

hotcontrol

Protective Shells and Measuring Inserts



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Components and Systems

Heating elements, thermal sensors and process control – hotset is your partner for the realization of intelligent product and service solutions in the field of industrial heat technology. Based on our international presence and our own production sites, we operate as a component supplier and development service provider for customers in all industries.

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General information

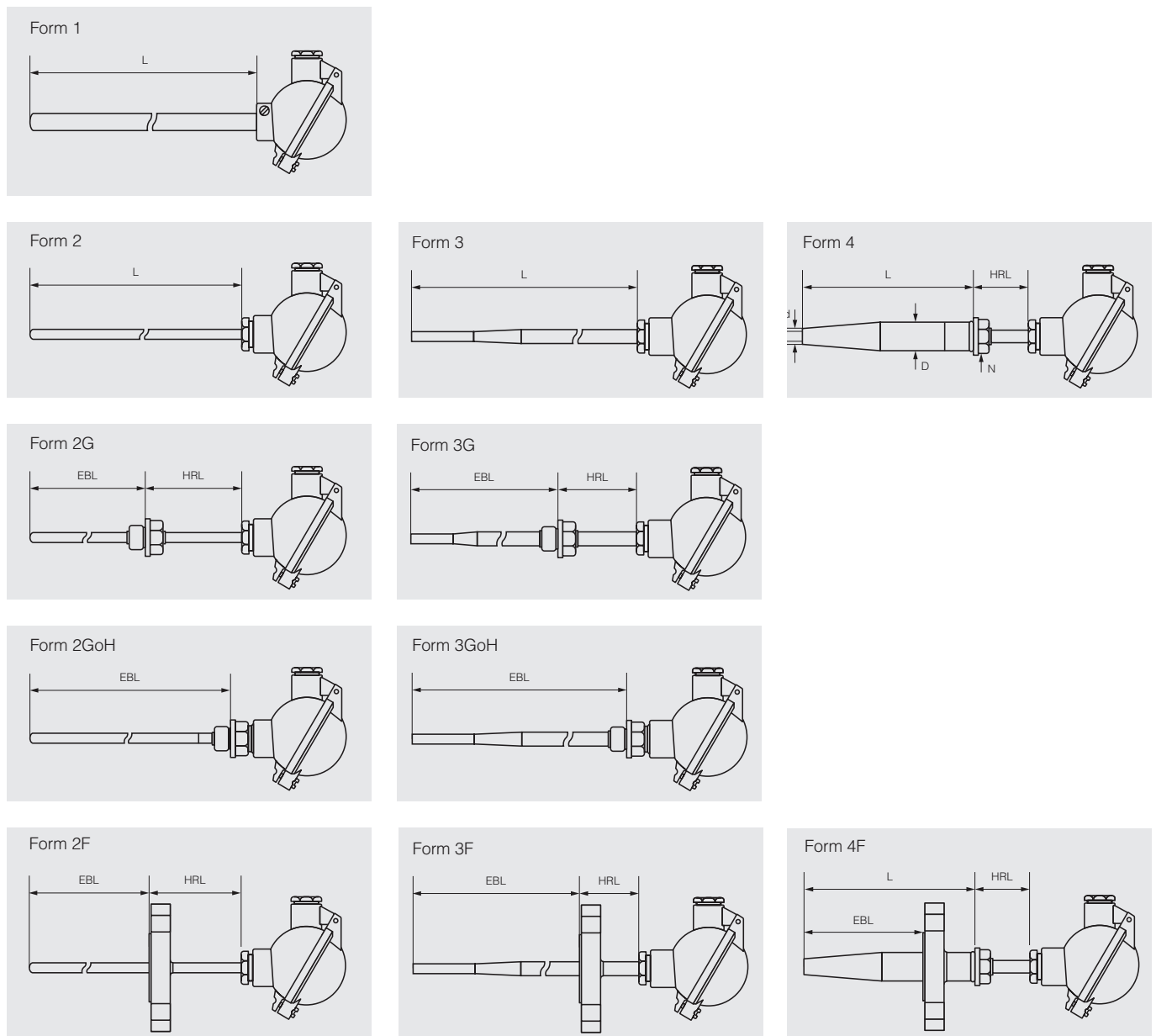
for all protective shells and measuring inserts

