Data sheet

Electronic overload relay EF19 and EF45

Electronic overload relays are the alternative to the thermal overload relays. An electronic overload relay offers reliable and fast protection for motors in the event of overload or phase failure. Starter combinations are setup together with contactors.

1SBC101147F0010

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Description

- Overload protection – trip class 10E, 20E, 30E selectable
- Phase loss sensitivity
- Temperature compensation from -25 … +70 °C
- Adjustable current setting for overload protection
- Automatic or manual reset selectable
- Trip-free mechanism
- Status indication
- STOP and TEST function
- Direct mounting onto block contactors
- Sealable operating elements
- Self-supplied devices

Approvals

- cULus UL 508
- CB scheme
- CCC
- GOST-R

Marks

- CE
- C-Tick

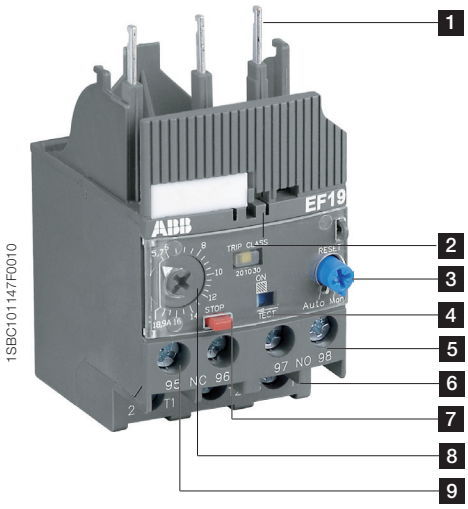
Order data

EF19, EF45 screw terminal
For AF09 … AF38 block contactors

Setting range A	Type	Order code	Suitable for	Packing unit PCE	Weight per PCE kg
0.10 ... 0.32	EF19-0.32	1SAX121001R1101	AF09 ... AF38	1	0.158
0.30 ... 1.00	EF19-1.0	1SAX121001R1102	AF09 ... AF38	1	0.158
0.80 ... 2.70	EF19-2.7	1SAX121001R1103	AF09 ... AF38	1	0.158
1.90 ... 6.30	EF19-6.3	1SAX121001R1104	AF09 ... AF38	1	0.158
5.70 ... 18.9	EF19-18.9	1SAX121001R1105	AF09 ... AF38	1	0.158
9.00 ... 30.0	EF45-30	1SAX221001R1101	AF26 ... AF38	1	0.362
15.0 ... 45.0	EF45-45	1SAX221001R1102	AF26 ... AF38	1	0.362

Suitable for mounting on:
AF09, AF12, AF16
AF26, AF30, AF38

Functional description



1 **Terminals (1L1, 3L2, 5L3)**

2 **Trip class 10E, 20E, 30E selectable**

3 **RESET button**
Automatic or manual reset selectable

4 **Status indication**

5 **Signaling contacts 97-98**

6 **Terminals 2T1, 4T2, 6T3**

7 **STOP button**

8 **Current setting range**
Adjustable current setting for overload protection

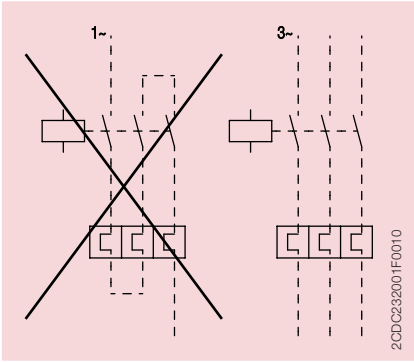
9 **Tripping contacts 95-96**

Application / internal function

The self-supplied electronic overload relays are three pole electronic/mechanical devices. The motor current flows through build-in current transformers and an evaluation circuit will recognize an overload (over current). This will lead to a release of the relay and a change of the contacts switching position (95-96 / 97-98). The contact 95-96 is used to control the load contactor. The electronic overload relay is self-supplied, which mean no extra external supply is needed.

