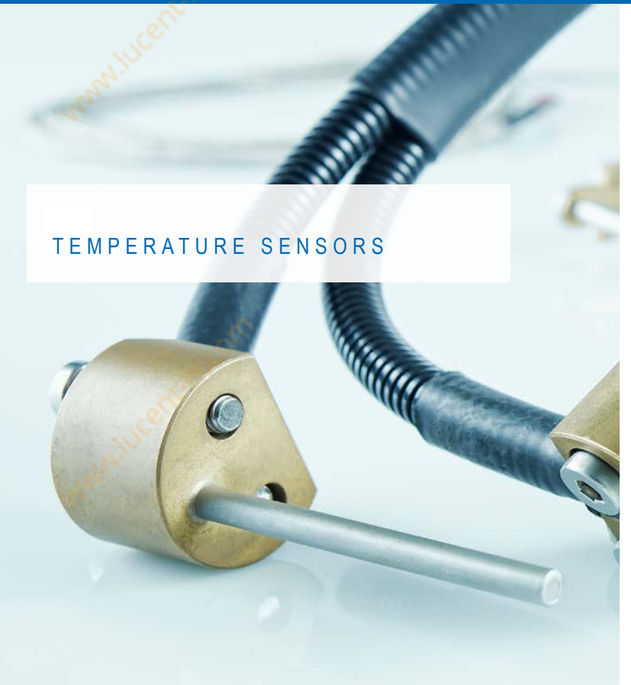
Temperature sensors
overview

Type	Standard		AKS 11	MBT 153	MBT 400	MBT 3250	MBT 3252	MBT 3270	MBT 3310	MBT 3560	MBT 5111	MBT 5113	MBT5114	MBT5116	MBT5250	MBT 5252	MBT5260	MBT 5310	MBT 5560
Industries	Heating		✔	✔	✔	✔	✔	✔		✔					✔	✔	✔		
	Industry			✔		✔	✔	✔	✔	✔					✔	✔	✔	✔	✔
	Marine				✔	✔					✔	✔	✔	✔	✔		✔	✔	
Characteristics	Pt 100/Pt 1000		✔	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔
	NTC/PTC			✔		✔		✔											
	Thermocouple										✔	✔							
	Transmitter									✔									✔
	Transmitter as option						✔					✔		✔		✔			
	Measuring insert		Fixed	Fixed	Fixed	Replaceable	Replaceable	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Replaceable	Replaceable	Fixed	Fixed	Fixed
	Medium temperature	°C	-40 - 100°C	-50 - 200°C	-30 - 50°C	- 50 - 200°C	-50 - 400°C	-50 - 300°C	-50 - 200°C	-50 - 200°C	-50 - 800°C	-50 - 800°C	-50 - 600°C	-50 - 600°C	-50 - 200°C	-50 - 400°C	-50 - 200°C	-50 - 200°C	-50 - 200°C
		°F	-104 - 212°F	-122 - 392°F	-86 - 122°F	-122 - 392°F	-122 - 752°F	-122 - 572°F	-122 - 392°F	-122 - 392°F	-122 - 1472°F	-122 - 1472°F	-122 - 1112°F	-122 - 1112°F	-122 - 392°F	-122 - 752°F	-122 - 392°F	-122 - 392°F	-122 - 392°F
	Enclosure IP		IP 67	IP 67	IP 54	IP 65	IP 65	IP 67	IP 65	IP 67	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 67
	Material protection tube		N/A	AISI 304/316	N/A	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti	AISI 316Ti
	Reaction time $t_{0,5}$ in water (sec)		10 s on Cu tube	1 s	τ air 3 min	9 s	12 s	1.3 s	6 s	10 s	2 s	30 s	2 s	30 s	9 s	12 s	2 s	6 s	9 s
	Zero point and span adjustment		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Marine approvals										✔	✔	✔	✔	✔	✔	✔	✔	✔



TEMPERATURE SENSORS

Temperature sensors

The temperature sensors are used worldwide in high-speed trains, freight and regional trains or metros and trams. They monitor the temperature of:

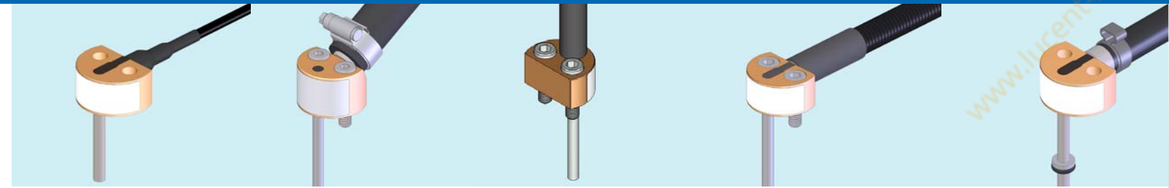
- **traction motors**
- **gears**
- **wheel-set bearings**
- **switching cabinets**

The temperature sensors can be widely combined to create customized sensors. Each sensor consists of a housing with measuring element, a wiring and, if needed, a plug connection with tension release.

Choice of housing type

During operation the sensor must resist extreme vibrations over a long period of time. For this reason solid and highly vibration-resistant brass housings in various designs are used.
The cable outlet can be constructed at angles from 90° to 180° degrees. The stainless steel protection sleeve are manufactured with a diameter between Ø 5 mm to Ø 12 mm and a length of up to 250 mm. Size and position of fixing bores are adapted accordingly.
As standard one or two Pt100 measuring resistors are available in a 2-, 3- or 4-wire circuitry.

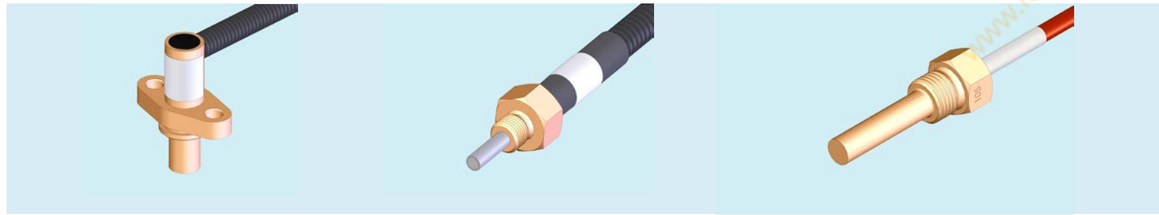
Rev. 20180102



straight sensor head | with 45° cable output | straight cable output | with countersunk screws | with O-ring