- Measuring insert according to DIN 43735
- Protective tube according to DIN 43772
- Deviations from standard are available on request

Application examples

- Plant and mechanical engineering
- Industrial furnace construction
- Steel and iron industry
- Aluminium industry
- Energy sector
- Automobile industry
- Chemistry and petrochemistry
- Laboratories
- Heat treatment
- Cement and building materials industry
- Waste incineration

Type overview protective shells

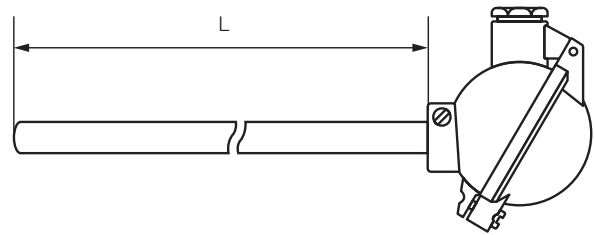
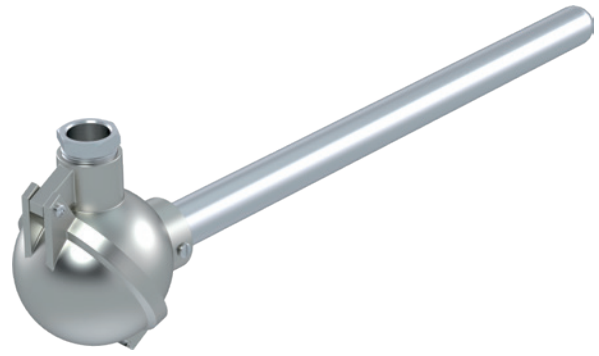


Form 1

- Thermocouples or RTDs with smooth protective tube
- with replaceable measuring insert
- with connection head, e. g. BUS type
- optional with built-in transmitter
in conjunction with connection head form BUZH or BUSH

Technical key features

Length* L	Standard: 500, 710, 1400, 2000 mm
Protective tube Ø d	15 mm
Protective tube material*	<ul style="list-style-type: none"> · Unalloyed steel for temperatures up to 500 °C · Unalloyed steel, enameled, for temperatures up to 700 °C / 371 °F · Stainless steel (1.4571) for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	with threaded sleeve, stop flange, or clamp screw connection upon request, see page 13

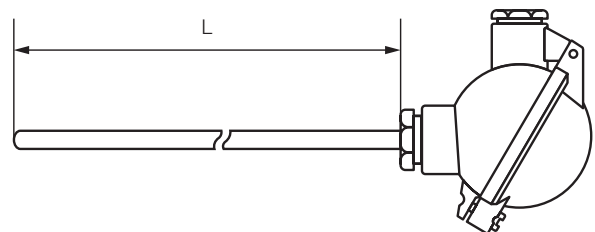
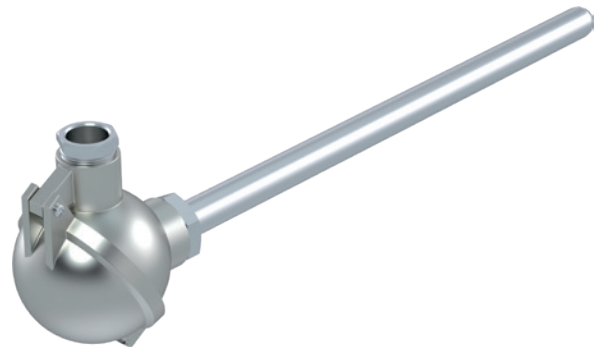


