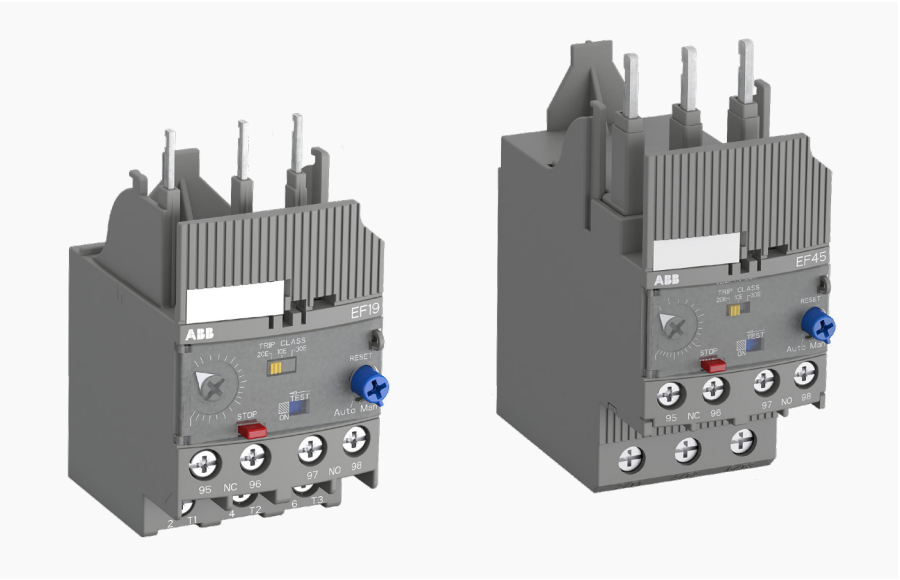
DATA SHEET

Electronic overload relay EF19 and EF45



Electronic overload relays offer reliable protection in case of overload and phase-failure.
They are the alternative for overload protection to thermal overload relays. Motor starters are combinations of overload

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

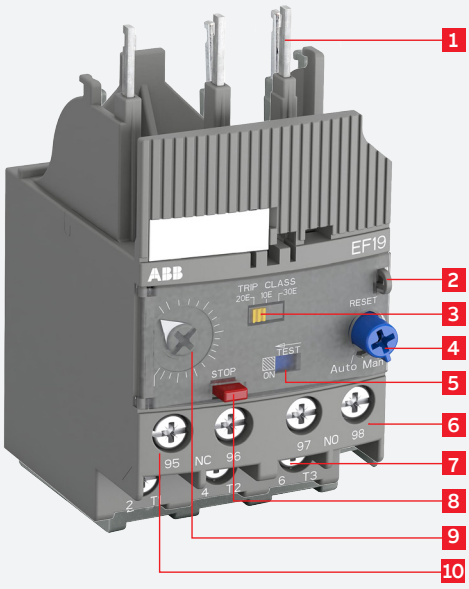
Order data

EF19 and EF45 screw terminal
For AF09 ... AF38 block contactors

Setting range A	Type	Order code	Weight Pkg (1 pce) kg
0.10 ... 0.32	EF19-0.32 (1)	1SAX121001R1101	0.158
0.30 ... 1.00	EF19-1.0 (1)	1SAX121001R1102	0.158
0.80 ... 2.70	EF19-2.7 (1)	1SAX121001R1103	0.158
1.90 ... 6.30	EF19-6.3 (1)	1SAX121001R1104	0.158
5.70 ... 18.9	EF19-18.9 (1)	1SAX121001R1105	0.158
9.00 ... 30.0	EF45-30 (2)	1SAX221001R1101	0.362
15.0 ... 45.0	EF45-45 (2)	1SAX221001R1102	0.362

Accessories	Type	Order code	Suitable for	Weight Pkg (1 pce)
Single mounting kit	DB19EF	1SAX101910R1001	EF19	0.046
	DB45EF	1SAX201910R0001	EF45	0.100

(1) Suitable for mounting on AF09 ... AF38
(2) Suitable for mounting on AF26 ... AF38



