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Operating Manual MINIKA®
PTC Temperature Sensors

updated: 2025-07-31 / dr

For more information and help about this product please scan the QR-Code or choose the following link: MINIKA K

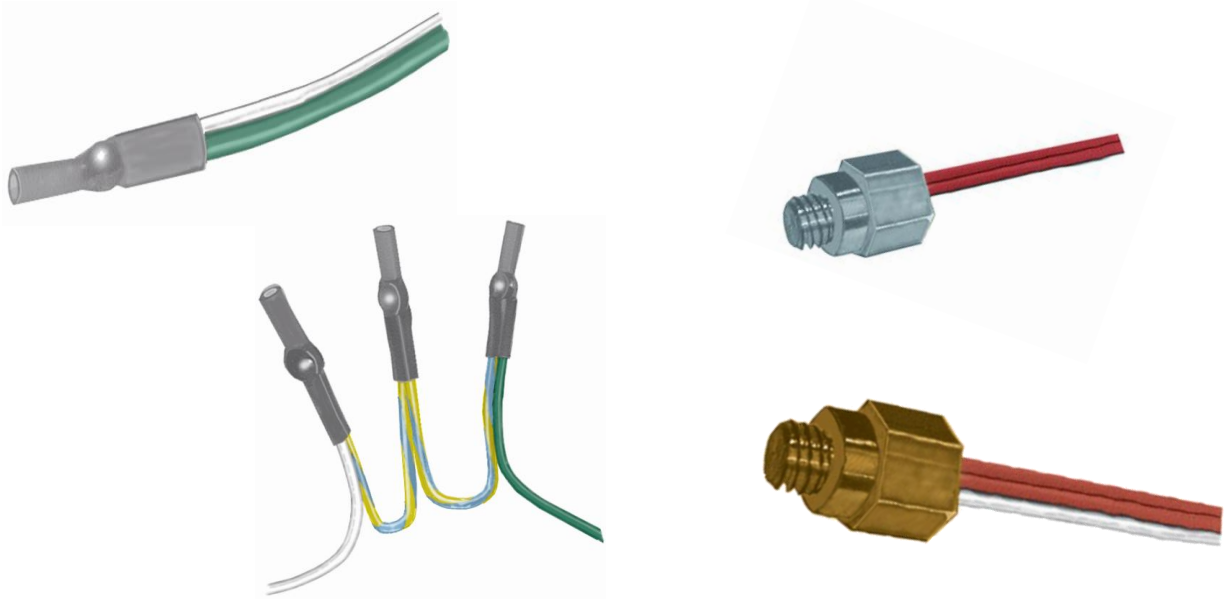
For more information and help about this product please scan the QR-Code or choose the following link: MINIKA KD

For more information and help about this product please scan the QR-Code or choose the following link: MINIKA KS G2

For more information and help about this product please scan the QR-Code or choose the following link: MINIKA KS G3

Operating manual, Quick guide, Datasheet, Connection diagram, CAD Data
Firmwareupdates, FAQ, Videos about installation and settings, Certificates

- Temperature sensors with step response for PTC thermistor trip devices



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1 General Notes

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, commissioning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

2 Application and short description

PTC temperature sensors, also known as PTC resistors or thermistors, are temperature-dependent semiconductor resistors that have the characteristic that their electrical resistance changes abruptly with temperature change in the range of the response temperature (EN 60947-8: Sensor response temperature TNF, DIN VDE V 0898-1-401 (prev. DIN 44081 / DIN 44082): Nominal response temperature NAT). PTCs are mainly used for overtemperature protection of windings in electric motors or transformers. Other applications include machinery and machine tools, specifically machine bearings, and the temperature monitoring of power semiconductors or heat sinks.

