

## Motor Protectors

**PTC Thermistors** act as thermal protectors for electrical motors. They are available with or without an insulated sleeve and have flexible connecting leads. PTC thermistors have a non-linear resistance/ temperature response. At a specified temperature the resistance changes rapidly to a very high value.

#### **Features**

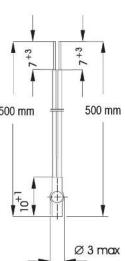
- Rapid response protection for electrical machines
- Compact size for easy assembly into windings
- Silvered copper leads



#### YGM1

# Single Thermistor with shrunk-sleeve & epoxy seal

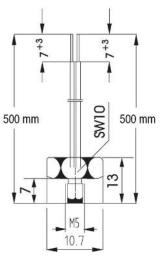
Туре	Response Temp. δ <sub>ΝΑΤ</sub>	Colour Code	
YGM1 C508	80 ±5	white - white	
YGM1 C509	90 ±5	green - green	
YGM1 C510	100 ±5	red - red	
YGM1 C511	110 ±5	brown - brown	
YGM1 C512	120 ±5	grey - grey	_
YGM1 C513	130 ±5	blue - blue	5
YGM1 C514	140 ±5	white - blue	
YGM1 C545	145 ±5	white - black	
YGM1 C515	150 ±5	black - black	
YGM1 C655	155 ±5	blue - black	
YGM1 C516	160 ±5	blue - red	
YGM1 C517	170 ±5	white - green	
YGM1 C518	180 ±5	red - white	



# CEF1

#### Mount-on Sensor in isolated brass/aluminium housing

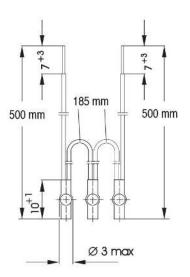
Туре	Response Temp. δ <sub>ΝΑΤ</sub>	Colour Code
CEF1 C508	80 ±5	white - white
CEF1 C509	90 ±5	green - green
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CEF1 C514	140 ±5	white - blue
CEF1 C545	145 ±5	white - black
CEF1 C515	150 ±5	black - black
CEF1 C655	155 ±5	blue - black
CEF1 C516	160 ±5	blue - red
CEF1 C517	170 ±5	white - green
CEF1 C518	180 ±5	red - white



#### YGM3

Triple Thermistor with shrunk-sleeve & epoxy seal

Туре	Response Temp. δ <sub>ΝΑΤ</sub>	Colour Code
YGM3 C508	80 ±5	white - yellow - yellow - white
YGM3 C509	90 ±5	green - yellow - yellow - green
YGM3 C510	100 ±5	red - yellow - yellow - red
YGM3 C511	110 ±5	brown - yellow - yellow - brown
YGM3 C512	120 ±5	grey - yellow - yellow - grey
YGM3 C513	130 ±5	blue - yellow - yellow - blue
YGM3 C514	140 ±5	white - yellow - yellow - blue
YGM3 C545	145 ±5	white - yellow - yellow - black
YGM3 C515	150 ±5	black - yellow - yellow - black
YGM3 C655	155 ±5	blue - yellow - yellow - black
YGM3 C516	160 ±5	blue - yellow - yellow - red
YGM3 C517	170 ±5	white - yellow - yellow - green
YGM3 C518	180 ±5	red - yellow - yellow - white





#### Operation

PTC thermistors exhibit very high sensitivity over a narrow temperature band. For temperature measurement in this range, NTC thermistors are easier to measure and more accurate.

PTC thermistors are especially suited as temperature sensors for monitoring the windings of electric machines, and also for use in simple fail-safe circuitry. When a given temperature (nominal response temperature  $\delta_{NAT}$ ) is exceeded, the circuit can be switched off through a relay or amplifier, since the PTC-sensor will have an extremely high ohmic value in the region of its response temperature. This will have the same effect as a break in the circuit or a failure of the thermistor.