Form 2

- Thermocouples or RTDs with smooth protective tube
- with replaceable measuring insert
- with connection head, e. g. BUS type
- optional with built-in transmitter
in conjunction with connection head form BUZH or BUSH

Technical key features

Length* L	Standard: 280, 370, 520 mm
Protective tube Ø d	9, 11, 12 or 14 mm
Protective tube material*	Stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	optional with adjustable clamp connection made of steel or stainless steel, see page 13



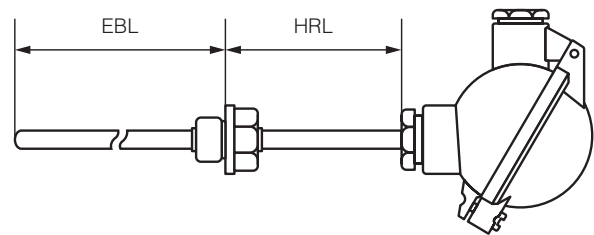
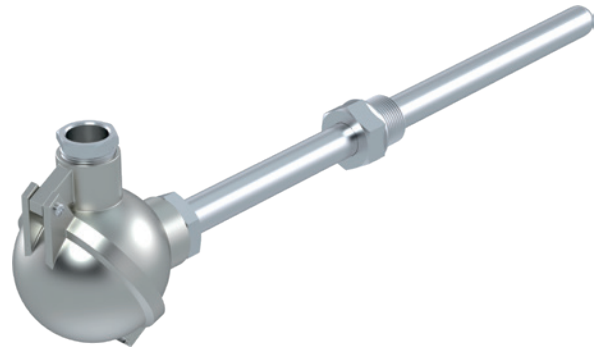
* Other lengths and materials available upon request

Form 2G

- Screw-in thermocouple or RTD with neck tube
- with replaceable measuring insert
- Neck tube HRL = 120 mm
- with connection head e. g. BUS
- optional head-mounted transmitter in conjunction with connection head BUZH or BUSH

Technical key features

Installation length* EBL	Standard: 160, 250, 400 mm
Protective tube Ø d	9, 11, 12 or 14 mm
Protective tube material*	Stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Ø E = G1/2" with SW 24 or Ø E = G1" with SW 36, other threads are available

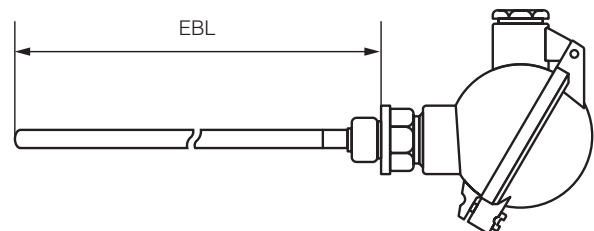


Form 2GoH

- Screw-in thermocouple or RTD without neck tube
- with replaceable measuring insert
- with connection head e. g. Form BUS
- optional head-mounted transmitter in conjunction with connection head form BUZH or BUSH

Technical key features

Length* L	Standard: 100, 160, 230, 360, 510
Protective tube Ø d	9, 11, 12 or 14 mm
Protective tube material*	Stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Ø E = G1/2" with SW 24 or Ø E = G1" with SW 36, other threads are available