3 Design variants:

NAT °C	Type*	Connection colors*
60 ±5	K.. 60	white - grey
70 ±5	K.. 70	white - brown
80 ±5	K.. 80	white - white
90 ±5	K.. 90	green - green
100 ±5	K.. 100	red - red
110 ±5	K.. 110	brown - brown
120 ±5	K.. 120	grey - grey
130 ±5	K.. 130	blue - blue
140 ±5	K.. 140	white - blue
150 ±5	K.. 150	black - black
160 ±5	K.. 160	blue - red
170 ±5	K.. 170	white - green
180 ±5	K.. 180	white - red

Single/Threefold PTC according to DIN VDE V 0898-1-401 (formerly DIN 44081 / DIN 44082)
* MINIKA® Single sensors Type K 60... K 180
MINIKA® Drilling sensors Type KD 60... KD 180

4 Detailed Description

The resistance of each individual sensor (measurement with max. 2.5 V) must have the following values at temperatures related to the nominal response temperature (NAT):

≤ 250 Ω at temperatures from –20°C to NAT – 20°C
≤ 550 Ω at a temperature of NAT – 5°C
≥ 1330 Ω at a temperature of NAT +5°C
≥ 4000 Ω at a temperature of NAT + 15°C

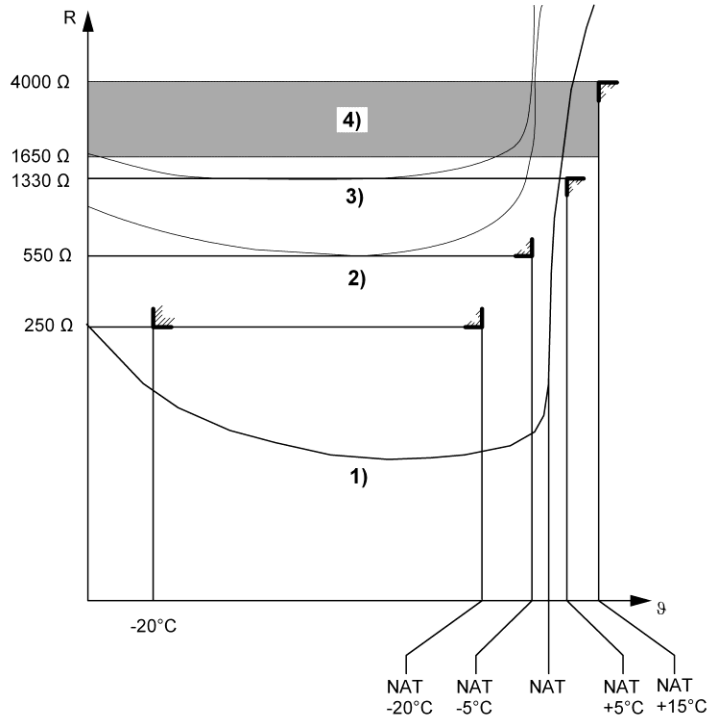
The exact resistance values in the temperature ranges are of no significance. The cold resistance of faultless sensors must lie between 20 and a maximum of 250 Ω. Typical values (room temperature) are between 50 -150 Ω. If the cold resistance is within the specified limits, interruption and short circuit can be excluded. Conclusions about the nominal response temperature are only possible when the PTC is heated to this temperature.
Tripping devices switch (according to standard) between 1650 Ω and 4000 Ω (range 4).

This results in the following switch-off point when a different number of temperature sensors connected in series to a trigger device are heated evenly:

1 PTC switches
at NAT + 15°C at the latest, at NAT + 5°C at the earliest (characteristic curve 1)

3 PTCs (typical case) switch at NAT + 5°C at the latest, at NAT – 5°C at the earliest (characteristic curve 2)

6 PTCs switch
at NAT at the latest,
at NAT -20°C at the earliest. (Characteristic curve 3)
(Absolutely uniform heating of all sensors is rare here.)



5 Important Information

5.1 Insulation classes

We recommend the following values of the nominal response temperature NAT (TNF) for built-in PTCs in machines that are fully utilized according to their insulation class.

