

Thermal motor protector

Temperature limiter

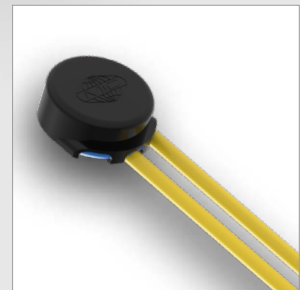
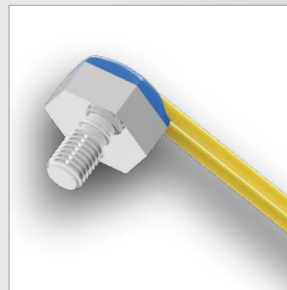
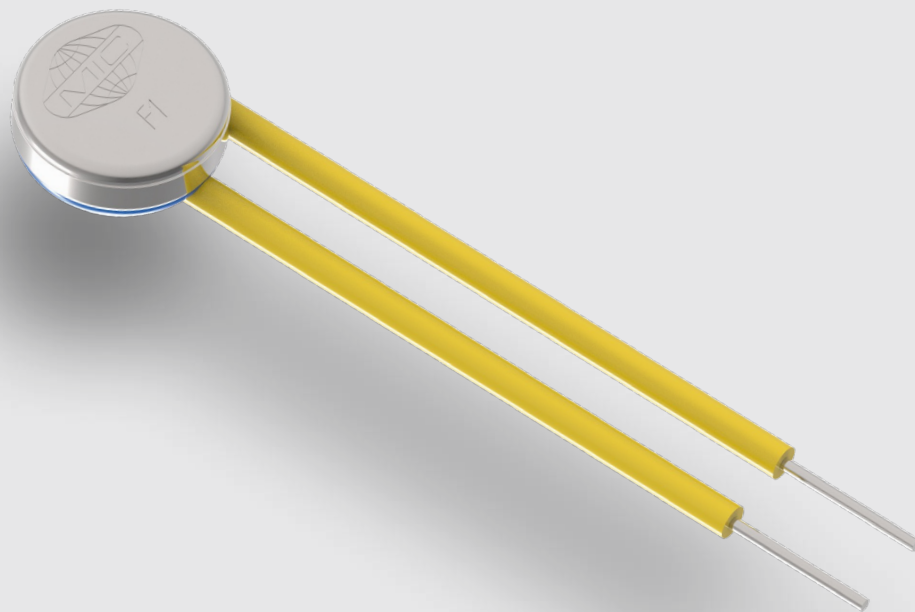
Thermal cut-out

F

13

20

23



Applications

- Motors
- Transformers
- Coils
- Electronics, sensors

Benefits

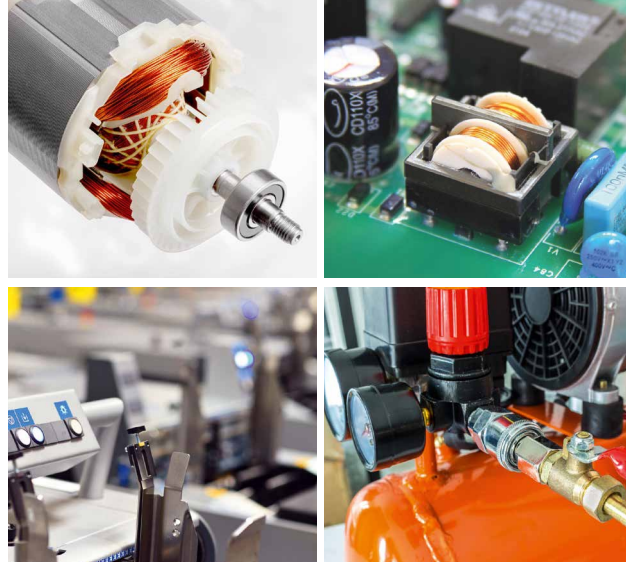
- Small dimensions
- Shock and vibration tested
- Leadframe version
- Various kinds of insulations

Description

Switches of the **F series** with a minimum size are very suitable for the **installation in confined conditions**. The switching principle consists of a central contact which opens or closes the circuit of the application when there is a temperature input by means of a pressure spring and a thermo-bimetal snap-disc.

Due to the low mass, a **very fast response** of the switch is possible. The heat is thereby preferably absorbed by the round contact surface of the switch and transmitted to the bimetallic element.

In addition to the direct protection of smaller electrical drives and devices with a rated power of up to approx. 750W, F series switches are often used as **thermal sensors**. In twin or triple configurations, they provide a triggering element in the control circuit for contactors, thus also able to thermally protect **larger three-phase Motors**.



