![NORIS AUTOMATION]

Robust Temperature Sensors
for Your Application

Contents

The right solution for your application

For 90 years, NORIS has been developing, producing and selling high-quality instrumentation products for use in the shipbuilding, transport technology, and machinery and equipment. Regarding sensors, the ability to take measurements under extreme conditions is at the heart of what we do. Thus, our sensors comply with the specifications required in the sectors, e. g.:

- DIN EN 50155 standard in the transport technology
- Ship classification BV, DNV, GL, LR

In transport technology, our temperature sensors are used to monitor e. g. bearing temperatures in the underfloor area as well as for engine and gearbox monitoring. In shipbuilding applications, our sensors are used to measure e. g. exhaust gas, oil, coolant and bearing temperatures.

One of our greatest strengths is customising our products. This brochure contains an extract of our standard designs, which can be easily modified on request to suit your specific applications. And if you need a special design, we are also the right partner for you. We would be pleased to assist you in selecting which physical measuring method and design are best suited to your requirements.

Standard designs
- Stick-in sensor for protective tube
- Stick-in sensor for clamp connection
- Screw-in sensor (with and without protective tube)
- Flange sensor and contact sensor

Measuring principles
- NTC thermistor
- Platinum measuring element Pt100/Pt1000
- Thermocouple (thermocouples)

Optional cable protection
Our sensors come with different types of protective cable tubing to suit the required protection class or protection stipulations.
- Polyamide protective tubing for standard applications
- Special protective tubing for increased or extreme demands

Robust sensor combinations
Robust sensor combinations are suitable for applications with several measuring points. The construction protect the sensors under extreme conditions against severe heat, cold, dust, humidity, stone and ice fall. We assemble sensor combinations to suit your specific requirements. Several sensors (temperature/speed/acceleration), a plug connector of your choice and a protective tubing, if necessary, are combined to create a robust sensor assembly.
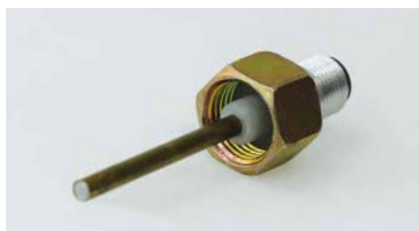
Shipbuilding Industry

Transport Technology

Machinery and Equipment

Commercial Vehicles

Stick-in sensor for protective tube

Type	Description	Measuring range	Page
TP10	**Measuring element:** Pt100/Pt1000 **Material:** Brass sensor tube **Connection:** DIN EN 175301-803, Female plug	-25 ... 120 °C	08
TP11	**Measuring element:** Pt100/Pt1000 **Material:** Brass sensor tube **Connection:** Euro M12x1 **Approvals:** DNV, GL	-25 ... 120 °C	09
TP23	**Measuring element:** Pt100 **Material:** Brass sensor tube **Connection:** Fixed connection cable **Approvals:** DNV	0 ... 200 °C	10
T.3.	**Measuring element:** Pt100/Pt1000, NTC thermistor **Material:** Stainless steel sensor tube **Connection:** Tab connector, fixed connection cable **Approvals:** BV, DNV, GL	0 ...120 °C	11
T.4.-1.	**Measuring element:** Pt100, Thermocouple **Material:** Stainless steel sensor tube **Connection:** Fixed connection cable **Approvals:** DNV, GL, LR	**Pt100:** 0 ... 600 °C **Thermocouple:** 0 ... 800 °C	12
T.4.-3.	**Measuring element:** Pt100/Pt1000, Thermocouple, NTC thermistor **Material:** Stainless steel sensor tube **Connection:** Terminal head form B, cable entry **Approvals:** BV, DNV, GL, LR	**Pt100/Pt1000:** 0 ... 600 °C **Thermocouple:** 0 ... 800 °C **NTC thermistor:** 0 ... 200 °C	13
T.4.-5.	**Measuring element:** Thermocouple **Material:** Stainless steel sensor tube **Connection:** Fixed connection cable **Approvals:** BV, DNV, GL, LR	0 ... 800 °C	14

Stick-in sensor for clamp connection

Type	Description	Measuring range	Page
T.4.-0	**Measuring element:** Thermocouple **Material:** Stainless steel **Connection:** Fixed connection cable **Approvals:** GL, LR	0 ... 800 °C	15
T.4.-2.	**Measuring element:** Pt100/Pt1000, Thermocouple, NTC thermistor **Material:** Stainless steel sensor tube **Connection:** Terminal head form B, cable entry **Approvals:** BV, DNV, GL, LR	**Pt100/Pt1000:** 0 ... 600 °C **Thermocouple:** 0 ... 800 °C **NTC thermistor:** 0 ... 200 °C	16
T.4.-4.	**Measuring element:** Thermocouple **Material:** Stainless steel sensor tube **Connection:** Fixed connection cable **Approvals:** GL	0 ... 800 °C	17

Stick-in sensor with integrated measuring amplifier

Type	Description	Measuring range	Page
TAV131	**Measuring element:** Pt100 **Material:** Stainless steel sensor tube **Connection:** Euro M12x1 male connector **Output signals:** 0 ... 20 mA, 4 ... 20 mA, 0 ... 10 VDC, 2 ... 10 VDC	**Pt100:** -30 ... 200 °C	18
T.4.-2.	**Measuring element:** Thermocouple, Pt100/Pt1000, NTC thermistor **Material:** Stainless steel sensor tube **Connection:** Terminal head form B, cable entry **Output signal:** 4 ... 20 mA **Approvals:** BV, DNV, GL, LR	**Pt100:** 0 ... 200 °C **Thermocouple:** 0 ... 800 °C	13
T.4.-3.	**Measuring element:** Thermocouple, Pt100/Pt1000, NTC thermistor **Material:** Stainless steel sensor tube **Connection:** Terminal head form B, cable entry **Output signal:** 4 ... 20 mA **Approvals:** BV, DNV, GL, LR	**Pt100:** 0 ... 200 °C **Thermocouple:** 0 ... 800 °C	16

Screw-in sensor

Type	Description	Measuring range	Page
MF20	**Measuring element:** Pt100 **Material:** Stainless steel sensor tube **Connection:** Fixed connection cable **Approvals:** BV, DNV, GL, LR	-25 ... 120 °C	19
T.61-12	**Measuring element:** Pt100, NTC thermistor **Material:** Copper sensor tube **Connection:** Fixed connection cable	0 ... 120 °C	21
T.61-28	**Measuring element:** Pt100, NTC thermistor **Material:** Copper sensor tube **Connection:** Fixed connection cable	0 ... 120 °C	22
TA..8	**Measuring element:** Pt100/Pt1000 **Material:** Stainless steel/brass sensor tube **Connection:** Fixed connection cable/cannon plug	-40 ... 180 °C	23
TP8 TPT8	**Measuring element:** Pt100/Pt1000 **Material:** Brass sensor tube **Connection:** Euro M12x1 **Approvals:** DNV, GL, LR	-25 ... 120 °C	24

Flange sensor and contact sensor

Type	Description	Measuring range	Page
MF22	**Measuring element:** Pt100, NTC thermistor **Material:** Aluminium flange housing **Connection:** Fixed connection cable **Mounting:** Flange mounting	0 ... 120 °C	25
TA.14	**Measuring element:** Pt100/Pt1000 **Material:** Stainless steel sensor tube **Connection:** Fixed connection cable **Mounting:** Flange mounting	-40 ... 250 °C	26
TA.17	**Measuring element:** Pt100/Pt1000 **Material:** Stainless steel sensor tube **Connection:** Fixed connection cable **Mounting:** Flange mounting	-40 ... 250 °C	27

Stick-in sensor for protective tube, type TP10

Type TP10 temperature sensors are brass stick-in sensors with a Pt100/Pt1000 measuring element. They have a 90° cable outlet at the side with a female plug and are clamped in place in protective tubes using a nut.