Insulation class			
120 (E)	**130 (B)**	**155 (F)**	**180 (H)**
120°C	**130°C**	**150°C**	**180°C**

These values can be reduced accordingly for machines with less utilization. In some cases, it may be necessary to define values of the nominal response temperature (NAT) different from the recommended values in the table based on experiments or experience. If a pre-warning is provided, a nominal response temperature value that is 20°C below the switch-off temperature is recommended.

5.2 Testing

For the insulation test of the built-in temperature sensors against the housing and winding with high voltage, connect both leads to the temperature sensors together. The maximum test voltage is 2500 V effective. After removing the short-circuit bridge, the resistance of the PTC can be tested. If the resistances are between 20 and 250 Ω per individual temperature sensor (threefold PTC = 3 individual temperature sensors), these are faultlessly installed in the motor. Usual resistance measuring devices that guarantee the measuring voltage per sensor < 2.5 V are to be used for the measurement.

Attention!
Test the PTCs only with a measuring voltage <2.5V.

To use the equipment flawless and safe, transport and store properly, install and start professionally and operate as directed.
Only let persons work with the equipment who are familiar with installation, start and use and who have appropriate qualification corresponding to their function. They must observe the contents of the instructions manual, the information which are written on the equipment and the relevant security instructions for the setting up and the use of electrical units.
The equipment is built according to DIN VDE/EN/IEC and checked and leave the plant according to security in perfect condition. If, in any case the information in the instructions manual is not sufficient, please contact our company or the responsible representative.
In order to maintain this status, you must observe the safety regulations entitled “caution” in this operating manual. Failures to follow the safety regulations can result in death, personal injury or property damage to the device itself and to other devices and facilities.
To maintain this condition, you must observe the safety instructions in this instruction manual titled “Important Information”. Failure to follow the safety instructions may result in death, personal injury, or property damage to the equipment itself and other equipment and facilities.
Instead of the industrial norms and regulations written in this instruction manual valid for Europe, you must observe out of their geographical scope the valid and relevant regulations of the corresponding country.

6 Installation

The installation of the PTCs can only be carried out before the impregnation of the winding by a motor factory. Subsequent installation is not possible. Each winding strand receives a temperature sensor. This means that 3 temperature sensors are installed in single-speed motors and 6 in pole-changeable motors. The sensors are arranged in series and led to separate terminals in the terminal box. The measuring circuit lines are to be laid as separate control lines. The use of conductors of the motor's supply line or other main power lines is not permissible. If inductive or capacitive interference from parallel power cables is to be expected, shielded control cables must be used. The maximum cable length for a cable cross-section of 0.5 mm2 is approx. 500 m. For larger cross-sections, the length is correspondingly greater. For devices with short-circuit monitoring, a short circuit at the sensor is not detected if the line resistance is > 20 Ω. The installation of the PTCs should preferably be in the warmest winding head, i.e., on the exhaust side of the electrical machine. Special attention should be paid to good thermal contact of the sensors with the winding during installation. The closer the PTCs are connected to the winding, the better they can follow the winding temperature, especially with steep temperature rises. For this reason, the temperature sensors should be embedded in the middle of the winding heads so that they are completely surrounded by the winding copper. To install the temperature sensors, the preformed winding heads are spread apart in the middle with a winding stick. The temperature sensors should be laid parallel to the winding wires. It should be ensured that the winding wires are in contact with the temperature sensors. Cavities and air inclusions impair thermal contact and should be minimized by pressing the winding wires against the sensors with manual force. At the installation site of the sensors, the winding wires of the winding head must be firmly bandaged. For wire gauges over 1 mm², the spaces should be filled with a resin filled with quartz powder. If the motor manufacturer uses special impregnating agents or varnishes that do not show chemically neutral behavior, or applies special working methods, they must test the resistance of the temperature sensors under the conditions they use. To avoid voltage spikes caused by loop formation, we recommend returning the connection lead on the same side as the supply line.