Technical data

type ratings		control		
		F13A	F23A / E	F20B / G
version		normally closed		normally open
rated current at 250 V 50/60 Hz (power factor 0.95 / 0.6)		3.0 A / 2.5 A	3.0 A / 3.0 A	2.0 A / 1.6 A
switching cycles under rated current		10,000	10,000	7,000
max. current under failure conditions at 250 V 50/60 Hz (power factor 0.95)		4.0 A	6.0 A	4.0 A
switching cycles under max. current		3,000		
temperature rating T _A (steps in 5 °C)		70°C ... 190°C / ... 160°C (CQC)		70°C ... 185°C
tolerances		standard: ± 5 °K		
feature of automatic action		2.C, 1.C		
contact resistance (incl. wire of 100 mm)		< 50 mΩ		
hysteresis		30 K ± 15 °K ¹⁾		
dielectric strength (standard insulation)		2 kV		
vibration resistance (10 to 60 Hz)		100 m/s ²		
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 / -2-9	
	UL		UL 2111 / UL 873 ²⁾	
	cUL		C22.2 No. 77 / C22.2 No. 24 ²⁾	
	CQC		GB14536.1-2008 / GB14536.10-2008 ³⁾	

¹⁾ at the T_A (upper and lower) limits the hysteresis could deviate ²⁾ on request ³⁾ different power rating

The variety of our product variations is nearly infinite. Microtherm distinguishes itself by a high expert's know-how in the area of customised developments. We will be pleased to give you specific advice during a personal consultation and present you all the options suitable for your application:

- application of plug connectors
- unique packaging and overmolding variations
- specific cable assemblies and many more



Versions

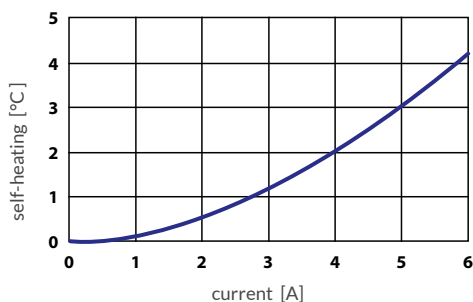
control type	n.c.	n.o.	code	illustration	drawing dimensions (mm)	technical specification	approvals
F13	A					not insulated, potted	VDE, UL, cUL
F20 F23	A	B				not insulated, potted	VDE, UL, cUL
F13 F20 F23	A	B	U254			shrink cap, potted	VDE, UL, cUL
F13 F20 F23	A	B	U198 U185			cap of PPS, potted	VDE, UL, cUL
F13 F20 F23	A	B	U112			coated T_A max. 160 °C	VDE, UL, cUL
F20 F23		B	A150 U280			housing of PPS leadframe leads grid dimension 5.08 potted	VDE, UL, cUL
F13 F20 F23	A	B	A800			not insulated, potted	VDE, UL, cUL
F20 F23		G	G700			aluminium housing thread M4x6 potted T_A max. 150 °C	VDE, UL, cUL
F13	A		U282			housing of PPS, potted	VDE, UL, cUL
F13 F20 F23	A	B	A150 U112			leadframe leads grid dimension 5.08 coated T_A max. 160 °C	VDE, UL, cUL
F13	A	B	B224			CuBe mounting cap combined with U198 / U112	VDE, UL, cUL

Standard wire

lead	code	temperature max.	operating voltage max.	approx. diameter insulation	approx. cross section / diameter	UL- Style
stranded white	L300	150 °C	300 V	1,50 mm	AWG24 / 0,25 mm ²	3398
	L310			1,82 mm	AWG20 / 0,50 mm ²	
	L360	200 °C	600 V	1,10 mm	AWG24 / 0,25 mm ²	10086
	L370			1,50 mm	AWG20 / 0,50 mm ²	
solid yellow	L400	150 °C	300 V	1,35 mm	AWG24 / 0,50 mm	3398
	L410			1,66 mm	AWG20 / 0,80 mm	
	L430	200 °C	300 V	1,16 mm	AWG24 / 0,50 mm	1332
	L440			1,54 mm	AWG20 / 0,80 mm	

Standard length 100 ± 10 mm, stripped 6 ± 1 mm, AWG24 is recommended

Heating by current



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

Note:

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

Ordering example

F13	A	120	05	L300	300	U254	
							shrink cap insulation
							length 300 mm
							lead wire white, AWG20
							tolerance
							temperature
							normally closed
							type

Marking

F13A	type (F13 n.c.)
12005	response temperature (120°C), tolerance (± 5°C)
101D	date of manufacture (October 2021), country (D=Germany)

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