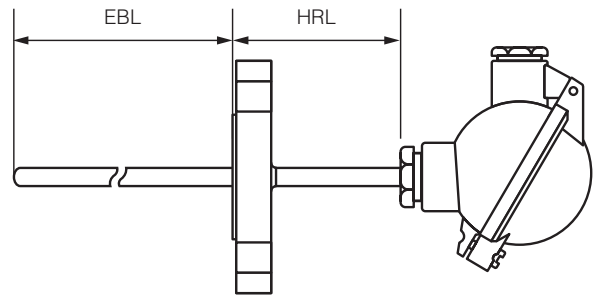
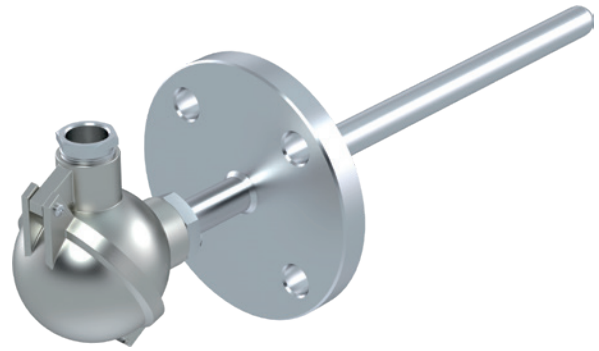
* Other lengths and materials available upon request

Form 2F

- Resistance thermocouple with flange and neck tube
- with replaceable measuring insert
- Neck tube = 55 mm
- with connection head e. g. Form BUS
- optional head-mounted transmitter in conjunction with BUSZ or BUSH

Technical key features

Installation length* EBL	Standard: 225, 315, 465 mm
Protective tube Ø d	9, 11, 12 or 14 mm
Protective tube material*	Stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Flange e. g. DN 25 PN 40, form B according to DIN EN 1092-1, other flanges (sizes and shapes) are available



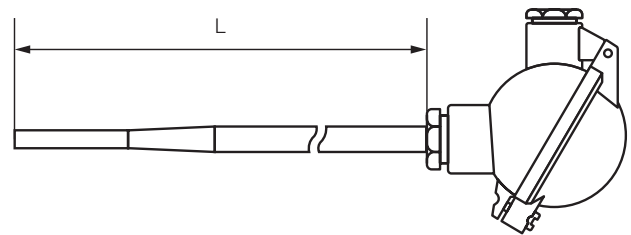
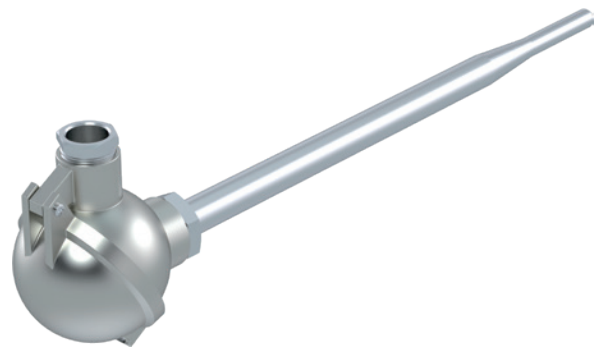
* Other lengths and materials available upon request

Form 3

- Thermocouple or RTD
with smooth protection tube and tapered tip
- with replaceable measuring insert
- with connection head e. g. Form BUS
- optional head-mounted transmitter
in conjunction with BUSZ or BUSH

Technical key features

Length* L	Standard: 280, 370, 520 mm
Protective tube Ø d	12 mm tapered to 9 mm or 14 mm tapered to 11 mm
Protective tube material*	One-piece tube made of stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	adjustable male compression fittings made of steel or stainless steel, see page 13

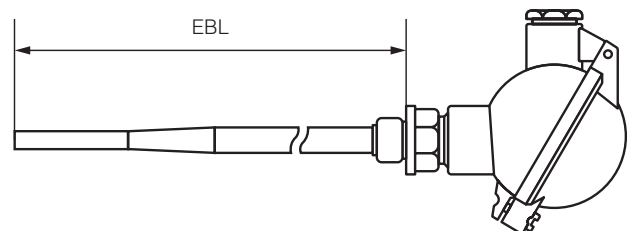


Form 3GoH

- Screw-in thermocouple without neck tube
with tapered tip
- with replaceable measuring insert
- with connection head e. g. Form BUS
- optional head-mounted transmitter
in conjunction with BUSZ or BUSH