7 Technical data

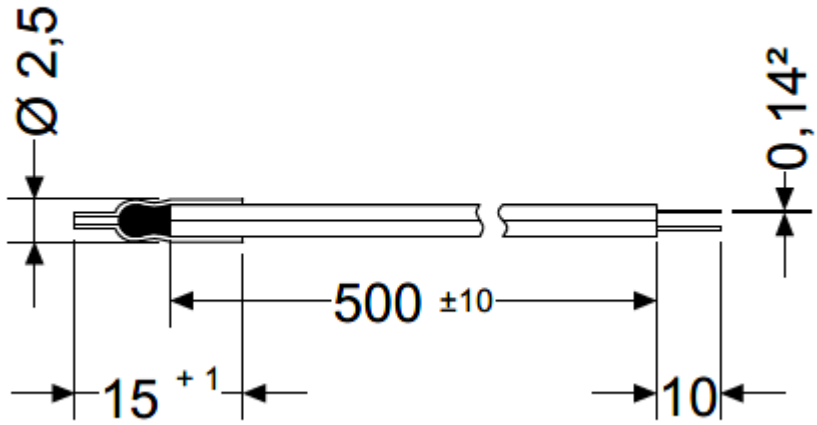
Electrical Properties			
Max. operating voltage	DC 25 V		
Thermal response time ta	≤ 5 s		
Measuring voltage at			
NAT +15K	≤ 7,5 V DC		
- 20… NAT +5K	≤ 2,5 V DC		
Nominal response temperature NAT	60 … 180°C		
Tolerance NAT	± 5 K		
MINIKA K			
Nominal resistance at -20 … NAT -20K, VPTC ≤ 2.5 V	R ≤ 250 Ω		
MINIKA KD			
Nominal resistance at -20 … NAT -20K, VPTC ≤ 2.5 V	R ≤ 750 Ω		
MINIKA KS			
Nominal resistance at -20 … NAT -20K, VPTC ≤ 2.5 V	R ≤ 250 Ω		
Test conditions	**EN 60947-8**		
Rated impulse withstand voltage	4000 V		
Overvoltage category	III		
Degree of contamination	2		
Nominal insulation voltage	690 V		
Rated insulation voltage Ui	2500 V		
Duty cycle	100 %		
Reliability - failure rates **Reliability – failure rate**	**EN 61709/ SN29500**		
MINIKA K			
Continuous operation 24/365	8760 h/a		
Failure rates (FIT) Tu = Tref (component not operated)	Tu = 40 °C 28 FIT 100 (4007) years	Tu = 60°C 33 FIT 100 (3418) years	Tu = 80°C 42 FIT 100 (2692) years
MINIKA KD			
Continuous operation 24/365	8760 h/a		
Failure rates (FIT) Tu = Tref (component not operated)	Tu = 40 °C 84 FIT 100 (1359) years	Tu = 60°C 100 FIT 100 (1139) years	Tu = 80°C 127 FIT 100 (897) years
MINIKA KS			
Continuous operation 24/365	8760 h/a		
Failure rates (FIT) Tu = Tref (component not operated)	Tu = 40 °C 28 FIT 100 (4007) years	Tu = 60°C 33 FIT 100 (3418) years	Tu = 80°C 42 FIT 100 (2692) years