Technical data (extract)	
Measuring element	Pt100/Pt1000
Measuring range	-25 ... 120 °C
Protection class	IP67, in connection with protective tube on measuring point IP68
Material	Sensor tube: Brass Protective tube: Stainless steel
Connection	Female plug DIN EN 175301-803 (replaces DIN 43650 A)
Immersion depth	56 mm; Other lengths available on request

Dimensions of sensor and protective tube

Temperature sensor TP10
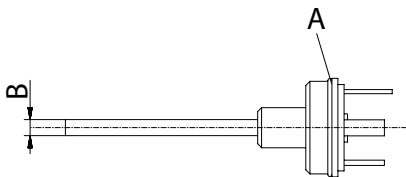
Dr.no. 60.271.1

Item	Description
A	Seal
B	Ø 4 mm

Protective tube MX33
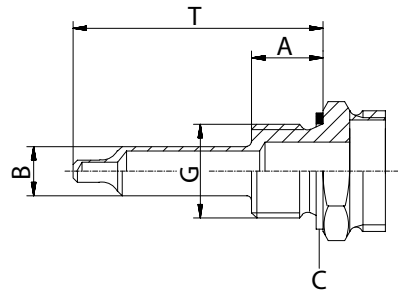
Dr.no. 60.271.1

Item	Description
A	16 mm
B	Ø 11 mm
C	Copper seal
G	G1/2"; Other threads available on request
T	Immersion depth 56 mm; Other lengths available on request

Connection variants

Female plug DIN 43650 A
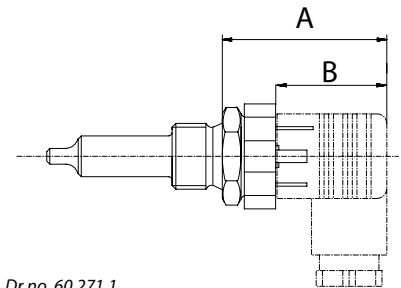
Dr.no. 60.271.1
Not included in scope of delivery

Item	Description
A	Approx. 53 mm
B	Approx. 35 mm

Stick-in sensor for protective tube, type TP11

Type TP11 temperature sensors are brass stick-in sensors with a Pt100 or Pt1000 measuring element. The sensors are also available with two Pt100 or two Pt1000 measuring elements with 2-wire technology. They have a straight or side 90° cable outlet depending on the female plug version, Euro M12x1. They are screwed into place in protective tubes.

Technical data (extract)	
Measuring element	Pt100/Pt1000
Measuring range	-25 ... 120 °C
Protection class	IP67, in connection with protective tube on measuring point IP68
Material	Sensor tube: Brass Protective tube: Brass
Connection	Euro M12x1
Immersion depth	30 mm; Other lengths available on request
Accuracy	Pt100: Class B (±0.12 Ω / ±0.3 °C @ 0 °C) Pt1000: Class B (±0.20 Ω / ±0.3 °C @ 0 °C)
Approvals	DNV, GL

Dimensions of sensor and protective tube

Temperature sensor TP11

Dr.no. 60.272.2

Item	Description
A	WAF19
B	Thermal paste
C	Ø 4 mm
D	Aluminium probe tip
E	Brass sensor tube

Protective tube MX34-M14

Dr.no. 60.272.2

Item	Description
A	13 mm
B	WAF24
C	Ø 5.5 mm
D	Screw-in plug, DIN 3852 Form A
E	Copper seal, DIN 7603 Form A
F	Material: Brass
G	M14x1.5; Other threads available on request
T	Immersion depth 30 mm; Other lengths available on request

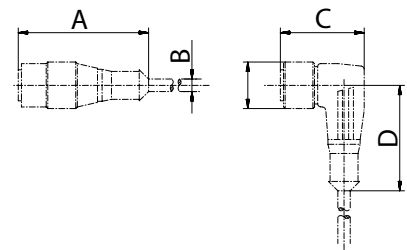### Connection variants

Female plug Euro M12x1

Dr.no. 60.272.2
Not included in scope of delivery (accessory set ZL4-2)

Item	Description
A	42 mm
B	Ø 6^{+1} mm
C	27 mm
D	31 mm

Sensor and protective tube
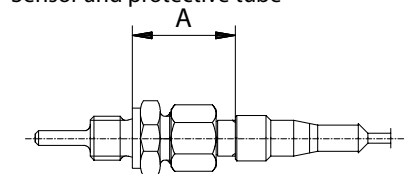
Dr.no. 60.272.2

Item	Description
A	35 mm

Stick-in sensor for protective tube, type TP23

Type TP23 temperature sensors are brass stick-in sensors with a Pt100 measuring element. They have a straight cable outlet with a fixed connection cable. They are clamped in place in protective tubes using a pressure screw.
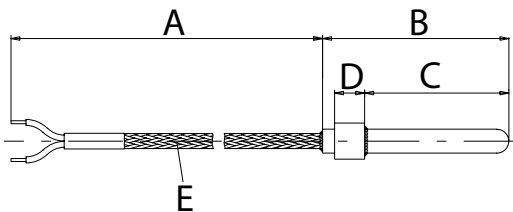
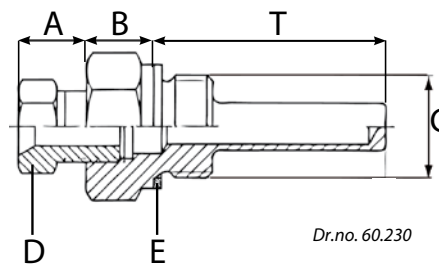| Technical data (extract)	
Measuring element	Pt100
Measuring range	0 ... 200 °C
Protection class	IP68
Material	Sensor tube: Brass Housing: Brass
Connection	Teflon cable with steel wire braid
Immersion depth	55 mm; Other lengths available on request
Accuracy	DIN EN 60571: Class B Other accuracy classes available on request
Approvals	DNV

Dimensions of sensor and protective tube

Temperature sensor TP23

Dr.no. 60.230

Item	Description
A	2.3 m (standard), 5 m, 6 m, 7.5 m, 8 m Other lengths available on request
B	62 mm
C	48 mm
D	10 mm
E	Teflon cable with steel wire braid, 2 x 0.75^2

Protective tube MX1 or MX6

Dr.no. 60.230

MX1: Brass
MX6: Stainless steel

Pipe thread acc. ISO 228/1-G1/2A, tolerance class A
Metric thread acc. DIN 13 T5, 6 and 7

Item	Description
A	16 mm
B	15 mm
C	R1/2", M18x1.5, M20x1.5
D	Screw connection
E	Seal
T	Immersion depth 55 mm; Other lengths available on request

Stick-in sensor for protective tube, type TP31, TH31, TH32

Type TP31 temperature sensors are stick-in sensors with a Pt100 measuring element, type TH31 or TH32 temperature sensors are NTC thermistors. They have a cable outlet at the side and are attached to protective tubes.
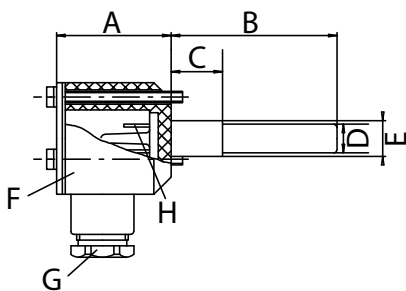
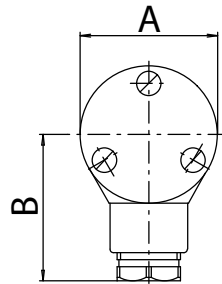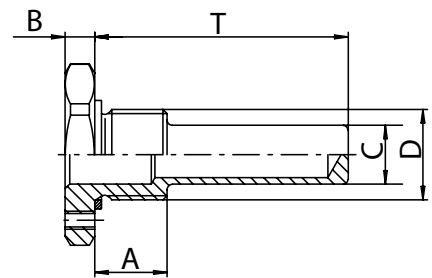| Technical data (extract)	
Measuring element	Type TP31: Pt100, type TH31/TH32: NTC thermistor
Measuring range	Pt100: 0 ...120 °C NTC thermistor: 0 ... 120 °C
Protection class	IP54, in connection with protective tube on measuring point IP68
Material	Stainless steel sensor tube; Plastic housing
Connection	Tab connector A6.3 x 0.8 DIN 46244
Immersion depth	56 mm, 100 mm; Other lengths available on request
Approvals	BV, DNV, GL

Dimensions of sensor and protective tube

Temperature sensor TP31, TH31, TH32

Dr.no. 60.206

Item	Description
A	40 mm
B	58 mm or 102 mm
C	18 mm
D	Ø 10 mm
E	Ø 12.5 mm
F	Sensor head
G	Cable entry (not included in scope of delivery): Pg11 DIN 462 (Art. no. 243013) M18x1.5 DIN 89280 (Art. no. 243014)
H	Tab connector, A6.3 x 0.8 DIN 46244

Item	Description
A	Ø 39 mm
B	55 mm

Protective tube MX2 or MX5

Dr.no. 60.206

Item	Description
A	16 mm
B	6.5 mm
C	Ø 13 mm
D	Stainless steel protective tube: M14x1.5 Brass protective tube: M18x1.5, M20x1.5, M22x1.5, G1/2 Other threads available on request
T	Immersion depth 56 mm, 100 mm Other lengths available on request

Stick-in sensor for protective tube, type T.4.-1.