# Technical data

Nominal response temperature			°C in steps
	of 10 °, p	lus 145 ° a	and 155 °C
Maximum allowable operating temp	).	٦	max. 200 °C
Max. allowable operating voltage at	+ 25 °C	Umax. 25V	(per bead)
Max. allowable power dissipation at	: + 25 °C		690 mW
Insulation strength (between leads	and outer in	sulation)	
also for threaded sensor			2.5 kV
Conductors - silvered copper wire v	vith teflon in	sulation	PTFE
Insulation stripping		app	rox 10 mm
Conductor cross-section	0.25 m		gle, double
		and ti	riple PTC's

#### Conductor lengths

Single PTC 500 mm ± 10 mm Triple PTC 500 - 180 - 180 - 500 mm ± 10 mm

#### Special versions

PTC's are also available in many special housings (can be manufactured to customers specifications)

# Installation tips

For PTC temperature sensors in electrical windings:

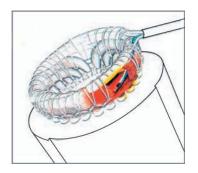
- the thermistors can only be inserted in the windings before impregnation

- it is advisable to embed one in each phase, if possible in the centre of the coil generating most heat, and generally on the outflow side of any air movement

- air inflow onto the temperature sensor will interfere with heat transfer

- if using varnish/lacquer which is not chemically neutral, suitability tests must be undertaken by the customer

- WARNING! It is very important that the sensor must be installed parallel with the copper of the winding, so that the teflon leads can assume the form of the rest of the winding and thereby retain the high- voltage resistance rating.



• PTC's are classified according to their nominal response temperature  $\delta_{\text{NAT}}$  but all have similar resistance characteristics to simplify the choice of switching device; the relationship of resistance to temperature of all these PTC's is as follows:

# Standard Resistance Values —

#### Single PTC

Temperature °C	Resistance $\Omega$	measuring Voltage V
– 20 to $artheta_{\scriptscriptstyle NAT}$ – 20	250 max./100	max. 2.5
<b>ϑ</b> <sub>NAT</sub> − 5	550 max.	2.5
ϑ <sub>NAT</sub>	1.000	2.5
ϑ <sub>NAT</sub> + 5	1.330 min.	2.5
ϑ <sub>NAT</sub> + 15 4.000 mir		7.5

#### **Triple PTC**

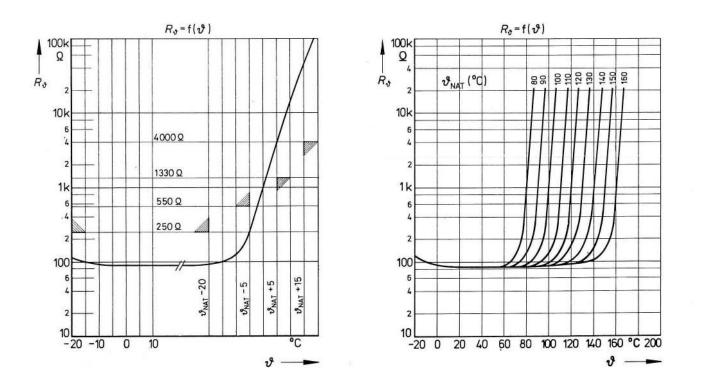
Temperature °C	Resistance $\Omega$	measuring Voltage V
– 20 to $artheta_{\scriptscriptstyle NAT}$ – 20	750 max./300	) max. 7.5
$\vartheta_{\text{NAT}} - 5$	1.650 max.	7.5
ϑ <sub>NAT</sub> + 5	4.000 min.	7.5
<u></u> θ <sub>NAT</sub> + 15	4.000 min.*	7.5

\* one PTC might reach  $\delta_{NAT}$  + 15 °C, while the second or even both of the others could still remain at room temperature. The PTC's resistance values for motor protection are specified in DIN 44081/44082. Resistance values below  $\delta_{NAT}$  –20 are not specified, and resistance when cold is no indication of the PTC's condition. It is ideally between 40 - 200 ohms but can be anywhere between 35 - 250 ohms.

The greatest resistance change occurs between  $\pm 5$  °C either side of  $\delta_{NAT}$ , being at least 15%/K.

#### Quality standard

Random testing is carried out according to DGQ P90/P10 (DIN 40080). AQL values can be fixed by arrangement.



### Ordering Information

Quantity	Туре	Temp. code No.	Resistance max.
1.000	YGM1	C 510	250 ohms



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