

Thermal motor protector
Temperature limiter
Thermal cut-out

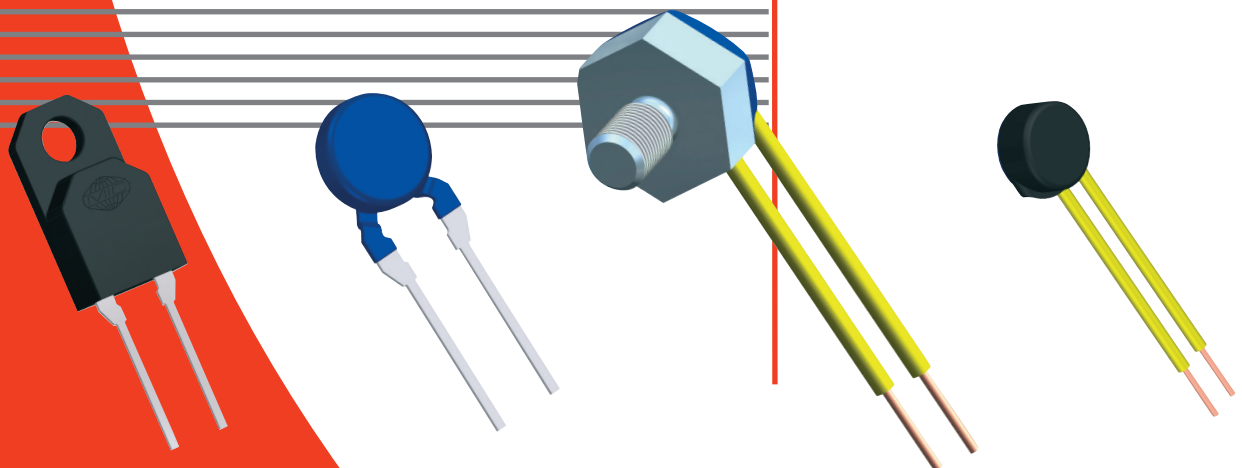
11
12
20
21

Applications

- Motors
- Transformers
- Coils
- Electronics, sensors

Benefits






- Small dimensions
- Shock and vibration tested
- Leadframe version
- Tested for audio, video applications (EN 60065)



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Technical data

ratings	control type	F11A F20A / E	F12A ¹⁾	F21A / E	F20B / G F21B / G
version		normally closed			normally open
rated current at 250 V 50/60 Hz (power factor 0.95 / 0.6)		2.0 A / 1.6 A	3.0 A / 2.5 A	3.0 A / 3.0 A	2.0 A / 1.6 A
switching cycles under rated current		7,000	10,000	10,000	7,000
max. current under failure condition at 250 V 50/60 Hz (power factor 0.95)		4.0 A		5.0 A	4.0 A
switching cycles under max. current		3,000			
temperature rating T _a (steps in 5 K)		70 °C ... 160 °C			70 °C ... 155 °C
tolerances		standard: ± 5 K			
feature of automatic action		1.B, 2.B.M, 1.C			2.B, 1.C
contact resistance (incl. wire of 100 mm)		< 50 mΩ			
hysteresis		30 K ± 15 K ²⁾			
dielectric strength (standard insulation)		2 kV			
shock / vibration testing (similar to EN 50155)		400 m/s ² sine half wave / 100 m/s ² 5 Hz ... 2,000 Hz sine			
resistances to impregnation		tight against ordinary resins and lacquers			
degrees of protection provided by enclosures (EN 60529)		IP00			
suitable for use in protection category		I, II			
approvals	VDE / ENEC		EN 60730-1 / -2-3 ³⁾ /-2-9		
	UL		UL 2111 / UL 873 ¹⁾		
	CSA / cUL	 	C22.2 No. 77 / C22.2 No. 24 ¹⁾		
	CQC		GB14536.1-1998 / GB14536.10-1996 ¹⁾		

¹⁾ details on request

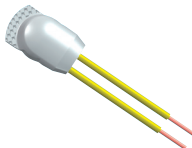
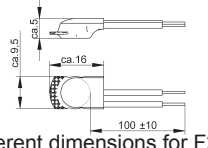
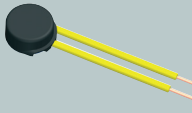
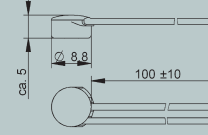
²⁾ at the T_a (upper and lower) limits the hysteresis could deviate

³⁾ different power rating

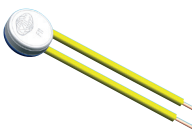
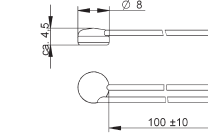
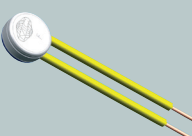
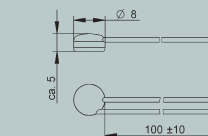