Type TP4.-1. temperature sensors are stainless steel stick-in sensors with a Pt100 measuring element. Type TH4.-1. sensors have a thermocouple. The sensors are also available with two Pt100 or two thermal measuring elements with 2-wire technology. They have a 90° cable outlet at the side with a fixed cable end. These are inserted into a protective tube and secured with a clamp connection.

| Technical data (extract)	
Measuring element	Pt100, thermocouple type J (Fe-CuNi) or type K (NiCr-Ni)
Measuring range	Pt100: 0 ... 600 °C Thermocouple: 0 ... 800 °C
Protection class	IP65, in connection with protective tube on measuring point IP68
Material	Sensor tube: Stainless steel Protective tube: Stainless steel
Connection	Fixed connection cable (standard length 1.5 m) Other lengths available on request
Immersion depth	100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request
Accuracy	Class 1
Approvals	DNV, GL, LR

Shipbuilding approvals are only valid for versions with a thermo-couple and for immersion depths of 50 mm, 100 mm or 150 mm
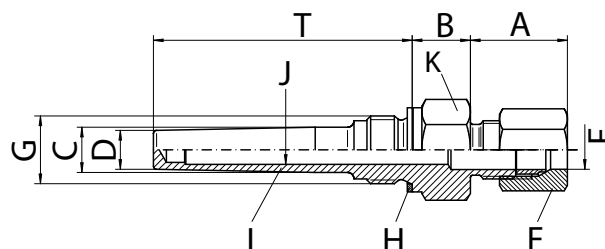
Dimensions of sensor and protective tube

Temperature sensor T.4.-1.
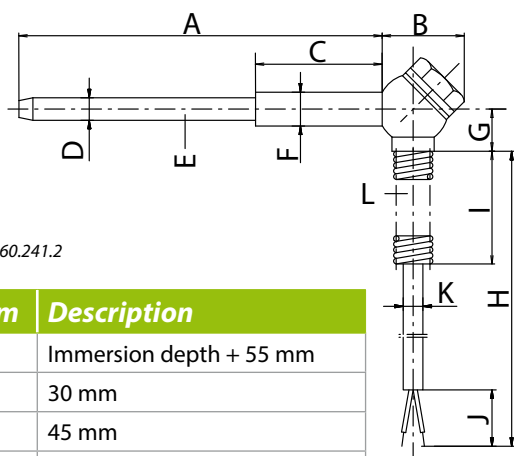
Dr.no. 60.241.2

Item	Description
A	Immersion depth + 55 mm
B	30 mm
C	45 mm
D	Ø 8 mm
E	Sensor tube acc. DIN 2462 Material: Stainless steel type 1.4541
F	Ø 12 mm
G	11 mm
H	Standard 1.5 m; Other lengths available on request
I	90 mm
J	$90^{\pm 10}$ mm
K	Pt100: Ø 8 mm Thermocouple: Ø 7 mm
L	Steel wire bend protection

Protective tube MX8

Dr.no. 60.242.011

Item	Description
A	30 mm
B	18 mm
C	Ø 14 mm
D	Ø 12 mm
E	Ø 12 mm
F	Clamp connection Ø 12 mm/WAF 22
G	M20x1.5, M22x1.5, M24x1.5, M27x2, M33x2; G1/2NPT, G3/4NPT, G1/2, G3/4
H	Copper seal (DIN 7603 Form A)
I	DIN 2462 pipe Material: Stainless steel type 1.4541 (DIN 17440)
J	Ø 9 mm
K	Width across flats depending on thread position G
T	Immersion depth 100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request

Stick-in sensor for protective tube, type T.4.-3.

Type T.4.-3 temperature sensors are stainless steel stick-in sensors for protective tubes and are available with a Pt100/Pt1000 measuring element or thermocouple or as an NTC thermistor. The sensors are also available with two Pt100 or two thermal measuring elements with 2-wire technology, and the Pt100 measuring element is also available with 4-wire technology. They have a 90° cable outlet at the side and are attached to protective tubes. The sensors can also be supplied with an integrated measuring amplifier on request.

Technical data (extract)

Measuring element	Pt100, Pt1000 (in 2-wire/4-wire technology), NTC thermistor, thermocouple type J (Fe-CuNi) or type K (NiCr-Ni)
Measuring range	Pt100/Pt1000: 0 ... 600 °C Thermocouple: 0 ... 800 °C NTC thermistor: 0 ... 200 °C
Protection class	IP54 at sensor head
Material	Stainless steel sensor tube, stainless steel protective tube
Connection	Terminal head form B, cable entry with screw connection
Immersion depth	100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request
Accuracy	Class 1
Approvals	BV, DNV, GL, LR

Additional technical data for versions with a measuring amplifier

|	
Auxiliary voltage	7.2 ... 35 VDC
Output signals	4 ... 20 mA (in 2-wire technology only)
Measuring ranges	Pt100: 0 ... 200 °C Thermocouple: 0 ... 800 °C
Ambient temperature	Max. 85 °C on sensor head
Other	Galvanic isolation

Shipbuilding approvals are only valid for versions with a thermocouple and for immersion depths of 50 mm, 100 mm or 150 mm with protective tube MX8
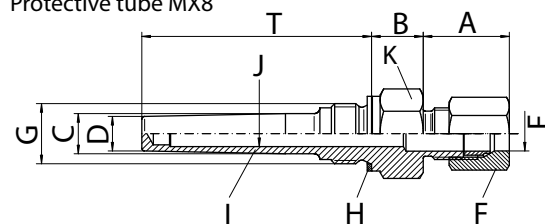
Dimensions of sensor and protective tube

Temperature sensor T.4.-3.
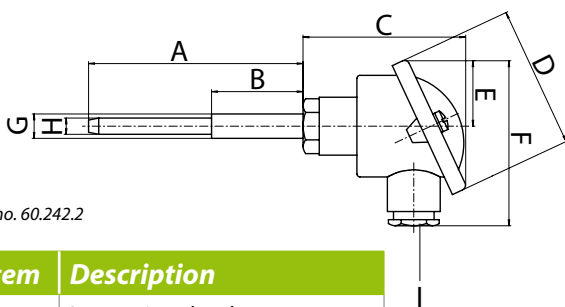
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Item	Description
A	Immersion depth + 55 mm
B	45 mm
C	86 mm
D	Ø 70 mm
E	30 mm
F	85 mm
G	Ø 12 mm
H	Ø 8 mm
I	M20x1.5

Protective tube MX8

Dr.no. 60.242.011

Item	Description
A	30 mm
B	18 mm
C	Ø 14 mm
D	Ø 12 mm
E	Ø 12 mm
F	Clamp connection Ø 12 mm / WAF 22
G	M20x1.5, M22x1.5, M24x1.5, M27x2, M33x2, G1/2NPT, G3/4NPT, G1/2, G3/4
H	Copper seal (DIN 7603 Form A)
I	DIN 2462 pipe; Material: Stainless steel type 1.4541
J	Ø 9 mm
K	Width across flats depending on thread position G
T	Immersion depth 100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request

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Stick-in sensor for protective tube, type T.4.-5.

Type T.4.-5 temperature sensors are stainless steel stick-in sensors with a thermocouple.

They have a straight cable outlet and are attached to a protective tube.