Functional description

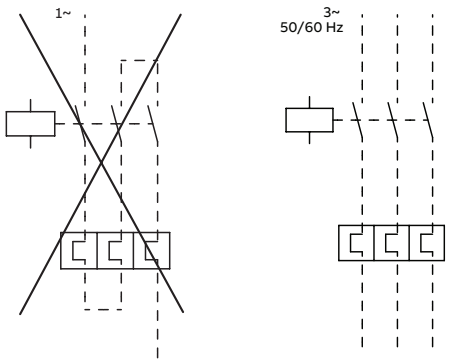
1. Terminals (1L1, 3L2, 5L3)
2. Sealable operating elements
3. Trip class 10E, 20E, 30E selectable
4. RESET
   Automatic or manual reset selectable
5. TEST - Status indication
6. Signaling contacts 97-98
7. Terminals 2T1, 4T2, 6T3
8. STOP
9. Current setting range / Self-test function ST
   Adjustable current setting for overload protection
10. 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.

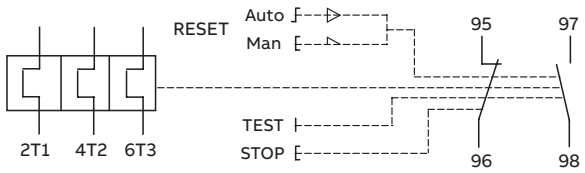
The overload relays have a setting scale in Amperes, which allows the direct adjusting of the relay without any additional calculation. In compliance with international and national standards, the setting current is the rated current of the motor and not the tripping current (no tripping at 1.05 x I, 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 protective devices are shown in the following tables. To prevent thermal overloads in heavy duty applications, the correct cable sizes have to be selected.

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

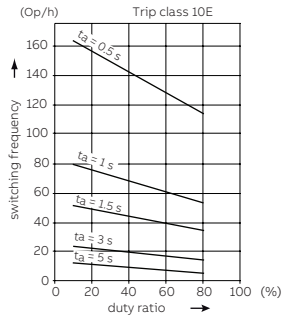
Wiring diagram

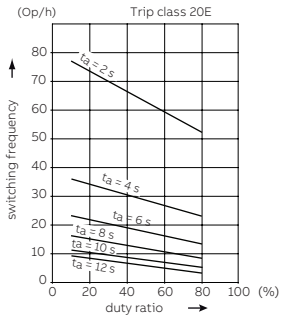


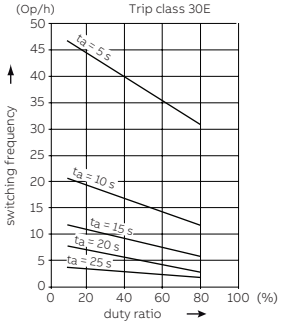
Resistance and power loss per pole and short-circuit protective devices

Type	Setting range		Resistance per pole	Power loss per pole		Short-circuit protective devices coordination type 2
	lower value	upper value		at lower value	at upper value	
	A	A	mΩ	W	W	
EF19-0.32	0.1	0.32	447	0.004	0.046	Fuse 1 A, Type gG
EF19-1.0	0.3	1	54	0.005	0.054	Fuse 4 A, Type gG
EF19-2.7	0.8	2.7	7.9	0.005	0.058	Fuse 10 A, Type gG
EF19-6.3	1.9	6.3	2.1	0.008	0.083	Fuse 20 A, Type gG
EF19-18.9	5.7	18.9	0.85	0.028	0.304	Fuse 50 A, Type gG
EF45-30	9	30	0.26	0.021	0.234	Fuse 160 A, Type gG
EF45-45	15	45	0.26	0.059	0.527	Fuse 160 A, Type gG