Installation conditions	
Storage temperature range	-25°C … +65°C
Operating temperature range	-20°C … NAT +20°C
Installation height	< 2000 m above N.N.
Permissible wiring temperature	-5 °C …+60 °C
Vibration resistance EN 60068-2-6	2 … 13,2 Hz ±1 mm 13,2 ... 100 Hz 1 g 2…25 Hz ±1,6 mm 25 ... 150 Hz 5 g
MINIKA K	
Climate resistance	5-85% rel. humidity, no condensation
MINIKA KD	
Climate resistance	5-85% rel. humidity, no condensation
MINIKA KS	
Climate resistance	0-100% rel. humidity, with condensation
Connection	
Connection cable	PTFE-insulated connection wire, copper, silver-plated
Conductor cross-section finely stranded	0,14 mm² (AWG 26)
Stripping length	10 mm
MINIKA K	
Supply wire length	500 ± 10mm
MINIKA KD	
Supply wire length	500-180-180-500 ± 10mm
MINIKA KS	
Supply wire length	500 ± 10mm
Housing	
Installation position	As desired
Dimensions (W x H x D)	See *8. Design variant*
MINIKA K	
IP protection class Housing	IP 30
Weight	ca. 2,6 g
MINIKA KD	
IP protection class Housing	IP 30
Weight	ca. 3,6 g
MINIKA KS G2	
Fastening	Thread M4
IP protection class Housing	IP 64
Weight	ca. 5 g
Tightening torque	< 1 Nm
MINIKA KS G3	
Fastening	Thread M6
IP protection class Housing	IP 64
Weight	ca. 14 g
Tightening torque	< 3 Nm