Technical key features

Einbaulänge* EBL	Standard: 225, 315, 465 mm
Protective tube Ø d	12 mm tapered to 9 mm or 14 mm tapered to 11 mm
Protective tube material*	One-piece tube made of stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Ø E = G1/2" with SW 24 or Ø E = G1" with SW 36, other threads are available



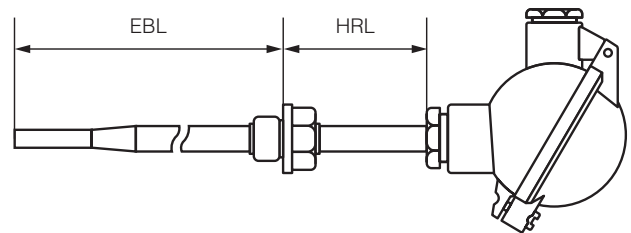
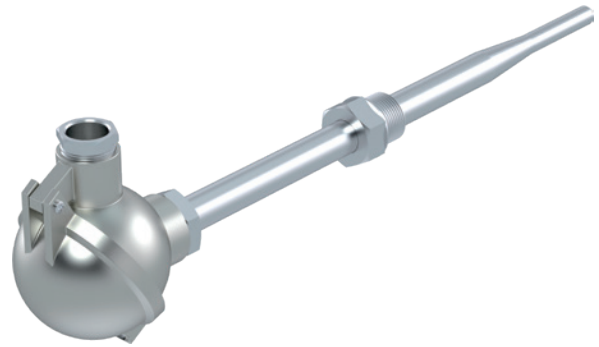
* Other lengths and materials available upon request

Form 3G

- Screw-in thermocouple or RTD with neck tube and with tapered tip
- with replaceable measuring insert
- Neck tube = 120 mm
- with connection head e. g. Form BUS
- optional head-mounted transmitter in conjunction with BUSZ or BUSH

Technical key features

Einbaulänge* EBL	Standard: 160, 250, 400 mm
Protective tube Ø d	12 mm tapered to 9 mm or 14 mm tapered to 11 mm
Protective tube material*	One-piece tube made of stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Ø E = G1/2" with SW 24 or Ø E = G1" with SW 36, other threads are available

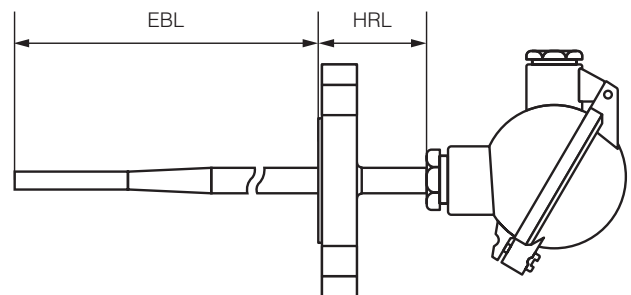
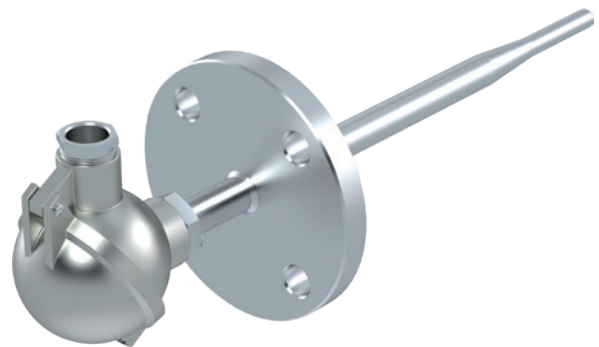


Form 3F

- Screw-in thermocouple or RTD with neck tube and with tapered tip
- with replaceable measuring insert
- Neck tube = 55 mm
- with connection head e. g. Form BUS
- optional head-mounted transmitter in conjunction with BUSZ or BUSH

