.
The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, etc.)
The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

Detailed explanations concerning license conditions
can be found in the "Terms and Conditions of Siemens AG"
or on the Internet at:
www.siemens.com /industrymall
(Industry Mall Online Help System)

I IA&DT/Software licenses/De 06.05.10

Overview

The "General License Conditions for Software Products for Automation and Drives" are applicable for supplies and deliveries of I DT software products.

Legal notes during setup for new software products

All software products feature a uniform reference to the license conditions. The license conditions are enclosed either with the documentation or in the software pack. When software is downloaded from the Internet, the license contract is displayed before the ordering procedure and must be accepted by the user before downloading can continue.

Notice:
This software is protected by German and/or US copyright law and the regulations of international agreements. Unauthorized reproduction or sale of this software or parts of it is a criminal offense. This will lead to criminal and civil prosecution, and may result in significant fines and/or claims for damages. Prior to installing and using the software, please read the applicable licensing conditions for this software. You will find these in the documentation or packaging.

If you have received this software on a CD-ROM that is marked “Trial version” or accompanying software that is licensed for your use, the software is only permitted to be used for test and validation purposes in accordance with the accompanying conditions for the trial license. To this end, it is necessary that programs, software libraries, etc., are installed on your computer. We therefore urgently recommend that installation is performed on a single-user computer or on a computer that is not used in the production process or for storing important data, since it cannot be completely excluded that existing files will be modified or overwritten. We accept no responsibility whatsoever for damage and/or data losses that result from this installation or the non-observance of this warning. Every other type of use of this software is only permitted if you are in possession of a valid license from Siemens.

If you are not in possession of a valid license that can be proven by presenting an appropriate Certificate of License/software product certificate, please abort installation immediately and contact a Siemens office without delay to avoid claims for damages.

Software update service

Ordering
To order the software update service, an order number must be specified. The software update service can be ordered when the software products are ordered or at a later date. Subsequent orders require that the ordering party is in possession at least of a single license.

Note:
It is recommended that the software update service is ordered as early as possible. If a new software version of a software product is released for delivery by Siemens, only those customers will receive it automatically who are entered in the appropriate delivery list at Siemens at this time. Previous software versions, or the current software version are not supplied when the software update service is ordered. The software update service requires that the software product is up-to-date at the time of completion of the contract for the software update service.

Delivery
When a software update service is ordered, you will be sent the contractual conditions of this service and the price is due for payment. At the same time, you will be included in a delivery list for the software product to be updated. If Siemens releases a new software version for the corresponding software product for general sale (function or product version), it will be delivered automatically to the goods recipient specified in the delivery address within the contract period.

Explanation of the metal factor

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded.

The surcharges will be determined based on the following criteria:

- Official price of the metal
- Official price on the day prior to receipt of the order or prior to the release order (=daily price) for
  - silver (sale price of the processed material),
  - gold (sale price of the processed material)

  Source: Umicore, Hanau
  (http://www.metalsmanagement.umicore.com)

  and for
  - copper (low DEL notation + 1%),
  - aluminum (aluminum in cables) and
  - lead (lead in cables)

  Source: German Trade Association for Cables and Conductors (http://www.kabelverband.org)
- Metal factor of the products
- Certain products are assigned a metal factor. The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used (weight or percentage method). An exact explanation is given below.

Structure of the metal factor

The metal factor consists of several digits; the first digit indicates whether the method of calculation refers to the list price or a discounted price (customer net price)
(L = list price / N = customer net price).

The remaining digits indicate the method of calculation used for the respective metal. If no surcharge is added, a "-" is used.

1st digit	List or customer net price using the percentage method
2nd digit	for silver (AG)
3rd digit	for copper (CU)
4th digit	for aluminum (AL)
5th digit	for lead (PB)
6th digit	for gold (AU)

Weight method

The weight method uses the basic official price, the daily price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the daily price. The result is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (2 to 9) of the respective digit of the metal factor. The raw material weight can be found in the respective product descriptions.

Percentage method

Use of the percentage method is indicated by the letters A-Z at the respective digit of the metal factor.

The surcharge is increased - dependent on the deviation of the daily price compared with the basic official price - using the percentage method in "steps" and consequently offers surcharges that remain constant within the framework of this "step range". A higher percentage rate is charged for each new step. The respective percentage level can be found in the table below.

