



### 3. PTC miniature type

#### Siemens-design according to DIN 44080 – 082

#### 3.1 Delivery program list - EPHY-MESS engine protection PTC

delivery program list - EPHY-MESS engine protection PTC according to DIN 44081 - 44082
<b>EPTC / SH</b> single PTC resistor, $\varnothing \leq 3$ mm, NAT +60°C...+190°C, enamelled, shrinkable tubing insulation, $R_N \leq 100\Omega$ , PTFE-insulated wires AWG 26/7, standard wire length <sup>1)</sup> : 500 mm, 2000 mm and 5050 mm, dielectric strength 2.5 kV / AC 50 Hz / 1 min.
<b>EPTC / KH<sup>2)</sup></b> single PTC resistor in ceramic sleeve, $\varnothing 4.9 \times 17$ mm, dielectric strength 5 kV / AC 50 Hz / 1 min. (also available with LGLS for antikininic).
<b>EPTC / ZS<sup>2)</sup></b> single PTC resistor, encapsulated in intermediate layer for installation into high voltage equipment, dielectric strength 2.5 kV / AC 50 Hz / 1 min.
<b>EPTC / SGH</b> single PTC resistor, in a brass- or Al- screw in housing, dielectric strength 2.5 kV/AC 50 Hz/1 min.
<b>EPTC / xxA</b> shielded single PTC resistor EPTC / SHA, shielding mesh with shrinkdown tubing, EPTC / ZSA, intermediate layer
<b>DPTC / SH<sup>1)</sup></b> triple PTC resistor, $\varnothing \leq 3$ mm, NAT +60°C...+190°C, enamelled, shrinkable tubing insulation, $R_N \leq 300\Omega$ , PTFE-insulated wires AWG 26/7, wire length: 500 / 180 / 180 / 500 mm
<sup>1)</sup> various NATs with wires of 1000 mm, 1500 mm, 2500 mm and 3000 mm available from stock <sup>2)</sup> The /KH and /ZS versions of triple thermally controlled resistors are also available upon request EPHY-MESS motor protection PTC are available as double, 4-fold and 6-fold PTC resistors for special equipment.

## 3.2 Engine protection, PTC with Siemens design according to DIN 44081 / 082

The EPHY-MESS engine protection PTC types are supplied only with original Siemens PTC pills, which meet the DIN 44081 / 082 with respect to structure and properties within the range of NAT 90°C ... 160°C. The PTC's are tested for NAT and dielectric strength (2.5 kV/AC 50 Hz/1 min.). All PTC pills are varnished and insulated with shrinkable tubing. The cable ends are generally bared from insulation by 5 mm and tin plated. A factory certificate 2.1 according to DIN EN 10204 can be written upon request.

### 3.2.1 Miniature single PTC resistor with shrinkable tubing insulation (EPTC / SH)

PTC with small sensor  $\varnothing \leq 3$  mm,  $R_{25} \leq 100\Omega$  : **M145 miniature model** with thermal reaction time  $t_a^*) < 5$  s.

\*) with single shrinkable tubing insulation

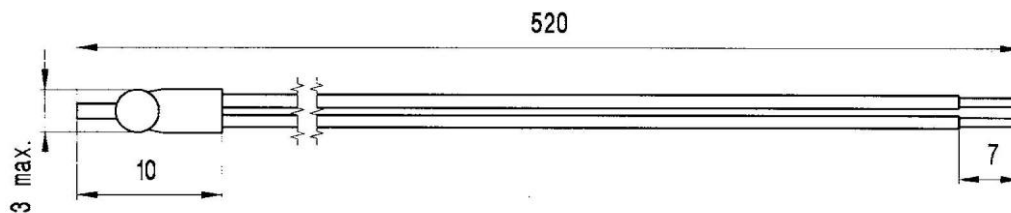


Fig. 1, EPTC miniature model

### 3.2.2 Single PTC resistor cemented into ceramic sleeve

For increase of the mechanical stability (pressure, vibration, etc.) and improvement of dielectric strength the PTC's can be cemented into a ceramic sleeve ( $\varnothing 4.9 \times 17$  mm ).

This design with bare sensor using extremely pure  $Al_2O_3$  sleeve material guarantees a very good thermal coupling.

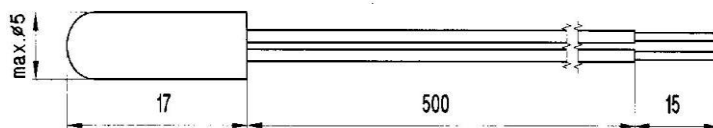


Fig. 2, EPTC / KH

### 3.2.3 Special type with LGLS antikink (EPTC / KH + LGLS)

This sensor is designed for installation in small generators and engines and therefore it is especially shakeproof due to the fact that a varnished glass fibre hose ( $\varnothing 1.5$  mm ) is encapsulated in the sleeve, which protects the wires against kinking.