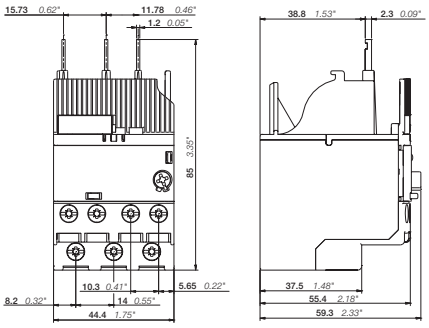
Intermittent periodic duty



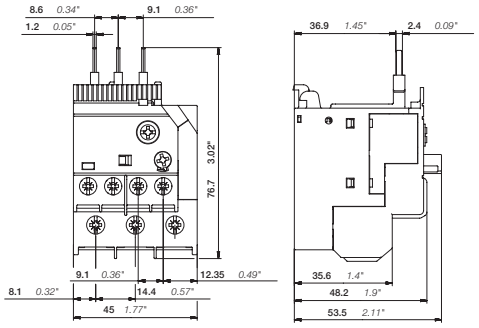




Dimensions



EF19



EF45

Technical data IEC/EN

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

Main circuit

	EF19, EF45
Rated operational voltage Ue	690 V AC
	- V DC
Setting range - electronic overload protection	see table on page 1
Rated operational current AC-3 Ie	see upper value of setting range, 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 protective devices	see table on page 3

Isolation data

	EF19, EF45
Rated impulse withstand voltage Uimp	6 kV
Rated insulation voltage Ui	690 V
Pollution degree	3
Overvoltage category	up to III

Electrical connection

Type	**EF19**	**EF45**	**DB19EF**	**DB45EF**
 rigid	1 x 1 ... 4 mm² 2 x 1 ... 4 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²	1 x 1 ... 4 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²
 flexible with ferrule	1 x 0.75 ... 2.5 mm² 2 x 0.75 ... 2.5 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²	1 x 0.75 ... 2.5 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²
 flexible with ferrule insulated	1 x 0.75 ... 2.5 mm² 2 x 0.75 ... 2.5 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²	1 x 0.75 ... 2.5 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²
 flexible	1 x 0.75 ... 2.5 mm² 2 x 0.75 ... 2.5 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²	1 x 0.75 ... 2.5 mm²	1 x 2.5 ... 16 mm² 2 x 2.5 ... 16 mm²
Stripping length	9 mm	13 mm	12 mm	15 mm
Tightening torque	0.8 ... 1.5 Nm	2.3 ... 2.6 Nm	0.8 ... 1.5 Nm	0.8 ... 1.5 Nm
Recommended screw driver	Pozidriv 2	Pozidriv 2	Pozidriv 2	Pozidriv 2

Auxiliary circuit

		95-96, 97-98
Rated operational voltage Ue		600 V AC / DC
Conventional free air thermal current Ith		6 A
Rated frequency		DC, 50/60 Hz
Number of poles		1 N.C. + 1 N.O.
Rated operational current Ie acc. to IEC/EN 60947-5-1 for utilization category		
at AC-15 at 110-120 V	N.C. 95-96	3.00 A
	N.O. 97-98	3.00 A
at AC-15 at 220-230-240 V	N.C. 95-96	3.00 A
	N.O. 97-98	3.00 A
at AC-15 at 400 V	N.C. 95-96	1.10 A
	N.O. 97-98	1.10 A
at AC-15 at 480-500 V	N.C. 95-96	0.75 A
	N.O. 97-98	0.75 A
at DC-13 at 24 V	N.C. 95-96	1.50 A
	N.O. 97-98	1.50 A
at DC-13 at 110-120-125 V	N.C. 95-96	0.55 A
	N.O. 97-98	0.55 A
at DC-13 at 250 V	N.C. 95-96	0.27 A
	N.O. 97-98	0.27 A
at DC-13 at 500 V	N.C. 95-96	0.10 A
	N.O. 97-98	0.10 A
Minimum switching capacity		12 V / 3 mA $\lambda = 10^{-7}$; Ukd = 3 V / 500.000 operating cycles
Short-circuit protective devices		fuse 6 A, Type gG

Isolation data

	95-96, 97-98
Rated impulse withstand voltage Uimp	6 kV
Rated insulation voltage Ui	690 V
Pollution degree	3
Overvoltage category	up to III