standard versions

special versions

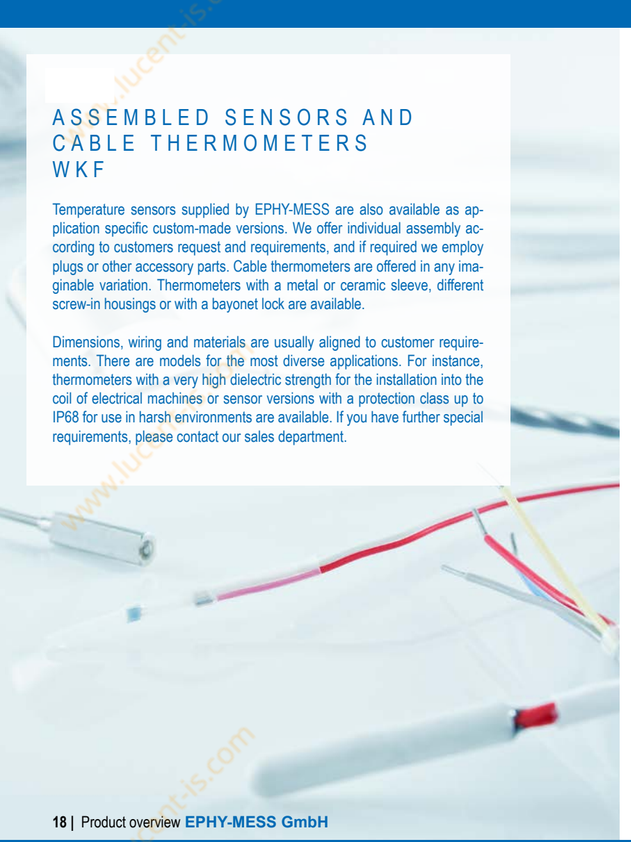


flange housing | Oil sump sensor | brass protection tube

ASSEMBLED SENSORS AND CABLE THERMOMETERS WKF

Temperature sensors supplied by EPHY-MESS are also available as application specific custom-made versions. We offer individual assembly according to customers request and requirements, and if required we employ plugs or other accessory parts. Cable thermometers are offered in any imaginable variation. Thermometers with a metal or ceramic sleeve, different screw-in housings or with a bayonet lock are available.

Dimensions, wiring and materials are usually aligned to customer requirements. There are models for the most diverse applications. For instance, thermometers with a very high dielectric strength for the installation into the coil of electrical machines or sensor versions with a protection class up to IP68 for use in harsh environments are available. If you have further special requirements, please contact our sales department.



available measuring elements: Pt100 / PTC / NTC / KTY / TE / BIS

Cable thermometer with shrinking tube XX / SH

- sensor with a permanently connected supply line, bare or shrinking tube insulation
- upon request also assembled with a plug
- measuring range from -60°C … +260°C
- measuring range Ex from -60°C ... +180°C
- connection as 2-, 3- or 4- wire circuit
- high-quality supply lines with Teflon® or silicone insulation, as single litzes, hose line or flat hose line
- supply line ends as bare or tin coated version, with cable end sleeve or
- assembled with a plug
- dielectric strength normally up to 4 kV / AC 50 Hz / 1 min.
- special versions with higher dielectric strength available

XX / SH

Certificates

Rev. 20180110

available measuring elements: Pt100 / PTC / NTC / KTY / TE

Cable thermometers in a metal sleeve XX / MH

- sensor with a permanently connected supply line, installed in diverse
- sleeve forms, e.g. in stepped sleeves, flattened sleeves with mounting hole or with bend protection
- measuring range from -60°C … +260°C, special versions up to 400°C
- measuring range Ex from -60°C ... +180°C
- sleeves made of brass, stainless steel or plastics
- sleeve diameter starting at ø 3 mm, sleeve length starting at 10 mm
- screened versions available
- IP protection class up to IP68 available
- with single litzes, hose line or screened wires
- as single or double thermometer
- connection as 2-, 3- or 4- wire circuit

XX / MH

Certificates

available measuring elements: Pt100 / PTC / NTC / KTY / TE

Cable thermometers in a ceramic sleeve XX / KH

- sensor with a permanently connected supply line encapsulated in a ceramic sleeve
- measuring range from -60°C … +400°C
- measuring range Ex from -60°C ... +180°C
- dimensions: ø 3 x 15 mm / ø 4.9 x 16 mm / ø 4.9 x 30 mm / ø 4 x 25 mm
- permanently connected single litzes or hose line with glass fibre
- dielectric strength normally up to 5 kV / AC 50 Hz / 1 min.
- special versions with higher dielectric strength available
- suitable not only for the installation into the coil of electrical machines

XX / KH

Certificates

available measuring elements: Pt100 / PTC / NTC / KTY / TE

available measuring elements: Pt100 / PTC / NTC / KTY / TE

Thermometers with a bayonet lock

- simple and fast installation / disassembly of the thermometer
- stageless adjustable bayonet lock
- contact pressure and pretension adjustable
- measuring range -55°C ... +220°C
- measuring range Ex -55°C ... +180°C
- metal sleeve with adjustable bayonet lock
- straight or angled versions
- different screw-in nipples are optionally available

Thermometers with screw-in housing SGH

- sensor built into various screw-in housing types, optionally with a permanently connected supply line or with a connection plug
- measuring range from -60°C ... +260°C
- temperature sensor head from -30°C ... +90°C
- screw-in housing made of brass, aluminium or stainless steel
- customer specific dimensions are possible