Metal factor examples

L E A – – –	
	Basis for % surcharge: List price
	Silver: basis 150 €, step range 50 €, 0.5%
	Copper: basis 150 €, step range 50 €, 0.1 %
	No surcharge for aluminum
	No surcharge for lead
	No surcharge for gold
N – A 6 – –	
	Basis for % surcharge: Customer net price
	No surcharge for silver
	Copper: basis 150 €, step range 50 €, 0.1 %
	Aluminum acc. to weight, basic offic. price 225 €
	No surcharge for lead
	No surcharge for gold
– – 3 – – –	
	No basis necessary
	No surcharge for silver
	Copper acc. to weight, basic official price150 €
	No surcharge for aluminum
	No surcharge for lead
	No surcharge for gold

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Values of the metal factor

Percentage method	Basic official price	Step range	% surcharge 1st step	% surcharge 2nd step	% surcharge 3rd step	% surcharge 4th step	% surcharge per additional step
			Official price	Official price	Official price	Official price	
			151 € – 200 €	201 € – 250 €	251 € – 300 €	301 € – 350 €	
A	150	50	0.1	0.2	0.3	0.4	0.1
B	150	50	0.2	0.4	0.6	0.8	0.2
C	150	50	0.3	0.6	0.9	1.2	0.3
D	150	50	0.4	0.8	1.2	1.6	0.4
E	150	50	0.5	1.0	1.5	2.0	0.5
F	150	50	0.6	1.2	1.8	2.4	0.6
H	150	50	1.2	2.4	3.6	4.8	1.2
J	150	50	1.8	3.6	5.4	7.2	1.8
			176 € – 225 €	226 € – 275 €	276 € – 325 €	326 € – 375 €	
O	175	50	0.1	0.2	0.3	0.4	0.1
P	175	50	0.2	0.4	0.6	0.8	0.2
R	175	50	0.5	1.0	1.5	2.0	0.5
			226 € – 275 €	276 € – 325 €	326 € – 375 €	376 € – 425 €	
S	225	50	0.2	0.4	0.6	0.8	0.2
U	225	50	1.0	2.0	3.0	4.0	1.0
V	225	50	1.0	1.5	2.0	3.0	1.0
W	225	50	1.2	2.5	3.5	4.5	1.0
			151 € – 175 €	176 € – 200 €	201 € – 225 €	226 € – 250 €	
Y	150	25	0.3	0.6	0.9	1.2	0.3
			401 € – 425 €	426 € – 450 €	451 € – 475 €	476 € – 500 €	
Z	400	25	0.1	0.2	0.3	0.4	0.1
	Price basis (1st digit)						
L	Charged on the list price						
N	Charged on the customer net price or discounted list price						

Weight method	Basic official price	
2	100	Calculation based on raw material weight
3	150	
4	175	
5	200	
6	225	
7	300	
8	400	
9	555	
Misc.		
-	No metal surcharge	

Appendix
Subject index

Appendix
Subject index

Appendix
Order No. index

Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following terms apply exclusivelyfor orders placed with Siemens AG.

For customers with a seat or registered office in Germany

The "General Terms of Payment" as well as the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" shall apply.

For software products, the "„General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office in Germany" shall apply.

For customers with a seat or registered office outside of Germany

The "General Terms of Payment" as well as the "General Conditions for Supplies of Siemens, Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

General

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

The prices are in € (Euro) ex works, exclusive packaging.

The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.

Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold, if the respective basic official prices for these metals are exceeded. These surcharges will be determined based on the official price and the metal factor of the respective product.

The surcharge will be calculated on the basis of the official price on the day prior to receipt of the order or prior to the release order.
The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used. The metal factor, provided it is relevant, is included with the price information of the respective products. An exact explanation of the metal factor can be found on the page entitled "Metal surcharges".

The texts of the Comprehensive Terms and Conditions of Sale and Delivery are available free of charge from your local Siemens business office under the following Order Nos.:

- 6ZB5310-0KR30-0BA1
  (for customers based in Germany)
- 6ZB5310-0KS53-0BA1
  (for customers based outside of Germany)

or download them from the Internet
www.siemens.com/industrymall
(Germany:Industry Mall Online-Help System)

Export regulations

Our obligation to fulfill this agreement is subject to the proviso that the fulfillment is not prevented by any impediments arising out of national and international foreign trade and customs requirements or any embargos and/or other sanctions.

If you transfer goods (hardware and/ or software and/ or technology as well as corresponding documentation, regardless of the mode of provision) delivered by us or works and services (including all kinds of technical support) performed by us to a third party worldwide, you shall comply with all applicable national and international (re-) export control regulations.

If required to conduct export control checks, you, upon request by us, shall promptly provide us with all information pertaining to particular end customer, destination and intended use of goods, works and services provided by us, as well as any export control restrictions existing.

The products listed in this catalog may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog:

AL	Number of the German Export List Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "AL" not equal to "N" are subject to a European or German export authorization when being exported out of the EU.
ECCN	Export Control Classification Number. Products marked other than "N" are subject to a reexport license to specific countries. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "ECCN" not equal to "N" are subject to a US re-export authorization.

Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.

Errors excepted and subject to change without prior notice.