Electrical connection

Type	**95-96, 97-98**
 rigid	1 x 1 ... 4 mm² 2 x 1 ... 4 mm²
 flexible with ferrule	1 x 0.75 ... 2.5 mm² 2 x 0.75 ... 2.5 mm²
 flexible with ferrule insulated	1 x 0.75 ... 2.5 mm² 2 x 0.75 ... 2.5 mm²
 flexible	1 x 0.75 ... 2.5 mm² 2 x 0.75 ... 2.5 mm²
Stripping length	9 mm
Tightening torque	0.8 ... 1.2 Nm
Recommended screw driver	Pozidriv 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 In 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 or with single mounting kit on DIN rail (35 mm)
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	housing	IP20
	main circuit terminals	IP20
Maximum operating altitude		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	-25 ... +70 °C
	open	-25 ... +70 °C
Storage		-50 ... +85 °C
Ambient air temperature compensation		acc. to IEC/EN 60947-4-1
Resistance to vibrations acc. to IEC 60068-2-6		3g / 3 ... 150 Hz
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms

Standards / directives

Standards	IEC/EN 60947-1 IEC/EN 60947-4-1 IEC/EN 60947-5-1 UL 60947-1 UL 60947-4-1
Low Voltage Directive	2014/35/EU
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Technical data UL/CSA

Full load amps and short-circuit protective devices

Type	Full load amps (FLA)	Short circuit protective devices									
		480 V AC		480 V AC		600 V AC		600 V AC		600 V AC	
		SCCR	Fuse K5 / RK5	SCCR	Circuit breaker	SCCR	Fuse K5 / RK5	SCCR	Fuse J	SCCR	Circuit breaker
EF19-0.32	0.32 A	50 kA	2 A (1)	65 kA	15 A	5 kA	2 A	100 kA	2 A	-	-
EF19-1.0	1 A	50 kA	2 A	65 kA	15 A	5 kA	2 A	100 kA	2 A	-	-
EF19-2.7	2.7 A	50 kA	4 A	65 kA	15 A	5 kA	4 A	100 kA	4 A	-	-
EF19-6.3	6.3 A	50 kA	15 A	65 kA	35 A	5 kA	15 A	100 kA	15 A	-	-
EF19-18.9	18.9	50 kA	30 A	65 kA	35 A	5 kA	30 A	100 kA	30 A	10 kA	20 A
EF45-30	30	18 kA (2)	150 A (2)	65 kA	70 A	5 kA	150 A	100 kA	150 A	-	-
EF45-45	45 A	18 kA (2)	250 A (2)	65 kA	70 A	5 kA	250 A	100 kA	250 A	-	-

(1) Class J fuse
(2) At 600 V AC

Main circuit

Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	see table above
Short-circuit rating RMS symmetrical	see table above
Short-circuit protective devices	see table above

Electrical connection

Type	EF19	EF45	DB19EF	DB45EF
 stranded	1 x AWG 16 ... 10 2 x AWG 16 ... 10	1 x AWG 14 ... 6 2 x AWG 14 ... 6	1 x AWG 16 ... 10 2 x AWG 16 ... 10	1 x AWG 18 ... 10 2 x AWG 18 ... 10
 flexible with ferrule	1 x AWG 16 ... 10 2 x AWG 16 ... 10	1 x AWG 14 ... 6 2 x AWG 14 ... 6	1 x AWG 16 ... 10 2 x AWG 16 ... 10	1 x AWG 18 ... 10 2 x AWG 18 ... 10
Stripping length	9 mm	13 mm	12 mm	15 mm
Tightening torque	7 ... 13 lb.in	20 ... 22 lb.in	7 ... 13 lb.in	7 ... 13 lb.in
Recommended screw driver	Pozidriv 2 / M3.5	Pozidriv 2 / M5	Pozidriv 2 / M3	Pozidriv 2 / M3

Auxiliary circuit

Conventional thermal current		5 A
Making and breaking capacity	N.C. / N.O.	B600, Q600

Electrical connection

Type	95-96, 97-98
 stranded	1 x AWG 18 ... 10 2 x AWG 18 ... 10
 flexible with ferrules	1 x AWG 18 ... 10 2 x AWG 18 ... 10
Stripping length	9 mm
Tightening torque	7 ... 11 lb.in
Recommended screw driver	Pozidriv 2

ABB STOTZ-KONTAKT GmbH
Eppelheimer Straße 82
D-69123 Heidelberg / Germany
Phone: +49 (0) 6221 7 01-0
Fax: +49 (0) 6221 7 01-13 25
E-Mail: info.desto@de.abb.com

abb.com/contacts

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