Technical data (extract)	
Measuring element	Thermocouple type J (Fe-CuNi) or type K (NiCr-Ni)
Measuring range	0 ... 800 °C
Protection class	IP65; in connection with protective tube on measuring point, IP68
Material	Stainless steel sensor tube Stainless steel protective tube
Connection	Fixed connection cable (standard length 1.5 m) Other lengths available on request
Immersion depth	100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request
Accuracy	Class 1
Approvals	BV, DNV, GL, LR

Shipbuilding approvals are only valid for versions with immersion depths of 50 mm, 100 mm or 150 mm and with protective tube MX8
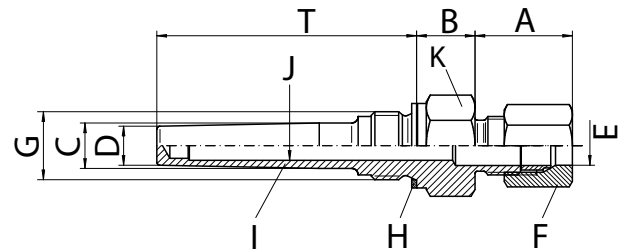
Dimensions of sensor and protective tube

Temperature sensor T.4.-5.
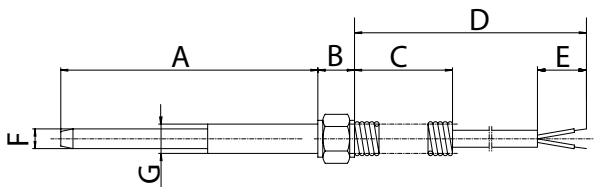
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Item	Description
A	Immersion depth + 55 mm
B	15 mm
C	90 mm
D	Standard 1.5 m; Other lengths available on request
E	20 mm
F	Ø 8 mm
G	Ø 12 mm

Protective tube MX8

Dr.no. 60.242.011

Item	Description
A	30 mm
B	18 mm
C	Ø 14 mm
D	Ø 12 mm
E	Ø 12 mm
F	Clamp connection Ø 12 mm / WAF 22
G	M20x1.5, M22x1.5, M24x1.5, M27x2, M33x2, G1/2NPT, G3/4NPT, G1/2, G3/4
H	Copper seal (DIN 7603 Form A)
I	DIN 2462 pipe Material: Stainless steel type 1.4541 (DIN 17440)
J	Ø 9 mm
K	Width across flats depending on thread position G
T	Immersion depth 100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request

Stick-in sensor for clamp connection, type T.4.-0

Type T.4.-0 temperature sensors are stainless steel stick-in sensors with a thermocouple. The sensors are also available with two thermal measuring elements with 2-wire technology. They have a 90° cable outlet at the side with a fixed connection cable. They are attached with a clamp connection.

Technical data (extract)	
Measuring element	Thermocouple type J (Fe-CuNi) or type K (NiCr-Ni)
Measuring range	0 ... 800 °C
Material	Stainless steel sensor tube Stainless steel clamp connection
Connection	Fixed connection cable (standard length 1.5 m) Other lengths available on request
Immersion depth	100 mm, 150 mm, 200 mm, 250 mm Other lengths available on request
Accuracy	Class 1
Approvals	GL, LR

Germanischer Lloyd

Lloyd's Register TYPE APPROVED

Dimensions of sensor and clamp connection

Temperature sensor T.4.-0
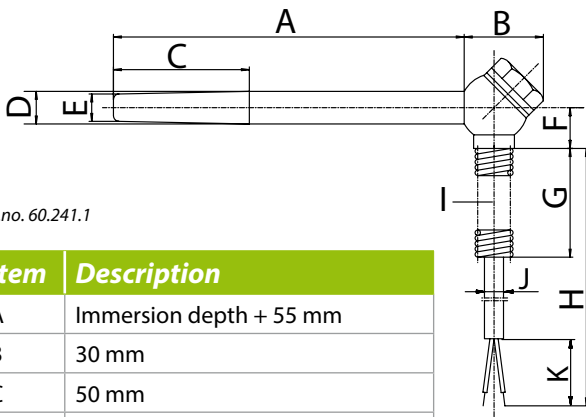
Dr.no. 60.241.1

Item	Description
A	Immersion depth + 55 mm
B	30 mm
C	50 mm
D	Ø 12 mm
E	Ø 10 mm
F	11 mm
G	90 mm
H	Standard 1.5 m; Other lengths available on request
I	Steel wire bend protection
J	Pt100: Ø 8 mm Thermocouple: Ø 7 mm
K	90$^{\pm 10}$ mm

Clamp connection VS37-...
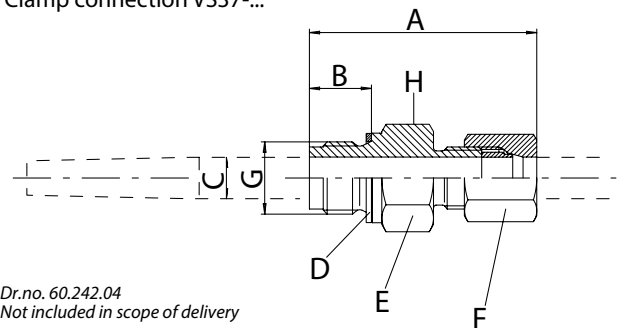
Dr.no. 60.242.04
Not included in scope of delivery

Item	Description
A	66 mm
B	18 mm
C	Ø 12 mm
D	Seal
E	Width across flats WAF24, WAF27, WAF32
F	Clamping nut WAF22
G	G3/8, G1/2, G3/4, M18x1.5, M20x1.5
H	Material: Stainless steel

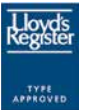## Stick-in sensor for clamp connection, type T.4.-2.

Type T.4.-2 temperature sensors are stainless steel stick-in sensors and are available with a Pt100/Pt1000 measuring element or thermocouple or as an NTC thermistor. The sensors are also available with two Pt100 or two thermal measuring elements with 2-wire technology, and the Pt100 measuring element is also available with 4-wire technology. They have a 90° cable outlet at the side and are attached with a clamp connection. The sensors can also be supplied with an integrated measuring amplifier on request.

| Technical data (extract)	
Measuring element	Pt10/Pt1000 (in 2-wire/4-wire technology), NTC thermistor, Thermocouple type J (Fe-CuNi) or type K (NiCr-Ni)
Measuring range	Pt100/Pt1000: 0 ... 600 °C Thermocouple:0 ... 800 °C NTC thermistor: 0 ... 200 °C
Protection class	IP54 at sensor head
Material	Stainless steel sensor tube Stainless steel clamp connection
Connection	Terminal head form B, cable entry with screw connection
Immersion depth	100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request
Accuracy	Class 1
Approvals	BV, DNV, GL, LR

| Additional technical data for versions with a measuring amplifier	
Auxiliary voltage	10 ... 36 VDC
Output signals	4 ... 20 mA (in 2-wire technology only)
Measuring ranges	Pt100: 0 ... 200 °C; Thermocouple: 0 ... 800 °C
Ambient temperature	Max. 85 °C on sensor head
Other	Galvanic isolation

Dimensions of sensor and clamp connection

Temperature sensor T.4.-2.

Dr.no. 60.242.1

Clamp connection VS37-...

Dr.no. 60.242.04
Not included in scope of delivery
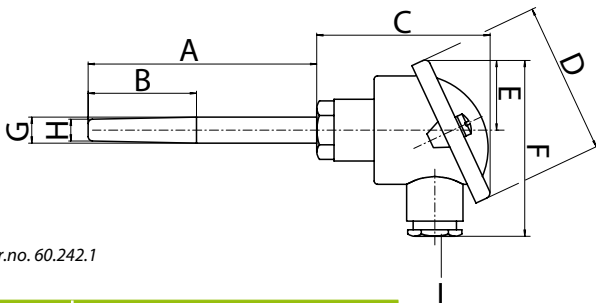
Item	Description
A	Immersion depth + 55 mm
B	50 mm
C	86 mm
D	Ø 70 mm
E	30 mm
F	85 mm
G	Ø 12 mm
H	Ø 8 mm
I	M20x1.5
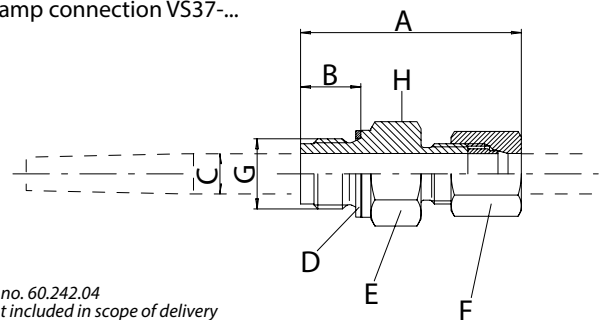
Item	Description
A	66 mm
B	18 mm
C	Ø 12 mm
D	Seal
E	Width across flats WAF24, WAF27, WAF32
F	Clamping nut WAF22
G	G3/8, G1/2, G3/4, M18x1.5, M20x1.5
H	Material: Stainless steel

Stick-in sensor for clamp connection, type T.4.-4.