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Notes

Catalogs

Industry Automation, Drive Technologies and Low Voltage Distribution

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

Interactive Catalog on DVD	*Catalog*
for Industry Automation, Drive Technologies and Low Voltage Distribution	**CA 01**

Drive Systems

Variable-Speed Drives	
SINAMICS G110, SINAMICS G120 Standard Inverters SINAMICS G110D, SINAMICS G120D Distributed Inverters	D 11.1
SINAMICS G130 Drive Converter Chassis Units SINAMICS G150 Drive Converter Cabinet Units	D 11
SINAMICS GM150, SINAMICS SM150 Medium-Voltage Converters	D 12
SINAMICS S120 Chassis Format Units and Cabinet Modules SINAMICS S150 Converter Cabinet Units	D 21.3
SINAMICS DCM Converter Units	D 23.1
Three-phase Induction Motors • H-compact • H-compact PLUS	D 84.1
Asynchronous Motors Standardline	D 86.1
Synchronous Motors with Permanent-Magnet Technology, HT-direct	D 86.2
DC Motors	DA 12
SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1
SIMOREG K 6RA22 Analog Chassis Converters	DA 21.2
PDF: SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units	*DA 22*
SIMOVERT PM Modular Converter Systems	DA 45
SIEMOSYN Motors	DA 48
MICROMASTER 420/430/440 Inverters	DA 51.2
MICROMASTER 411/COMBIMASTER 411	DA 51.3
SIMOVERT MASTERDRIVES Vector Control	DA 65.10
SIMOVERT MASTERDRIVES Motion Control	DA 65.11
Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES	DA 65.3
SIMODRIVE 611 universal and POSMO	DA 65.4
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
SINAMICS S110 The Basic Positioning Drive	PM 22
Low-Voltage Three-Phase-Motors	
IEC Squirrel-Cage Motors	D 81.1
MOTOX Geared Motors	D 87.1
Automation Systems for Machine Tools SIMODRIVE • Motors • Converter Systems SIMODRIVE 611/POSMO	NC 60
Automation Systems for Machine Tools SINAMICS • Motors • Drive System SINAMICS S120	NC 61
Mechanical Driving Machines	
FLENDER Standard Couplings	MD 10.1

Low-Voltage Power Distribution and Electrical Installation Technology

Protection, Switching, Measuring & Monitoring Devices	LV 10.1
Switchboards and Distribution Systems	LV 10.2
GAMMA Building Management Systems	ET G1
PDF: DELTA Switches and Socket Outlets	*ET D1*
SICUBE System Cubicles and Cubicle Air-Conditioning	LV 50
SIVACON 8PS Busbar Trunking Systems	LV 70

Motion Control

	Catalog
SINUMERIK & SIMODRIVE Automation Systems for Machine Tools	NC 60
SINUMERIK & SINAMICS Equipment for Machine Tools	NC 61
SINUMERIK 828D BASIC T/BASIC M, SINAMICS S120 Combi and 1FK7/1PH8 motors	NC 82
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
SINAMICS S110 The Basic Positioning Drive	PM 22

Power Supply and System Cabling

Power supply SITOP	KT 10.1
System cabling SIMATIC TOP connect	KT 10.2

Process Instrumentation and Analytics

Field Instruments for Process Automation	FI 01
SIREC Recorders and Accessories	MP 20
SIPART, Controllers and Software	MP 31
Products for Weighing Technology	WT 10
Process Analytical Instruments	PA 01
PDF: Process Analytics, Components for the System Integration	*PA 11*

Safety Integrated

Safety Technology for Factory Automation	SI 10

SIMATIC HMI/PC-based Automation

Human Machine Interface Systems/ PC-based Automation	ST 80/ ST PC

SIMATIC Industrial Automation Systems

Products for Totally Integrated Automation and Micro Automation	ST 70
SIMATIC PCS 7 Process Control System	ST PCS 7
Add-ons for the SIMATIC PCS 7 Process Control System	ST PCS 7.1
PDF: Migration solutions with the SIMATIC PCS 7 Process Control System	*ST PCS 7.2*

SIMATIC NET

Industrial Communication	IK PI

SIMATIC Sensors

Sensor Technology for Factory Automation	FS 10
Industrial Identification Systems	ID 10

SINVERT Photovoltaics

Inverters and Components for Photovoltaic Installations	RE 10

SIRIUS Industrial Controls

SIRIUS Industrial Controls	IC 10
SIRIUS Industrial Controls (selected content from catalog IC 10)	IC 90

System Solutions

Applications and Products for Industry are part of the interactive catalog CA 01

PDF: These catalogs are only available as pdf files.

Download-Center

PDF versions of the catalogs are available on the Internet at:
www.siemens.com/drives/infocenter

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