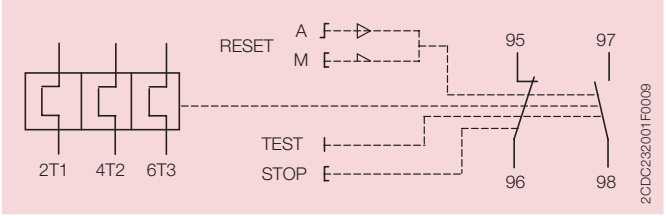
The overload relays have a setting scale in Amperes, which allows the direct adjusting of the relay without any additional calculation. In compliance with international and national standards, the setting current is the rated current of the motor and not the tripping current (no tripping at 1.05 x I, tripping at 1.2 x I; I = setting current). The relays are constructed in a way that they protect themselves in the event of an overload. The overload relay has to be protected against short-circuit. The appropriate short-circuit protection devices are shown in the table.

Operation mode



	Contact 95-96	Contact 97-98	Opto-mechanical slide	Comment
Trip state	open	closed		
RESET state	closed	open	ON	
TEST manual reset mode	open	closed		
TEST auto reset mode	open	closed		
STOP while device is in trip state	open	closed		STOP button has no function
STOP while device is in RESET state	open	open		while STOP button is pressed

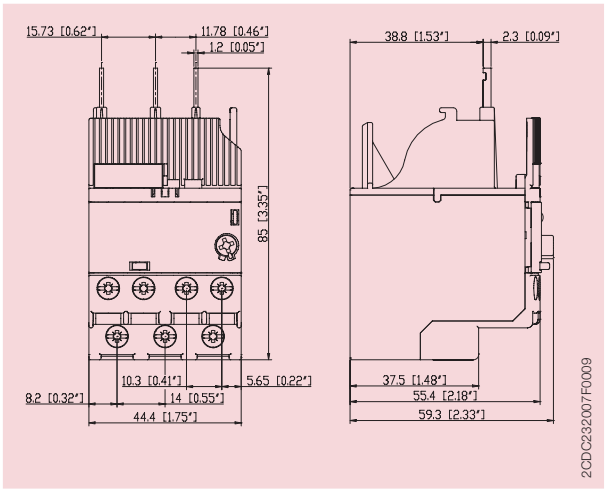
Wiring diagram



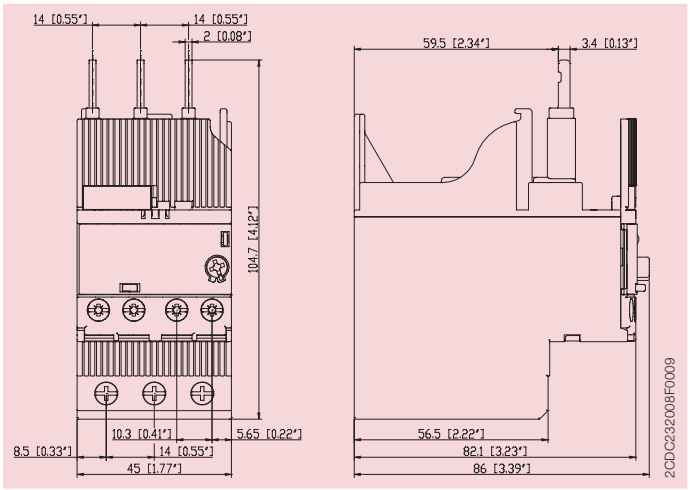
Resistance and power loss per pole and short-circuit protection device