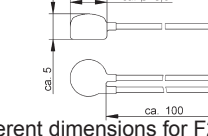
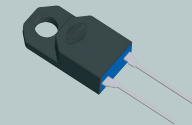
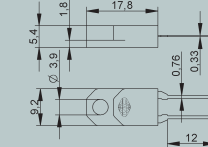
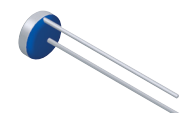
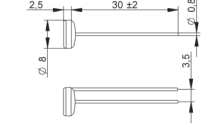
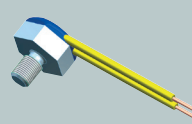
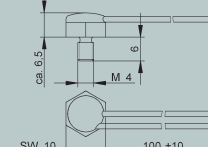
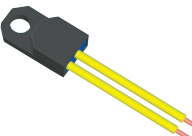
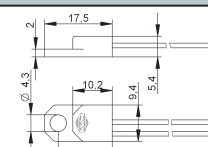
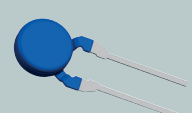
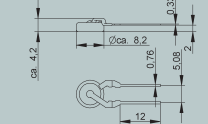
Standard wire (length 100 ± 10 mm, stripped 6 ± 1 mm)

lead	code	temperature max.	operating voltage max.	diameter insulation	cross section diameter ¹⁾	UL style
stranded white	L300	150 °C	300 V	1.57 mm	AWG24 / 0.24 mm ²	3398
	L310			1.80 mm	AWG20 / 0.48 mm ²	
	L330	200 °C	600 V	0.90 mm	AWG24 / 0.24 mm ²	3557
	L340			1.26 mm	AWG20 / 0.61 mm ²	
solid yellow	L400	150 °C	300 V	1.40 mm	AWG24 / 0.51 mm	3398
	L410			1.65 mm	AWG20 / 0.81 mm	
	L430	200 °C	300 V	1.21 mm	AWG24 / 0.51 mm	1332
	L440			1.51 mm	AWG20 / 0.81 mm	

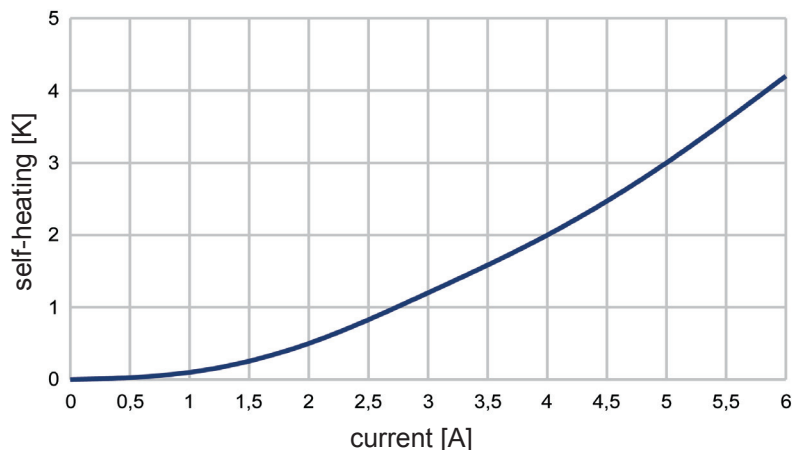
¹⁾ AWG24 is recommended

control type	nc	no	code	illustration	drawing dimensions (mm)	technical specification	approvals
F11, F12 F20, F21	A A	 B	U254		 different dimensions for F20, F21	shrink cap potted	VDE, UL, cUL
F11, F12	A		U198		 different dimensions for F20, F21	cap of PPS potted	VDE, UL, cUL
F20, F21	A	B	U185				

Specific variations

control type	nc	no	code	illustration	drawing dimensions (mm)	technical specification	approvals
F11, F12	A					not insulated potted	VDE, UL, cUL
F20, F21	A	B				not insulated potted	VDE, UL, cUL, CSA
F11, F12 F20, F21	A A	 B	U112		 different dimensions for F20, F21	coated	VDE, UL, cUL
F20, F21	A	B	A150 U280			housing of PPS leadframe leads grid dimension 5.08 potted	VDE, UL, cUL, CSA
F11, F12 F20, F21	A A	 B	A800		 different dimensions for F20, F21	not insulated potted	VDE, UL, cUL
F20, F21	E	G	G700			aluminium housing thread M4x6 potted T_a max. 150 °C	VDE, UL, cUL, CSA
F11, F12	A		U282			housing of PPS potted	VDE, UL, cUL
F11, F12 F20, F21	A A	 B	A150 U112		 different dimensions for F20, F21	leadframe leads grid dimension 5.08 coated	VDE, UL, cUL, CSA

Heating by current



The characteristic curve in the diagram is measured with a thermal control without any insulation in an oil bath.

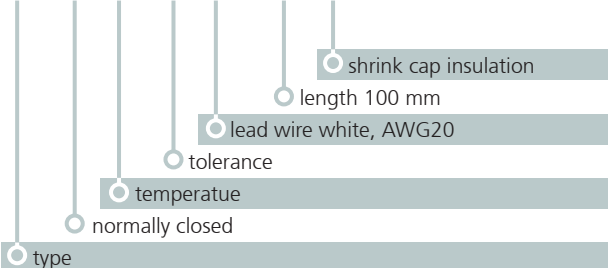
Attention:

The heating depends on the thermal conduction of the control to the equipment or part which should be protected.

Ordering and marking example

Ordering example

F11 A 120 05 L310 100 U254



Deviations from standard controls on request.

Marking

- F11A** type (F11 nc)
- 12005** response temperature (120°C), tolerance ($\pm 5K$)
- 049D** date of manufacture (April 2009), country (D=Germany)

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