Technical key features

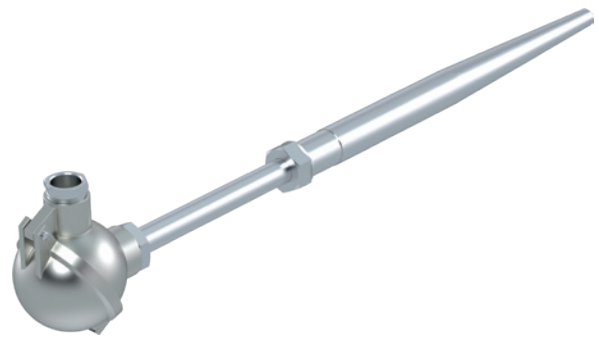
Einbaulänge* EBL	Standard: 225, 315, 465 mm
Protective tube Ø d	12 mm tapered to 9 mm or 14 mm tapered to 11 mm
Protective tube material*	One-piece tube made of stainless steel for temperatures up to 800 °C / 427 °F
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Flange e. g. DN 25 PN 40, form B according to DIN EN 1092-1, other flanges (sizes and shapes) are available



* Other lengths and materials available upon request

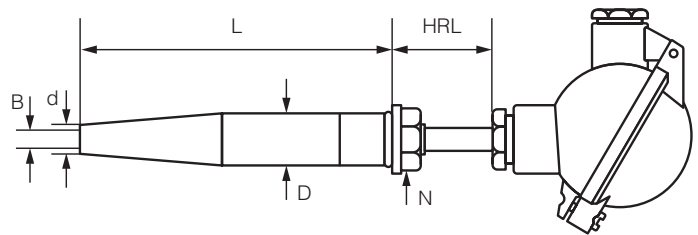
Form 4

- Thermocouple and RTD with thermowell, and neck tube
- with replaceable measuring insert
- Neck tube = 140 mm
- with connection head e. g. Form BUS
- optional head-mounted transmitter in conjunction with BUSZ or BUSH



Technical key features

Length* L	Standard: 140, 200, 260 mm
Protective tube	$\varnothing D = 18 \text{ mm}$, $\varnothing d = 9.0 \text{ mm}$, $\varnothing B = 3.5 \text{ mm}$, $\varnothing N = M14 \times 1.5$ $\varnothing D = 24 \text{ mm}$, $\varnothing d = 12.5 \text{ mm}$, $\varnothing B = 7.0 \text{ mm}$, $\varnothing N = M18 \times 1.5$
Protective tube material*	solid drilled thermowells, made of material: 1.4571 (X6 CrNiMoTi 17-12-2) or 1.7380 (10 CrMo 9-10) or 1.7335 (13 CrMo 4-5) or 1.5415 (16 Mo 3)
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Thermowell is welded into the process.



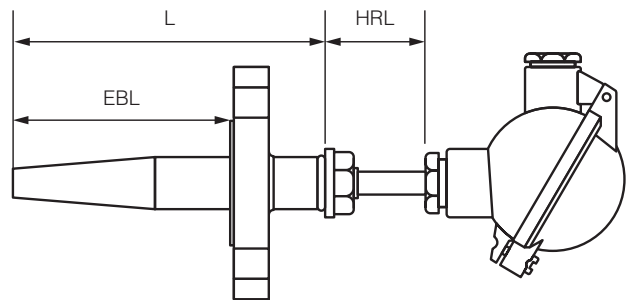
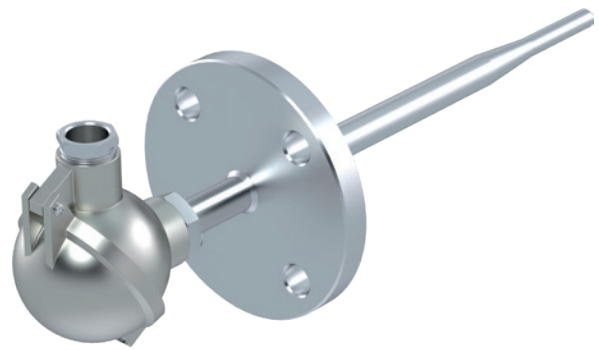
* Other lengths and materials available upon request