Type	Setting range		Resistance per pole	Power loss		Short-circuit protection device
	lower value A	upper value A	mΩ	at lower value W	at upper value W	coordination type 2
EF19-0.32	0.1	0.32	447	4.5	46	Fuse 1 A, Type gG
EF19-1.0	0.3	1	54	4.9	54	Fuse 4 A, Type gG
EF19-2.7	0.8	2.7	7.9	5.1	58	Fuse 10 A, Type gG
EF19-6.3	1.9	6.3	2.1	7.6	83	Fuse 20 A, Type gG
EF19-18.9	5.7	18.9	0.85	28	304	Fuse 50 A, Type gG
EF45-30	9	30	0.26	21	234	Fuse 160 A, Type gG
EF45-45	15	45	0.26	59	527	Fuse 160 A, Type gG

Dimensions



EF19



EF45

Technical data IEC/EN

Data at T_A = 40 °C and at rated values, if nothing else indicated

Main circuit

	2T1-4T2-6T3
Rated operational voltage U_e	690 V a.c.
	- V d.c.
Setting range - electronic overload protection	see table on page 1
Rated operational current AC-3 I_e	see upper value of setting range, table on page 3
Trip class	10E, 20E, 30E, selectable
Rated frequency	50/60 Hz
Number of poles	3
Resistance per pole	see table on page 3
Power loss per pole	see table on page 3
Short-circuit protection device	see table on page 3

Isolation data	2T1-4T2-6T3
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V
Pollution degree	3
Overvoltage category	up to III

Electrical connection		EF19	EF45
Connecting capacity	solid	1/2 x 1 ... 4 mm²	1/2 x 2.5 ... 16 mm²
	stranded	1/2 x 1 ... 4 mm²	1/2 x 2.5 ... 16 mm²
	flexible with ferrule	1/2 x 0.75 ... 2.5 mm²	1/2 x 2.5 ... 10 mm²
	flexible with ferrule insulated	1/2 x 0.75 ... 2.5 mm²	1/2 x 2.5 ... 10 mm²
	flexible without ferrule	1/2 x 0.75 ... 2.5 mm²	1/2 x 2.5 ... 10 mm²
Stripping length		9 mm	13 mm
Tightening torque		0.8 ... 1.5 Nm	2.3 ... 2.6 Nm
Connection screw		M3 (Pozidrive 2)	M3 (Pozidrive 2)

Auxiliary circuit

		95-96, 97-98
Rated operational voltage U_e		600 V
Conventional free air thermal current I_{th}		6 A
Rated frequency		d.c., 50/60 Hz
Number of poles		1NC + 1NO
Rated operational current I_e		
acc. to IEC/EN 60947-5-1 for utilization category		
at AC15 at 110-120 V	NC, 95-96	3.00 A
	NO, 97-98	3.00 A
at AC15 at 220-230-240 V	NC, 95-96	3.00 A
	NO, 97-98	3.00 A
at AC15 at 440 V	NC, 95-96	1.10 A
	NO, 97-98	1.10 A
at AC15 at 480-500 V	NC, 95-96	0.75 A
	NO, 97-98	0.75 A
at DC13 at 24 V	NC, 95-96	1.50 A
	NO, 97-98	1.50 A
at DC13 at 110-120-125 V	NC, 95-96	0.55 A
	NO, 97-98	0.55 A
at DC13 at 250 V	NC, 95-96	0.27 A
	NO, 97-98	0.27 A
at DC13 at 500 V	NC, 95-96	0.10 A
	NO, 97-98	0.10 A
Minimum switching capacity		12 V / 3 mA
		$\lambda = 10^{-7}$; U_{kg} = 3 V / 500.000 operating cycles
Short-circuit protection device		fuse 6 A, Type gG

Isolation data	95-96, 97-98
Rated impulse withstand voltage U_{imp}	6 kV
Rated insulation voltage U_i	690 V
Pollution degree	3
Overvoltage category	up to III

Electrical connection		95-96, 97-98
Connecting capacity	solid	1/2 x 1 ... 4 mm²
	stranded	1/2 x 1 ... 4 mm²
	flexible with ferrule	1/2 x 0.75 ... 2.5 mm²
	flexible with ferrule insulated	1/2 x 0.75 ... 2.5 mm²
	flexible without ferrule	1/2 x 0.75 ... 2.5 mm²
Stripping length		9 mm
Tightening torque		0.8 ... 1.2 Nm
Connection screw		M3 (Pozidrive 2)