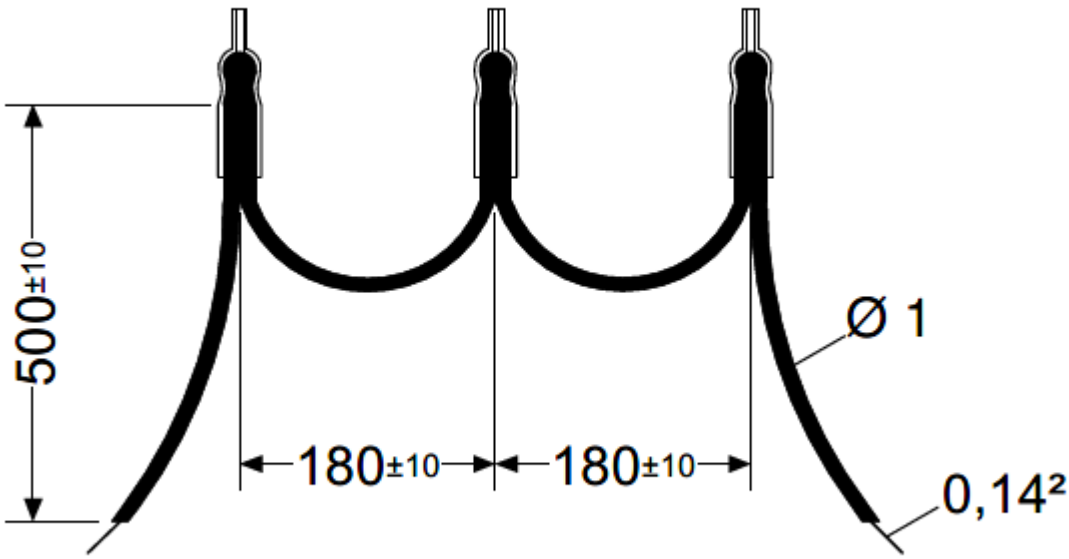
Subject to technical changes

8 Housing

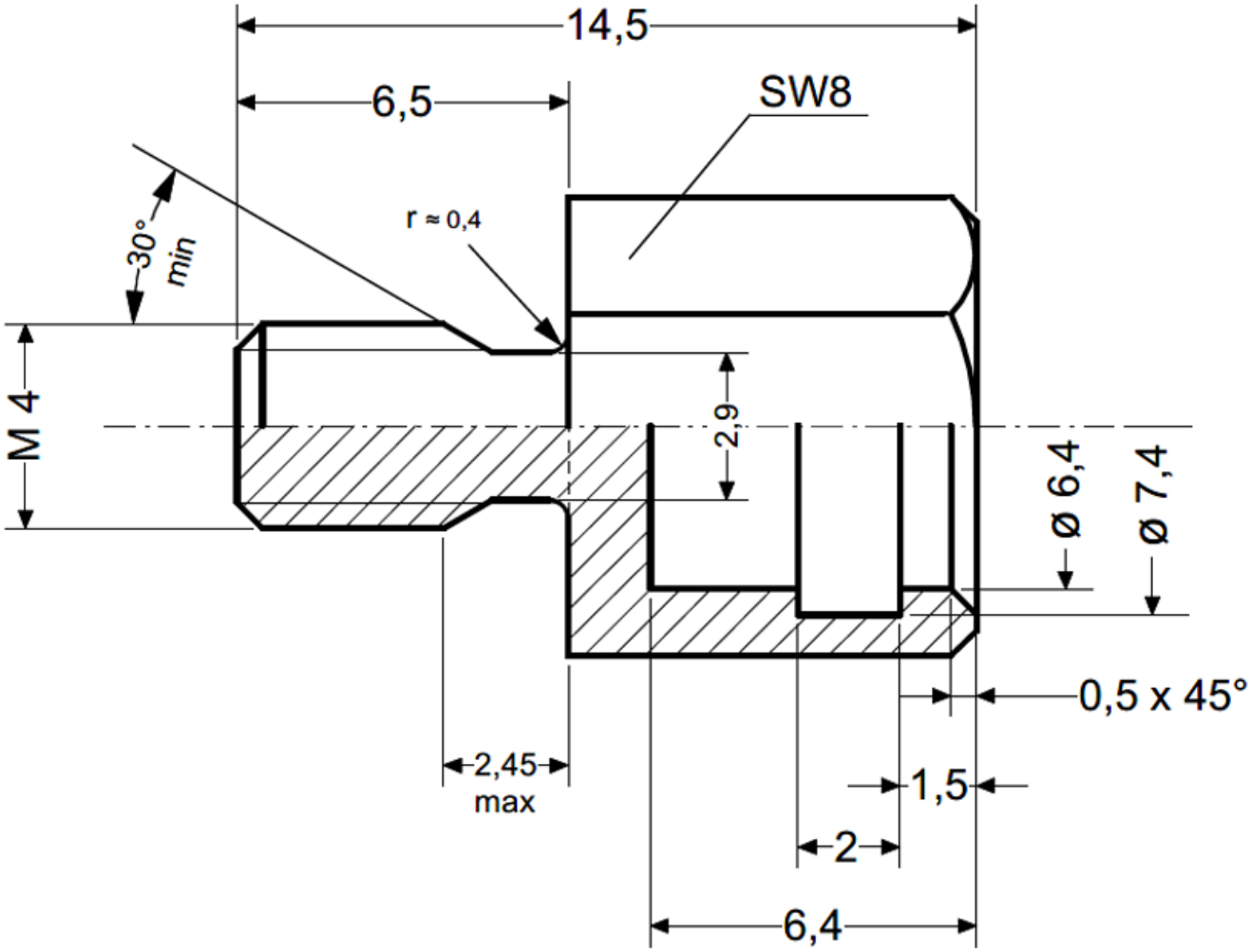
8.1 MINIKA K



8.2 MINIKA KD

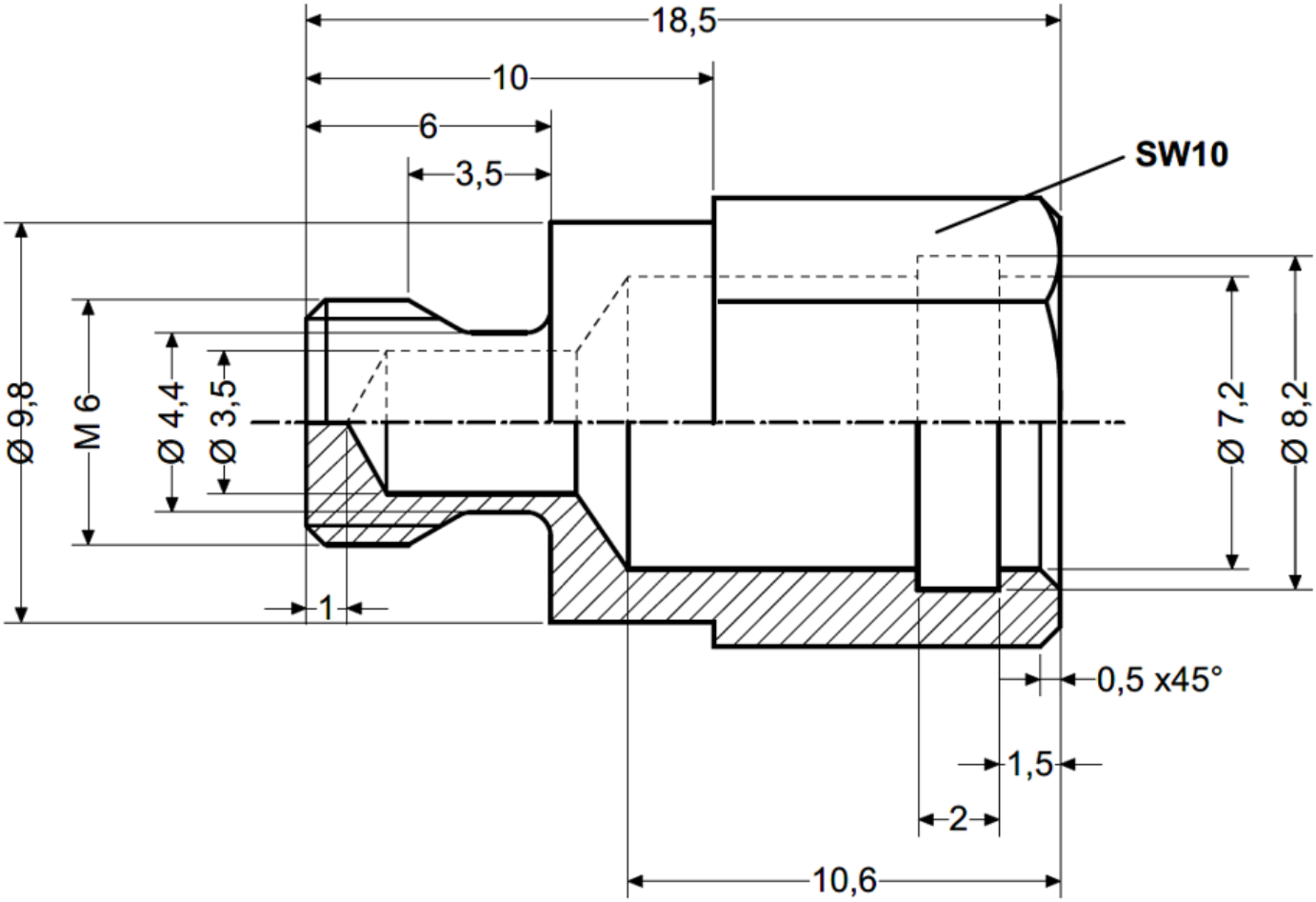


8.3 MINIKA KS G2



Thread M4 Metric ISO-winding compliant with DIN 13-1
Thread chamfer according to DIN 76-1 Form A
Free dimension tolerances according to DIN ISO 2768-1 m
Material: AL Cu Bi Pb / F37

8.4 MINIKA KS G3



Thread M6 Metric ISO-winding compliant with DIN 13-1
Thread chamfer according to DIN 76-1 Form A
Free dimension tolerances according to DIN ISO 2768-1 m
Material: MS 58 BLANK

9 Disposal

Disposal should be carried out properly and in an environmentally friendly manner in accordance with legal provisions.
ZIEHL is registered with the EAR Foundation under WEEE no.: DE 49 698 543.