Form 4F

- Thermocouple or RTD with flange and neck tube
- with replaceable measuring insert
- Neck tube HRL = 140 mm
- with connection head e. g. Form BUS
- optional head-mounted transmitter in conjunction with BUSZ or BUSH

Technical key features

Lengths* L, EBL	L = 200 mm, EBL = 130 mm or L = 260 mm, EBL = 190 mm
Protective tube	$\varnothing D = 18 \text{ mm}$, $\varnothing d = 9.0 \text{ mm}$, $\varnothing B = 3.5 \text{ mm}$, $\varnothing N = M14 \times 1.5$ $\varnothing D = 24 \text{ mm}$, $\varnothing d = 12.5 \text{ mm}$, $\varnothing B = 7.0 \text{ mm}$, $\varnothing N = M18 \times 1.5$
Protective tube material*	solid drilled thermowells, made of material: 1.4571 (X6 CrNiMoTi 17-12-2) oder 1.7380 (10 CrMo 9-10) oder 1.7335 (13 CrMo 4-5) oder 1.5415 (16 Mo 3)
Measuring insert	optionally with thermocouple or RTD. For details on thermocouples see page 12, for details on RTDs see page 13
Mounting devices	Flange e. g. DN 25 PN 40, form B according to DIN EN 1092-1, other flanges (sizes and shapes) are available

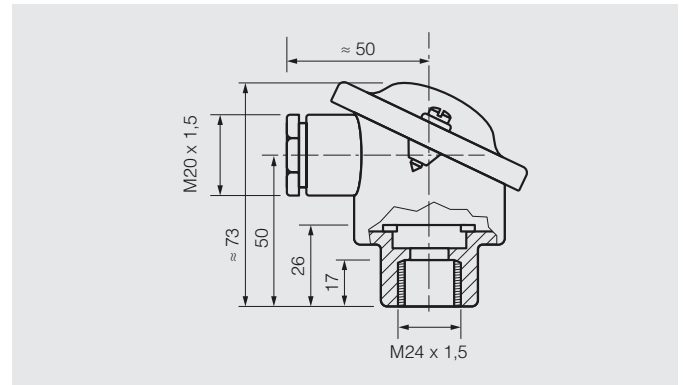


* Other lengths and materials available upon request

Type overview connection heads*

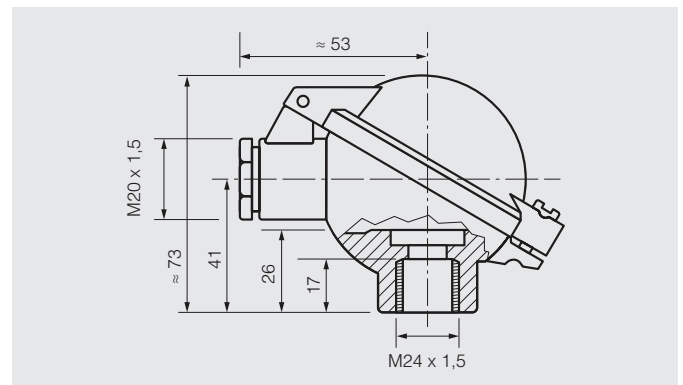
Form B

- made of light metal
- small, slanted head with loos lid attached
- screwed
- Thread M24 x 1.5 mm
- IP 54