Type T.4.-4 temperature sensors are stainless steel stick-in sensors with a thermocouple. They have a fixed connection cable with a straight cable outlet and are attached with a clamp connection. The clamp connection is available in different versions (width across flats and threads).

Technical data (extract)

|	
Measuring element	Thermocouple type J (Fe-CuNi) or type K (NiCr-Ni)
Measuring range	0 ... 800 °C
Material	Stainless steel sensor tube Stainless steel clamp connection
Connection	Fixed connection cable (standard length 1.5 m); Other lengths available on request
Immersion depth	100 mm, 150 mm, 200 mm, 250 mm; Other lengths available on request
Accuracy	Class 1
Approvals	GL

Shipbuilding approvals are only valid for versions with clamp connection VS37-R12, VS37-R34, VS37-M18

Germanischer Lloyd

Dimensions of sensor and clamp connection

Temperature sensor T.4.-4.
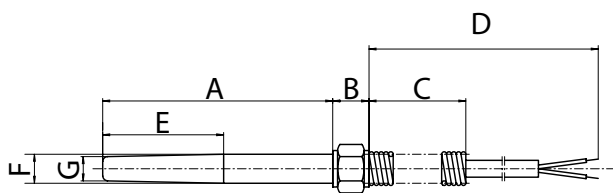
Dr.no. 60.241.4

Item	Description
A	Immersion depth + 50 mm
B	15 mm
C	90 mm
D	Standard 1.5 m; Other lengths available on request
E	50 mm
F	Ø 12 mm
G	Ø 10 mm

Clamp connection VS37-...
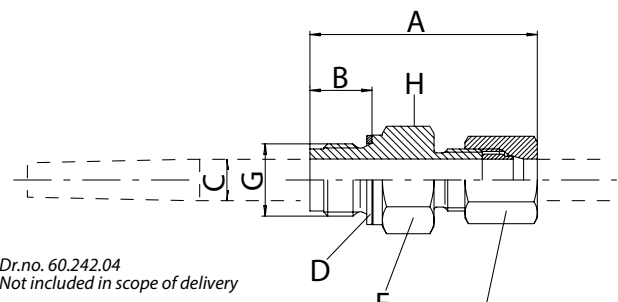
Dr.no. 60.242.04
Not included in scope of delivery

Item	Description
A	66 mm
B	18 mm
C	Ø 12 mm
D	Seal
E	Width across flats WAF24, WAF27, WAF32
F	Clamping nut WAF22
G	G3/8, G1/2, G3/4, M18x1.5, M20x1.5
H	Material: Stainless steel

Stick-in sensor with integrated measuring amplifier, type TAV131
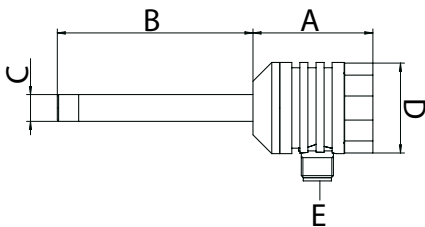
Type TAV131 temperature sensors are stick-in sensors with a stainless steel sensor tube (and nickel-plated probe tip) with a Pt100 measuring element with 2-wire or 3-wire technology. They are attached to a protective tube. Depending on the Euro M12x1 connector, they have a straight or side 90° cable outlet or, alternatively, a fixed connection cable. Depending on the measuring element design, the integrated measuring amplifier delivers output signals 4 ... 20 mA, 0 ... 20 mA, 0 ... 10 VDC or 2 ... 10 VDC.

| Technical data (extract)	
Measuring element	Pt100 (in 2-wire/3-wire technology)
Measuring range	-30 ... 200 °C
Output signals	2-wire: 4 ... 20 mA 3-wire: 4 ... 20 mA / 0 ... 20 mA / 0 ... 10 VDC / 2 ... 10 VDC
Protection class	IP68
Auxiliary voltage	2-wire: 8 ... 24 VDC, 3-wire: 12 ... 29 VDC
Material	Sensor tube: Stainless steel type 1.4301 Probe tip: Nickel-plated brass Housing: Anodized aluminium
Connection	Euro M12x1 male connector or fixed cable end (standard length 2 m)
Immersion depth	56 mm, 100 mm; Other lengths available on request
Accuracy	IEC 51-1: Class 0.5

Dimensions of sensor and protective tube

Temperature sensor TAV131

Dr.no. 60.131.141.001.1

Protective tube RS2...

Dr.no. 60.012.000.001.1

Connection variants

Female plug Euro M12x1

Not included in scope of delivery (accessory set ZL4-2)

Item	Description
A	45$^{\pm 2\,mm}$
B	Immersion depth + 15 mm
C	Ø 10 mm
D	Ø 34$^{+1\,mm}$
E	Euro M12x1 male connector
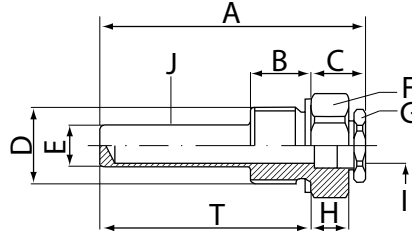
Item	Description
A	71 mm, 115 mm
B	16 mm
C	15$^{\pm 1}$ mm
D	Thread versions see drawing
E	Ø 12 mm
F	Width across flats WAF27
G	Width across flats WAF19
H	10 mm
I	Ø 10 mm
J	Material: Brass or stainless steel
T	Immersion depth 56 mm, 100 mm
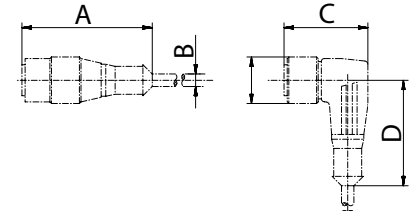
Item	Description
A	42 mm
B	Ø 6^{+1} mm
C	27 mm
D	31 mm

The item numbers for the straight or angled plug versions can be found in the following table:

Length	Item no. straight	Item no. angled
2.0 m	522101	522105
5.0 m	522102	522106
7.5 m	522108	522110
10.0 m	522109	522111

Screw-in sensor, type MF20

Type MF20 temperature sensors are screw-in sensors for measuring the bearing temperature with a Pt100 measuring element or NTC thermistor. Sensors with platinum measuring elements are also available with two or three integrated measuring elements. The sensors have a straight cable outlet.