XX / SGH

Certificates

Certificates

Rev. 20180110

BIMETALLIC SWITCHES AND THERMOSTATS

Bimetallic switches or respectively bimetallic thermostats can be utilized if a switching operation should be triggered (open or close a circuit) when a predetermined temperature threshold is reached. They are an economical solution, because temperature measuring and switching operation can be handled by only one part. No additional electronics are therefore required.

available measuring elements: BIS

Bimetallic switches BIS

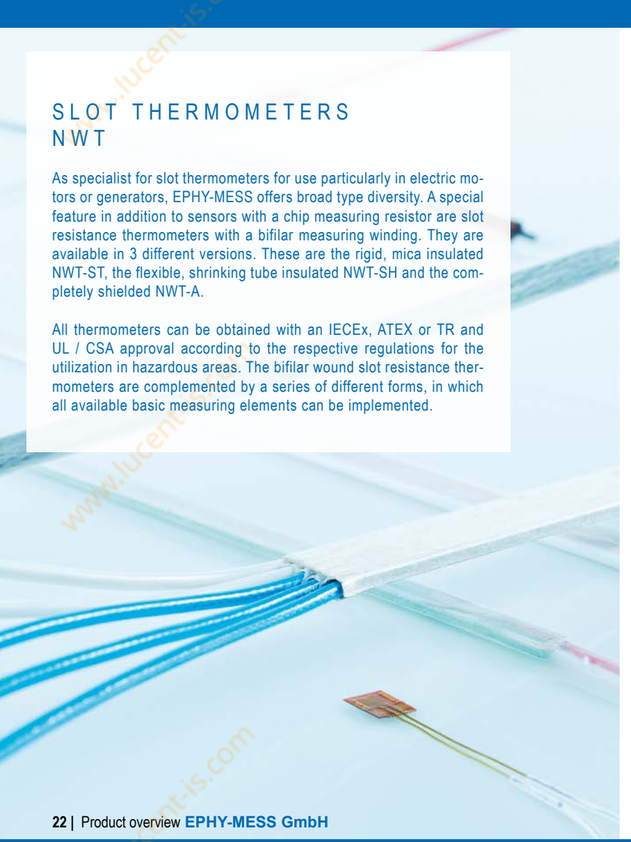
- in single, double or triple circuit
- normally closed or normally open
- nominal switching temperature (NST) of +60°C ... +200°C
- standard cable length: 300mm
- nominal / switching current up to 10 A / 25 A
- nominal voltage 250 V AC (acc. VDE)
- optionally with a screw-in housing (L0x)
- with UL / CSA version on request
- special versions on request
- especially suited for the installation into the coil of electric motors

Bimetallthermostate TBIS

- connection of the supply line through soldering pins, blade terminal or permanently connected supply line
- nominal switching temperature (NST) of -20°C ... +400°C
- normally closed or normally open
- switching tolerances and hysteresis depend on the nominal switching temperature
- maximum switching current up to 25 A
- installation via screw connector or flange

BIS Mylar cap

Certificates



SLOT THERMOMETERS NWT

As specialist for slot thermometers for use particularly in electric motors or generators, EPHY-MESS offers broad type diversity. A special feature in addition to sensors with a chip measuring resistor are slot resistance thermometers with a bifilar measuring winding. They are available in 3 different versions. These are the rigid, mica insulated NWT-ST, the flexible, shrinking tube insulated NWT-SH and the completely shielded NWT-A.

All thermometers can be obtained with an IECEx, ATEX or TR and UL / CSA approval according to the respective regulations for the utilization in hazardous areas. The bifilar wound slot resistance thermometers are complemented by a series of different forms, in which all available basic measuring elements can be implemented.