General data

Duty time		100 %
Operating frequency without early tripping		up to 15 operations/h or 60 operations/h with 40 % duty ratio, if the motor breaking current 6 x I_n and the motor starting time does not exceed 1 s
Dimensions (W x H x D)		see dimension drawing
Weight		see ordering data
Mounting		mount on the contactor and tighten the screws of the main circuit terminals
Mounting position		optional, position 1-6
Minimum distance to other units same type	horizontal	none
	vertical	not applicable
Minimum distance to electrical conductive board	horizontal	1.5 mm
	vertical	1.5 mm
Degree of protection		IP20 (depends on contactor)
Altitude		up to 2000 m

Electromagnetic compatibility

Immunity acc. to IEC 60947-1	Environment A
Emission acc. to IEC 60947-1	Environment B

Environmental data

Ambient air temperature		
Operation	open - compensated without derating	-25 ... +70 °C
	open	-25 ... +70 °C
Storage		-50 ... +85 °C
Temperature compensation		continuous
Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc)		1g / 3 ... 150 Hz
Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea)		15g / 11 ms

Standards / directives

Product standard	IEC/EN 60947–4–1 IEC/EN 60497-5-1 IEC/EN 60947-1 UL 508, CSA22.2 No. 14
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC
RoHS Directive	2002/95/EC

Technical data UL/CSA

Full load amps and short-circuit protection device

Type	Full load amps (FLA)	Short-circuit protection device 480 V a.c. SCCR	Fuse type	600 V a.c. SCCR	Fuse type	600 V a.c. SCCR	Fuse type
EF19-0.32	0.32 A	50 kA	2 A, Class J	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-1.0	1.00 A	50 kA	2 A, K5 / RK5	5 kA	2 A, K5 / RK5	100 kA	2 A, Class J
EF19-2.7	2.70 A	50 kA	4 A, K5 / RK5	5 kA	4 A, K5 / RK5	100 kA	4 A, Class J
EF19-6.3	6.30 A	50 kA	15 A, K5 / RK5	5 kA	15 A, K5 / RK5	100 kA	15 A, Class J
EF19-18.9	18.9 A	50 kA	30 A, K5 / RK5	5 kA	30 A, K5 / RK5	100 kA	30 A, Class J
EF45-30	30.0 A	18 kA	150 A, K5 / RK5	18 kA	150 A, K5 / RK5	100 kA	150 A, Class J
EF45-45	45.0 A	18 kA	250 A, K5 / RK5	18 kA	250 A, K5 / RK5	100 kA	250 A, Class J

Main circuit

Maximum operational voltage	600 V a.c.
Trip rating	125 % of FLA
Full load amps (FLA)	see table above
Short-circuit rating RMS symmetrical	see table above
Short-circuit protection device	see table above

Electrical connection		EF19	EF45
Connecting capacity	stranded	1/2 x AWG 16 ... 10	1/2 x AWG 14 ... 6
	flexible without ferrule	1/2 x AWG 16 ... 10	1/2 x AWG 14 ... 6
Stripping length		9 mm	13 mm
Tightening torque		7 ... 13 lb-in	20 ... 22 lb-in
Connection screw		M3 (Pozidrive 2)	M3 (Pozidrive 2)

Auxiliary circuit

Conventional thermal current		5 A
Making and breaking capacity	NC / NO	B600, Q600

Electrical connection		
Connecting capacity	stranded	1/2 x AWG 18 ... 10
	flexible without ferrule	1/2 x AWG 18 ... 10
Stripping length		9 mm
Tightening torque		7 ... 11 lb-in
Connection screw		M3 (Pozidrive 2)

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