Technical data (extract)

|	
Measuring element	Pt100
Measuring range	-25 ... 120 °C
Protection class	IP65 (open cable ends, IP00)
Material	Sensor tube: Stainless steel
Connection	Fixed connection cable
Immersion depth	See drawing below or table on page 21
Accuracy	Class B (±0.12 Ω / ±0.3 °C @ 0 °C)
Approvals	BV, DNV, GL, LR
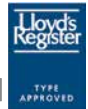
Sensor dimensions

Version A: MF20 temperature sensor including levelling piece and clamp connection
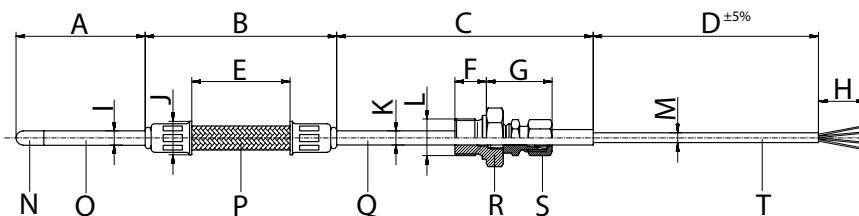
Dr. no. 60.232

Version B: MF20 temperature sensor excluding levelling piece but including clamp connection
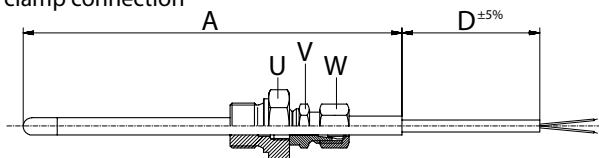
Dr. no. 60.232

Version C: MF20 temperature sensor excluding levelling piece and clamp connection

Dr. no. 60.232

Item	Description
A	See table on page 21
B	See table on page 21
C	See table on page 21
D	See table on page 21
E	B - 40 mm
F	14 mm
G	Approx. 38 mm
H	$80^{\pm10}$ mm
I	Ø 8 mm
J	Ø 13 mm
K	Ø 8 mm
L	G1/2
M	Ø $4^{\pm1}$ mm
N	Measuring tip
O	Material: Stainless steel 1.4301
P	Compensation piece steel wire reinforced
Q	Material: Stainless steel 1.4301
R	Screwed socket
S	Clamp connection
T	Teflon cable 0.38 mm² shielded
U	WAF27
V	WAF19
W	WAF17

Variants and dimensions of type MF20 temperature sensors:

Type	Variant	Measuring element	Pos. A in mm	Pos. B in mm	Pos. C in mm	Pos. D in mm
MF20-1-1	A	1xPt100	50	80	110	4000
MF20-2-2	A	2xPt100	100	80	120	4000
MF20-1-3	A	1xPt100	150	80	430	4000
MF20-2-4	A	2xPt100	80	80	80	4000
MF20-1-5	A	1xPt100	120	80	380	4000
MF20-1-6	A	1xPt100	40	80	80	4000
MF20-1-7	A	1xPt100	100	80	120	4000
MF20-1-8	A	1xPt100	70	80	400	4000
MF20-1-9	A	2xPt100	60	80	80	4000
MF20-1-10	A	1xPt100	30	60	70	4000
MF20-2-10	A	2xPt100	30	60	70	4000
MF20-1-11	B	1xPt100	105	-	-	4000
MF20-1-12	C	1xPt100	50	-	-	4000
MF20-1-13	A	1xPt100	60	60	80	4000
MF20-1-14	A	1xPt100	110	80	750	4000
MF20-1-15	A	1xPt100	70	80	340	4000
MF20-1-16	A	1xPt100	70	80	120	4000
MF20-1-17	A	1xPt100	150	80	550	4000
MF20-2-17	A	1xPt100	150	80	550	4000
MF20-1-18	A	1xPt100	80	80	340	4000
MF20-1-19	A	1xPt100	50	80	80	4000
MF20-2-20	A	2xPt100	60	60	80	4000
MF20-1-21	A	1xPt100	180	80	550	4000
MF20-2-22	A	2xPt100	40	80	80	7000
MF20-2-23	A	2xPt100	100	80	120	7000
MF20-3-23	A	3xPt100	100	80	120	7000
MF20-2-24	A	2xPt100	80	80	80	7000
MF20-3-24	A	3xPt100	80	80	80	7000
MF20-1H-25	A	NTC thermistor	40	80	100	4000
MF20-1H-26	A	NTC thermistor	40	80	150	4000
MF20-2-27	A	2xPt100	50	80	110	4000
MF20-2-28	A	2xPt100	80	80	250	4000
MF20-2-29	A	2xPt100	100	80	320	4000
MF20-3-29	A	3xPt100	100	80	320	4000
MF20-3-30	A	3xPt100	100	80	160	4000
MF20-2-31	B	2xPt100	135	-	-	4000
MF20-2-32	B	2xPt100	100	80	400	4000
MF20-3-33	B	3xPt100	130	-	-	4000

Screw-in sensor, type T.61-12

Type T.61-12 temperature sensors are bearing temperature sensors with a Pt100 measuring element or NTC thermistor. The sensor with Pt100 measuring element is also available with 4-wire technology. They have a fixed connection cable with a straight cable outlet. They are screwed into place in a threaded hole.
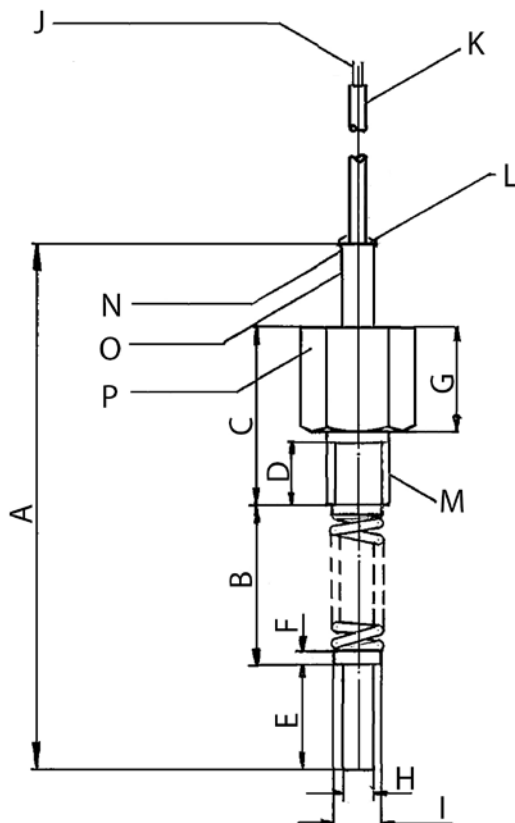
Technical data (extract)	
Measuring element	Pt100 (in 2-wire/4-wire technology), NTC thermistor (2-wire)
Measuring range	Pt100: 0 ... 120 °C, NTC thermistor: 0 ... 120 °C
Material	Sensor tube: Copper
Connection	Fixed connection cable (custom-specific length)
Accuracy	DIN EN 60571: Class B Other accuracy classes available on request

Sensor dimensions

Temperature sensor T.61-12

Item	Description
A	100 mm
B	30.6 mm
C	34 mm
D	12 mm
E	20 mm
F	3 mm
G	20 mm
H	Ø 6 mm
I	Ø 9 mm
J	Tin-plated ends
K	Teflon cable PTFE(C) with shielding
L	Soft soldered
M	M12x1.5
N	Heat-shrinkable sleeve
O	6x1 copper tube
P	WAF 19

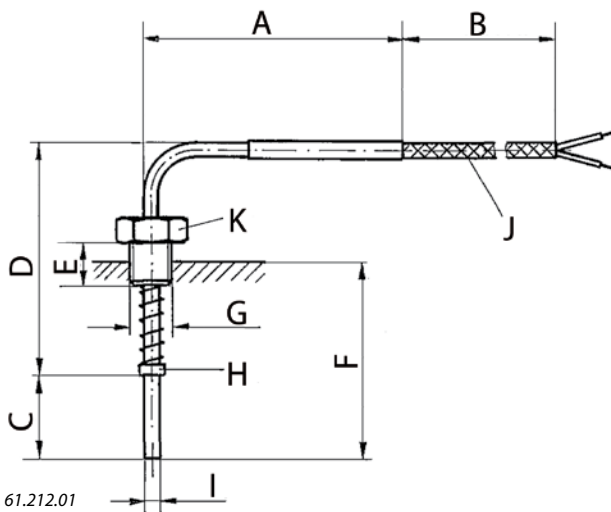*Dr.no. 61.212*

Screw-in sensor, type T.61-28

Type T.61-28 temperature sensors are storage temperature sensors with a Pt100 measuring element or NTC thermistor. They have a fixed connection cable with a 90° angled cable outlet. They are screwed into place in a threaded hole. The installation and pressing processes involve a spring and pressure screw.