available measuring elements: Pt100 platinum wire, Cu wire, Ni wire

Slot thermometers with bifilar measuring winding

- temperature sensitive length selectable
- version as a rigid NWT-ST, flexible NWT-SH or shielded NWT-A slot resistance thermometer
- insulated with external mica or shrinking tube insulation
- bifilar measuring winding made of platinum, nickel or copper wire
- measuring range from -60°C ... +200°C
- measuring range Ex from -60°C ... +180°C
- tolerances according to the standard of the respective resistor material
- as single or double thermometer available
- connection as 2-, 3- or 4-wire circuit
- dimensions: thickness starting at 1 mm, width starting at 5 mm, length starting at 80 mm
- special dimensions are available on customer request
- ampacity of the schielding up to 50 A for NWT-A
- dielectric strength up to 3 kV / AC 50 Hz / 1 min.
- with single wires, hose line or flat hose line
- single wires and hose lines as shielded version available
- also available as slot thermocouple

NWT-Bifilar

Certificates

Rev. 20180110

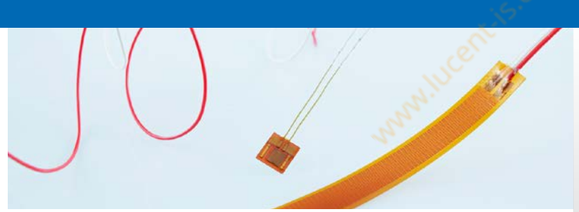
available measuring elements: Pt100 / PTC / NTC / KTY / TE

Slot thermometers with thin-film sensors

- model with carrier body (AK) made of silicone hard glass fibre
- model with intermediate slider case (ZS) made of epoxy
- model with a plastic case (KS) made of PESU
- dimensions aligned to the slot form
- different measuring elements can be implemented
- measuring range from -60°C ... +200°C
- measuring range Ex from -60°C ... +180°C
- connection as 2-, 3- or 4- wire circuit
- as multispot version with up to 4 measuring points
- dimensions: thickness starting at 2 mm, width starting at 6 mm, length starting at 50 mm
- special dimensions available on request
- dielectric strength up to 5 kV / AC 50 Hz / 1 min.
- with single litzes, hose line or flat hose line

NWT-Chip

Certificates



available measuring elements: Pt100 platinum wire, TE

Foil thermometers

- very thin, flexible foil thermometers as Pt100 or thermocouple
- measuring element embedded in Kapton® foil
- partially also with factory attached adhesive film (one-sided)
- dimensions for example:
  0.7 x 8 x 8 mm (D x B x L)
  2 x 10 x 102 mm (D x B x L)
- on request with a permanently connected supply line
- also available as thermocouple type J or K

NWT-Film

SCREW-IN THERMOMETERS LTH

Screw-in thermometers with DIN heads are commonly used for industrial purposes. They possess a fixed or a moveable screw connection and are mostly installed to cabinets, containers or pipes. They are available in various dimensions and forms. Thermometers of the EM12 / 18 / 24 / 38 series have a compact design and are often used as bearing thermometers (LT) in electric motors and drives.

available measuring elements: Pt100 / PTC / NTC / KTY / TE

Screw-in thermometers with EM12 / 18 / 24 / 38 head

- measuring resistor built into a stainless steel protective tube with a compact connection head made of brass or copper
- measuring range: -60°C ... +260°C
- measuring range Ex -60°C ... +180°C (only EM24 / 38)
- connection head diameter (diameter without lateral cable connection):
  - EM12 = ø 12 mm / LTH12 = ø 12 mm
  - EM18 = ø 18 mm / LTH18 = ø 18 mm
  - EM24 = ø 24 mm / LTH24 = ø 24 mm
  - EM38 = ø 38 mm / LTH38 = ø 38 mm
- optionally with head transmitter 4 - 20 mA
- as single or double thermometer
- connection as 2-, 3- or 4- wire circuit
- with screw connection

LT EM38-head

Certificates

Rev. 20180110

available measuring elements: Pt100 / PTC / NTC / KTY / TE

Screw-in thermometers with DIN head

- screw-in thermometer with DIN connection head
- with a fixed or exchangeable measuring insert
- measuring range -60°C ... +400°C
- measuring range Ex -60°C ... +180°C
- connection heads form MA, A, B, BUS, BUZ (others on request)
- processing connector with a fixed or flexible screw connection
- as single or double thermometer
- optionally with a connection head transmitter 4 - 20 mA / 0 - 10 V
- with screw connection