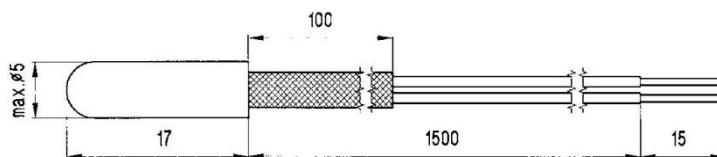


Figure 3, EPTC / KH + LGLS

### 3.2.4 Single PTC resistor encapsulated in intermediate layer (EPTC / ZS)

For installation in e.g. slots of high voltage engines these single PTC's can be encapsulated in epoxy intermediate layers. In order to reduce the reaction time which in case of the PTC resistors is of special importance, the thickness of the carrier body in the area of the PTC pill

is only 0.3 mm. IECEx and ATEX-approval for use in hazardous areas with protection type:

IECEx: Ex e II

ATEX: 2G Ex e II

The following standard dimensions (T x W x L) are available:

3 x 6 x 25 mm / 3 x 8 x 50 mm / 3 x 8 x 100 mm.

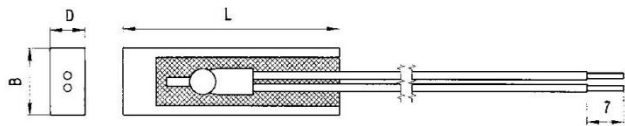


Fig. 4, EPTC / ZS

### 3.2.5 Single PTC resistor cemented into screw-in housing (EPTC / SGH)

Remarkable features of this sensor are its large connection surface towards the object to be monitored, excellent thermal coupling and short reaction times.

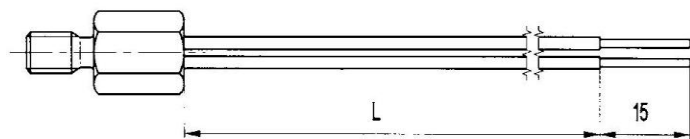


Fig. 5, EPTC / SGH

This type of sensor is mainly used

for temperature control of housings for electric engines, generators, transformers as well as in other locations which are accessible via thread bore.

### 3.2.6 Single PTC resistor, shielded type (EPTC / xxA)

Two shielded versions of the PTC resistors are available for use in potentially explosive areas and special equipment.

**Version 1:** single PTC resistor, miniature type with shielding mesh, shrinkable tubing insulation (EPTC / SHA).

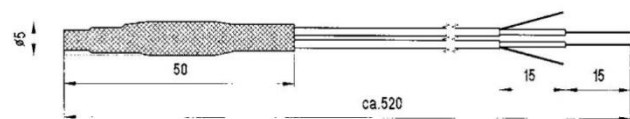


Fig. 6, EPTC / SHA

**Version 2:** single PTC resistor in intermediate layer, covered with sheet copper and equipped with mica insulation (EPTC / ZSA).

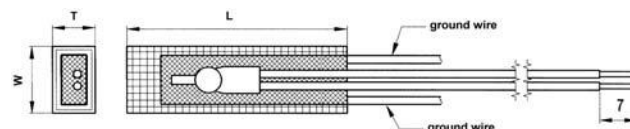


Fig. 7, EPTC / ZSA

IECEx and ATEX-approval for use in hazardous areas with protection type:

IECEx: Ex ia IIC

ATEX: II 2G Ex ia IIC T6



## 3.2.7 Technical data and order names of miniature type single PTC resistors (EPTC)

### Model M145

Technical data and order names of miniature type single PTC resistors (EPTC) M145 with 500 mm, 2000 mm and 5050 mm cable length										
U <sub>max</sub> <sup>1)</sup> / V	T <sub>NAT</sub> / °C	ΔT / K	R <sub>25</sub> / Ω	R(T <sub>NAT</sub> -ΔT) / Ω	R(T <sub>NAT</sub> + ΔT) / Ω	R(T <sub>NAT</sub> +15K) / Ω	T <sup>3)</sup> / s	color code	type code	model
30	60	±5	≤100	≤570	≥570	≥10000 <sup>2)</sup>	< 5	white/grey	060 Mini	-SH  -KH  -ZS  -ESF  -SHA  -ZSA
	70			≤570	≥570	≥10000 <sup>2)</sup>		white/brown	070 Mini	
	80			≤570	≥570	≥10000 <sup>2)</sup>		white/white	080 Mini	
	90			≤550	≥1330	≥4000		green/green	090 Mini	
	100			≤550	≥1330	≥4000		red/red	100 Mini	
	110			≤550	≥1330	≥4000		brown/brown	110 Mini	
	120			≤550	≥1330	≥4000		grey/grey	120 Mini	
	130			≤550	≥1330	≥4000		blue/blue	130 Mini	
	140			≤550	≥1330	≥4000		white/blue	140 Mini	
	145			≤550	≥1330	≥4000		white/black	145 Mini	
	150			≤550	≥1330	≥4000		black/black	150 Mini	
	155			≤550	≥1330	≥4000		blue/black	155 Mini	
	160			≤550	≥1330	≥4000		blue/red	160 Mini	
	170	±7		≤570	≥570	≥10000 <sup>2)</sup>		white/green	170 Mini	
	180			≤570	≥570	≥10000 <sup>2)</sup>		white/red	180 Mini	
	190			≤570	≥570	≥10000 <sup>2)</sup>		black/grey	190 Mini	
<sup>1)</sup> for T = 25°C										
<sup>2)</sup> measured at T <sub>NAT</sub> + 23K and U <sub>KL</sub> ≤ 2,5 V										
<sup>3)</sup> for PTC with shrinkable tubing insulation										

### Structure of the order names of miniature type single PTC resistors (miniature type):

**EPTC NAT model cable length**

f.e.: **EPTC 145 SH 2000 mm** = single PTC model M145, NAT 145°C,  
with shrinkdown tubing insul., 2000 mm cable

**EPTC 130 KH 5050 mm** = single PTC model M145, NAT 130°C,  
installed in ceramic sleeve, 5050 mm cable

### 3.3 Triple PTC resistors miniature model (DPTC)

PTC resistors for engine protection are also available as triple sensor, type M345. The technical data  $U_{max}$ ,  $\Delta t_a$  and the color code are identical with those for the single thermally controlled resistors, however due to the series connection of the PTC's the resistance values  $R_{25}$ ,  $R(T_{NAT} - \Delta T)$ ,  $R(T_{NAT} + \Delta T)$  and  $R(T_{NAT} + 15K)$  are tripled.

- DPTC with small sensor  $\varnothing \leq 3 \text{ mm}$ ,  $R_{25} \leq 300\Omega$  : **M345 miniature type** with thermal reaction time  $t_a^{*)} < 5 \text{ s}$

\*) with single shrinkable tubing insulation

All PTC resistor pills are varnished and insulated with shrinkable tubing. Principally the insulation is removed at the ends, stranded and tin-plated.

The wire length is 500 mm, the length of the connecting cables 180 mm each, alternative: wire length of 2000 mm and connecting line length of 300 mm.

Triple PTC resistors are available in the following versions as described on the previous pages: -SH, -ZS and -ESF.

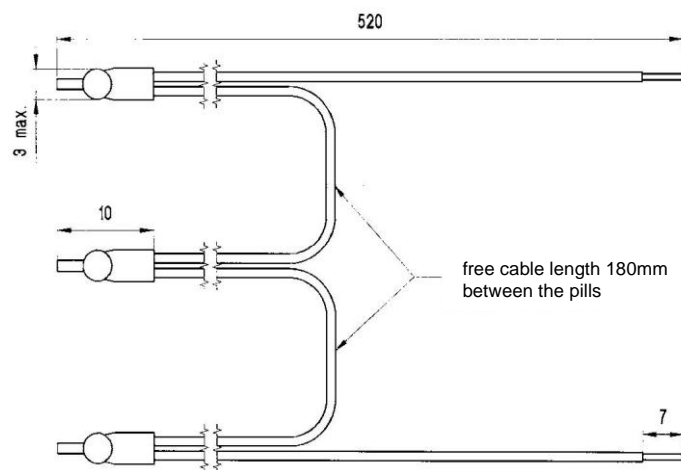


Fig. 8. DPTC-Mini (M345)

#### 3.3.1 Technical data and order names for triple PTC resistors (DPTC)

##### Miniature design, type M345

The technical data of the triple PTC resistors, M345 design correspond exactly to those of the single PTC resistors of the M145 design. Due to the series connection of PTCs the resistance values have to be multiplied by 3.

#### Structure of the ordering designation for DPTC triple thermally controlled resistors

##### *DPTC NAT model cable length*

f.e.: **DPTC 160 SH 500 / 180 / 180 / 500 mm** = triple PTC M145 design,  
NAT 160°C, shrinkable tubing insulation