Technical data (extract)	
Measuring element	Pt100, NTC thermistor
Measuring range	Pt100: 0 ... 120 °C, NTC thermistor: 0 .... 120 °C
Material	Sensor tube: Copper
Connection	Fixed connection cable (standard length 2.0 m) Other lengths available on request
Immersion depth	38 mm; Other lengths available on request
Accuracy	DIN EN 60571: Class B Other accuracy classes available on request

Sensor dimensions

Temperature sensor T.61-28

Dr.no. 61.212.01

Item	Description
A	65 mm
B	2.0 m (standard); Other lengths available on request
C	16 mm
D	45 mm
E	8 mm
F	Immersion depth 38 mm; Other lengths available on request
G	M8x1
H	Ø 5$^{\pm0,5}$ mm
I	Ø 3.2 mm
J	Teflon cable PTFE(C)
K	WAF12

Screw-in sensor, type TA..8

Type TA..8 temperature sensors are brass (type TA..81) or stainless steel (type TA..82) screw-in sensors with a Pt100 or Pt1000 measuring element. They have a fixed connection cable with a straight cable outlet and are screwed into place in a threaded hole.

Technical data (extract)	
Measuring element	Pt100/Pt1000 (in 2-wire/3-wire technology)
Measuring range	-40 ... 180 °C (range depending on connection cable)
Protection class	IP68
Material	TA..81: Brass, TA..82: Stainless steel
Connection	Fixed connection cable (custom-specific length) Other connections available on request
Immersion depth	See table below
Accuracy	Class B (±0.12 Ω / ±0.3 °C @ 0 °C)

Sensor dimensions

Temperature sensor TAP182 (design example A)
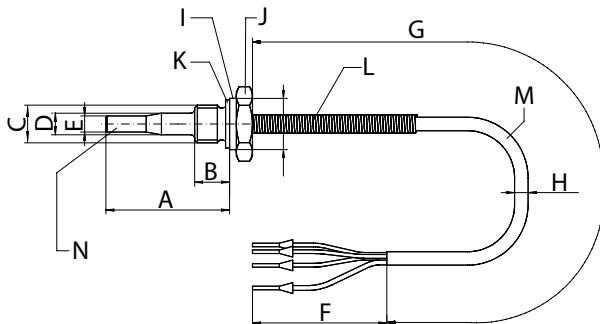
Dr.no. 60.882.121.001.1

Item	Description
A	Immersion depth 46 mm; Other lengths available on request
B	13 mm
C	M14x1.5
D	Ø 8 mm
E	Ø 6 mm
F	80$^{\pm10}$ mm or custom-specific
G	Custom-specific length
H	Ø 4.5$^{\pm0.5}$ mm
I	Screw thread DIN 3852 type A
J	Width across flats WAF24
K	Copper seal DIN 7603 type A
L	Bend protection
M	Cable 0.34 mm², halogen-free, shielded
N	Material: Stainless steel type 1.4305

Temperature sensor TAP182 (design example B)
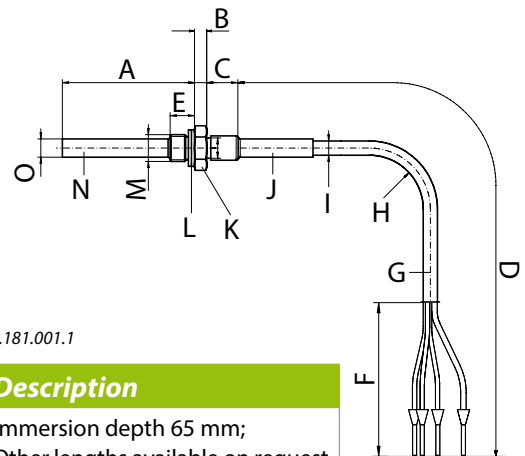
Dr.no. 60.882.181.001.1

Item	Description
A	Immersion depth 65 mm; Other lengths available on request
B	6 mm
C	15 mm
D	Custom-specific length
E	12 mm
F	80$^{\pm10}$ mm or custom-specific
G	Cable, 0.33 mm², halogen-free, shielded
H	R35 min
I	Ø 7 mm
J	Heat-shrinkable sleeve
K	Width across flats WAF19
L	Copper seal DIN 7603 type A
M	R1/4"
N	Material: Stainless steel type 1.4305
O	Ø 9 mm

# Screw-in sensor for protective tube, type TP8 and TPT8

Type TP8/TPT8 temperature sensors are brass screw-in sensors with a Pt100/Pt1000 measuring element. The sensors are also available with two integrated measuring elements. Depending on the Euro M12x1 connector, you have a straight or side 90° cable outlet. They are screwed into a protective tube.

Technical data (extract)	
Measuring element	Pt100/Pt1000
Measuring range	-25 ... 120 °C
Protection class	IP67 (cable end wiring IP00)
Material	Sensor tube: Brass Protective tube: Brass
Connection	Euro M12x1
Immersion depth	55 mm, 75 mm; Other lengths available on request
Accuracy	Pt100: Class B (±0.12 Ω / ±0.3 °C @ 0 °C) Pt1000: Class B (±1.2 Ω / ±0.3 °C @ 0 °C)
Approvals	DNV, GL, LR
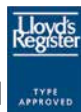
Dimensions of sensor and protective tube

Temperature sensor TP8/TPT8

Dr.no. 60.207.8

Item	Description
A	66 mm, 86 mm
B	12 mm
C	9 mm
D	G3/8
E	Ø 8 mm
F	Material: Brass
G	WAF19

Protective tube
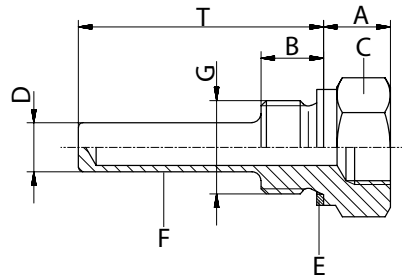
Dr.no. 60.207.8

Item	Description
A	15 mm
B	14 mm
C	WAF24, WAF27, WAF36
D	Ø 11 mm
E	Copper seal (DIN 7603 Form A)
F	Material: Brass, stainless steel
G	G1/2, M18x1.5, M14x1.5, M16x1.5, M26x1.5
T	Immersion depth 55 mm, 75 mm

Connection variants
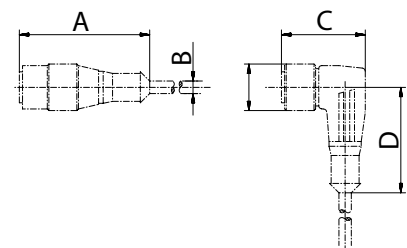
Female plug Euro M12x1

Not included in scope of delivery (accessory set ZL4-2)

Item	Description
A	42 mm
B	Ø 6^{+1} mm
C	27 mm
D	31 mm

The item numbers for the straight or angled plug versions can be found in the following table:

Length	Item no. straight	Item no. angled
2.0 m	522101	522105
5.0 m	522102	522106
7.5 m	522108	522110
10.0 m	522109	522111

Contact sensor, type MF22

Type MF22 temperature sensors are contact sensors which are available with a Pt100 measuring element or NTC thermistor with 2-wire technology. The Pt100 measuring element is also available with 4-wire technology. They have a straight cable outlet and are attached to a measuring point with 2 screws.

Technical data (extract)	
Measuring element	Pt100 (in 2-wire/4-wire technology), NTC thermistor
Measuring range	Pt100: 0 ... 120 °C, NTC thermistor: 0 ... 120 °C
Protection class	IP65
Material	Aluminium flange
Connection	Fixed connection cable
Accuracy	DIN EN 60571: Class B; Other accuracy classes available on request

Sensor dimensions

Temperature sensor type MF22

Dr.no. 60.232.4

Dr.no. 60.232.4
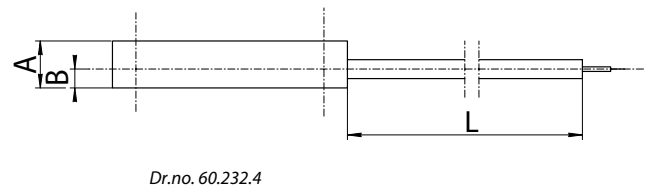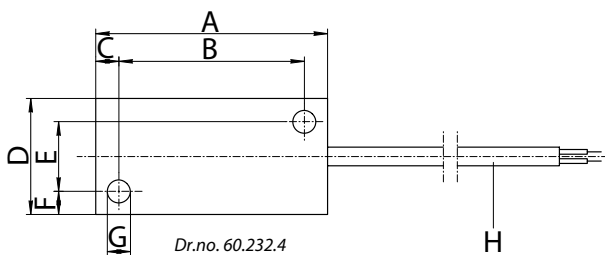
Item	Description
A	50 mm
B	40 mm
C	5 mm
D	25 mm
E	15 mm
F	5 mm
G	5 mm
H	Teflon cable PTFE(C), 2x0.38 mm^2

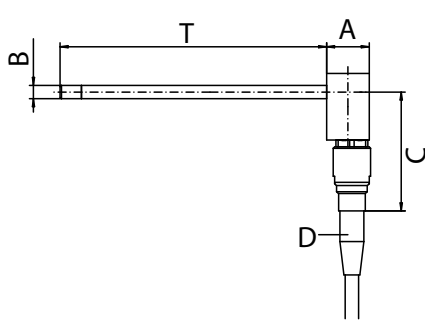| Item	Description
A	10 mm
B	4 mm
L	1.0 m, 1.5 m, 5.0 m; Other lengths available on request

Flange sensor, type TA.14

Type TA.14 temperature sensors are flange sensors with a Pt100/Pt1000 measuring element and are available with one or two integrated measuring elements on request. They have a 90° angled cable outlet. The standard connection cable can be fitted with polyamide protective sheathing for use in harsh environments, or with textile-reinforced sheathing for use in extreme harsh environments.