LT DIN-head

Certificates

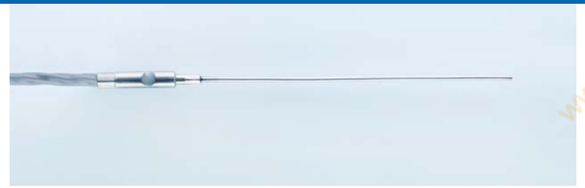
available measuring elements: Pt100 / PTC / NTC / KTY / TE

Thermometers with industrial plug

- temperature range from -60°C ... +260°C
- temperature sensor head from -30°C ... +90°C
- compact connection head (28 mm x 28 mm x 50 mm)
- quickly released without disconnecting the cable
- reverse polarity protection
- alternatively with spring-loaded protection fitting
- special version with 100 bar pressure resistance

SHEATHED RESISTANCE THERMOMETERS AND SHEATHED THERMOCOUPLES

Sheathed resistance sensors (Pt100) and thermocouples (TE) are well-suited for measuring high temperatures due to their configuration. They are generally designed moisture sealed and shock resistant. Depending on the diameter, they are quite bendable and flexible and can therefore be adapted very well to the respective installation location, especially in power plant technology.



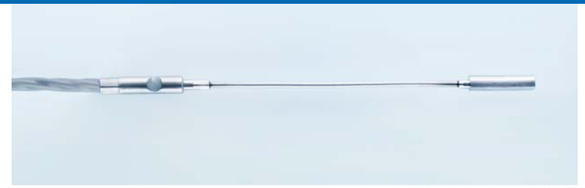
available measuring elements: Pt100 / TE

Sheathed resistance thermometer / -thermocouples

- with bare supply line ends
- with a cable transition sleeve and a permanently connected Teflon® or silicone supply line
- with a permanently connected plug
- as single or double element
- connection as 2-, 3- or 4- wire circuit
- diameter starting at ø 1 mm
- nominal length according to customer request
- measuring ranges:
  - a) thermometers Pt-based -60°C ... +400°C
  - b) thermocouples (sheathed material stainless steel) -200°C ... +850°C
  - c) thermocouples (sheathed material Inconel®600) -200°C ... +1100°C

Sheathed thermometers

Rev. 20180110



available measuring elements: Pt100 / TE

Sheathed resistance thermometers special design „Halbmondfühler“

- bendable, flexible mineral insulated wire (MI) or rigid as capillary tube version
- protection tube diameter from ø 1.8 mm
- pressure and vibration resistant
- corrosion resistant
- customized stainless steel moulding at sensor tip for special installation situations
- with bare supply line ends or with a permanently connected plug
- with a cable transition sleeve and a permanently connected supply line
- as single or double element
- connection as 2-, 3- or 4- wire circuit
- measuring ranges:
  - a) thermometers Pt-based (MI) -60°C ... +400°C
  - b) thermometer Pt-based (capillary tube) -40°C ... +180°C
  - c) thermocouples (sheathed material stainless steel) -200°C ... +850°C
  - d) thermocouples (sheathed material Inconel®600) -200°C ... +1100°C

available measuring elements: Pt100 / TE

Sheathed resistance thermometer special design „Flügelfühler“

- bendable, flexible mineral insulated wire (MI) or rigid pre-bent as capillary tube version
- protection tube diameter from ø 1.8 mm
- design with strip-wings or clamp ring
- optional spigot connection port
- optional coated with ceramic fibre leaves (upper and lower insulation part)
- with bare supply line ends or with a permanently connected plug
- with a cable transition sleeve and a permanently connected supply line
- as single or double element
- connection as 2-, 3- or 4- wire circuit
- measuring ranges:
  - a) thermometers Pt-based (MI) -60°C ... +400°C
  - b) thermometer Pt-based (capillary tube) -40°C ... +180°C
  - c) thermocouples (sheathed material stainless steel) -200°C ... +850°C
  - d) thermocouples (sheathed material Inconel®600) -200°C ... +1100°C