Technical data (extract)

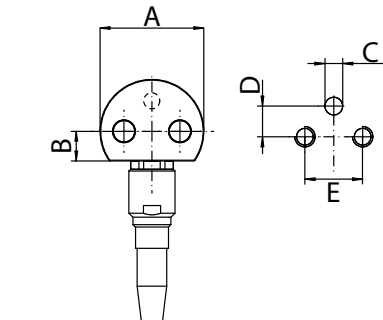|	
Measuring element	Pt100/Pt1000 (in 2-wire, 3-wire or 4-wire technology)
Measuring range	Probe tip: -40 ... 250 °C
Protection class	IP66/IP68
Material	Probe tip: Nickel-plated brass Sensor tube: Stainless steel Housing: Anodized aluminium
Connection	Fixed connection cable, 0.33 mm² shielded, halogen-free Other connections available on request
Immersion depth	75 mm, 100 mm; Other lengths available on request
Accuracy	DIN EN 60571: Class B Other accuracy classes available on request

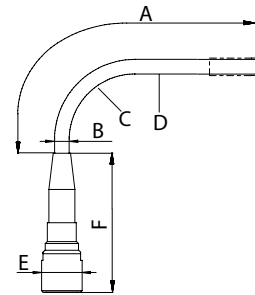### Dimensions of sensor and protective tube

Temperature sensor TA.14

Standard cable (X)

Polyamide sheathing (XP)

Textile-reinforced sheathing (XGT)

Dr.no. 60.814.

Dr.no. 60.814.

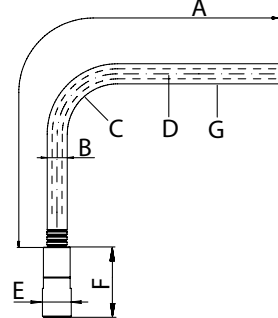| Item	Description
A	16 mm
B	Ø 5±0.05 mm
C	52.5±2 mm (for standard cables)
D	Bend protection
T	Immersion depth 75±0.5 mm, 100±0.5 mm; Other lengths available on request

Item	Description
A	Ø 31.5 mm
B	6 mm
C	Ø 5.2 H11 mm
D	6 mm
E	17 ±0.2 mm

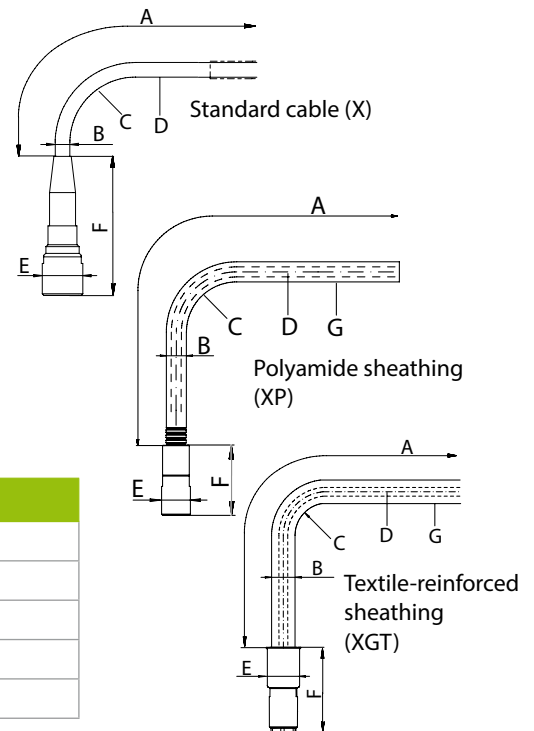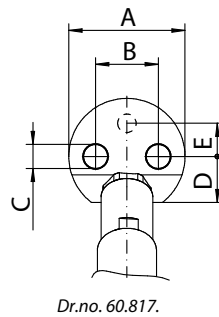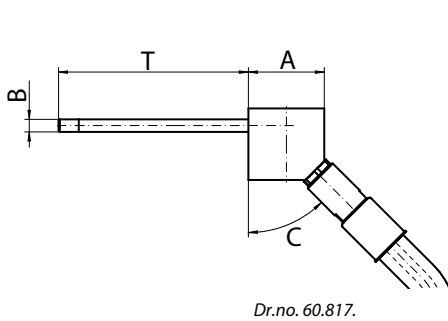| Item	Standard cable (X)	Protective sheathing polyamide (XP)	Protective sheathing textile (XGT)
A	Sheathing length 2.0 m, 5.0 m, 10.0 m; other lengths available on request		
B	Ø 5±0.5 mm	Ø 10±0.5 mm	Ø 13.4±0.7 mm
C	R25	R25	R40
D	Cable, halogen-free, 0.33mm² / 0.34 mm²		
E	Ø 14 mm	Ø 14 mm	Ø 15 mm
F	26±2 mm	36±2 mm	33±2 mm
G	- - -	Protective sheathing polyamide PMA-PCST	Protective sheathing textile-reinforced Eaton GH585

Flange sensor, type TA.17

Type TA.17 temperature sensors are flange sensors with a Pt100/Pt1000 measuring element and are available with one or two integrated measuring elements on request. They have a 45° angled cable outlet. The standard connection cable can be fitted with polyamide protective sheathing for use in harsh environments, or with textile-reinforced sheathing for use in extreme harsh environments.

Technical data (extract)	
Measuring element	Pt100/Pt1000 (in 2-wire, 3-wire or 4-wire technology)
Measuring range	Probe tip: -40 ... 250 °C
Protection class	IP66/IP68
Material	Probe tip: Nickel-plated brass Sensor tube: Stainless steel Housing: Anodized aluminium
Connection	Fixed connection cable, 0.33 mm² shielded, halogen-free; Other connections available on request
Nominal lengths	75 mm, 100 mm; Other lengths available on request
Accuracy	DIN EN 60571: Class B; Other accuracy classes available on request

Sensor dimensions

Temperature sensor type TA.17

Dr.no. 60.817.

Dr.no. 60.817.

Standard cable (X)

Polyamide sheathing (XP)

Textile-reinforced sheathing (XGT)

Item	Description
A	30 mm
B	Ø 5±0.05 mm
C	45°
T	Immersion depth 75±0.5 mm, 100±0.5 mm; Other lengths available on request

Item	Description
A	Ø 32⁻¹ mm
B	17 mm
C	Ø 6.5 mm
D	12.5 mm
E	9 mm

Item	Standard cable (X)	Protective sheathing polyamide (XP)	Protective sheathing textile (XGT)
A	Sheathing length 2.0 m, 5.0 m, 10.0 m; other lengths available on request		
B	Ø 5±0.5 mm	Ø 10±0.5 mm	Ø 13.4±0.7 mm
C	R25	R25	R40
D	Cable, halogen-free, 0.33mm² / 0.34 mm²		
E	Ø 14 mm	Ø 14 mm	Ø 15 mm
F	26±2 mm	36±2 mm	33±2 mm
G	- - -	Protective sheathing polyamide PMA-PCST	Protective sheathing textile-reinforced Eaton GH585

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