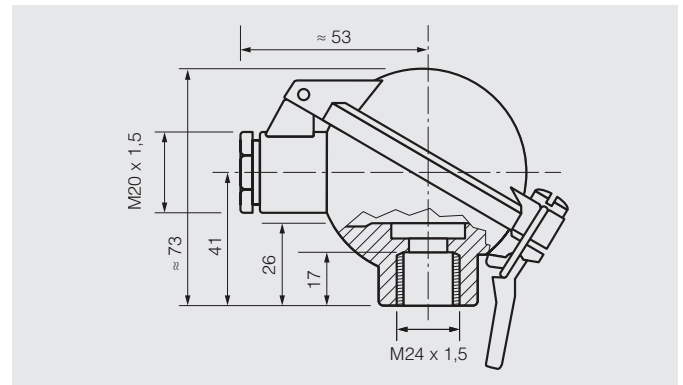
Form BUZ

- Ball head with hinged lid and cylinder screw
- Thread M24 x 1.5 mm
- IP 65



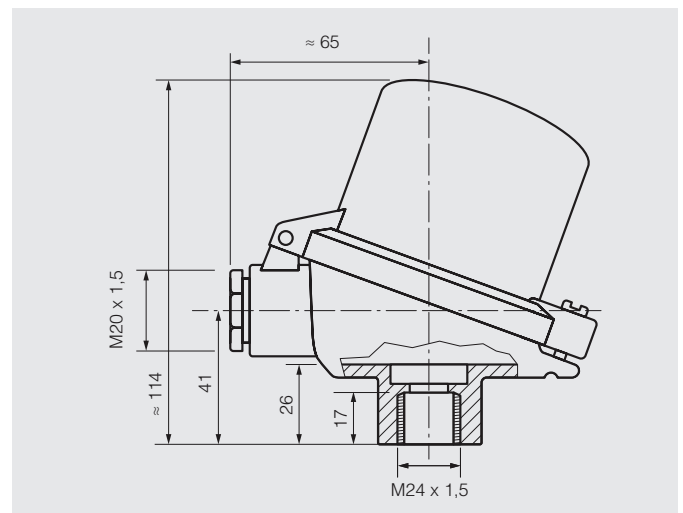
Form BUS

- Ball head with hinged lid, cylinder screw and quick-release fastener
- Thread M24 x 1.5 mm
- IP 65



Form BUZH oder BUSH

- Raised hinged cover for mounting a transducer, with cylinder screw/quick-release fastener
- Thread M24 x 1.4 mm
- IP 65



* Other lengths and materials available upon request

Measuring inserts – thermocouples – RTDs

Required insertion length of measuring insert
for the respective design of the protective shell

Design of protection tube/ thermowell	Computation of the insert length EL
Form 1	$EL = L + 25 \text{ mm}$
Form 2	$EL = L + 35 \text{ mm}$
Form 2G and Form 2F	$EL = EBL + HRL + 35 \text{ mm}$
Form 2GoH	$EL = EBL + 45 \text{ mm}$
Form 3	$EL = L + 35 \text{ mm}$
Form 3G and Form 3F	$EL = EBL + HRL + 35 \text{ mm}$
Form 3GoH	$EL = EBL + 45 \text{ mm}$
Form 4 and Form 4F	$EL = L + HRL + 35 \text{ mm}$

Measuring inserts with thermocouple

- Design suitable for all protection shells and all connection heads of size B
- Ceramic terminal block $\varnothing 42 \text{ mm}$ and spring-loaded fastening screws
- by using those springs the measuring insert with correct length (see above) is pressed on the bottom of the protective shell for better heat transfer

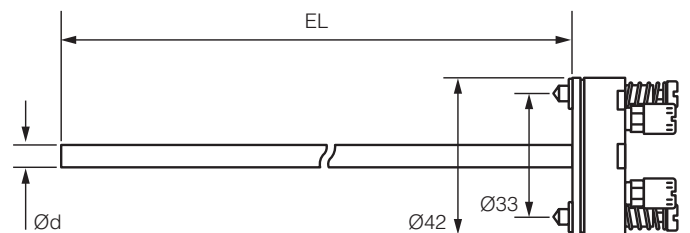
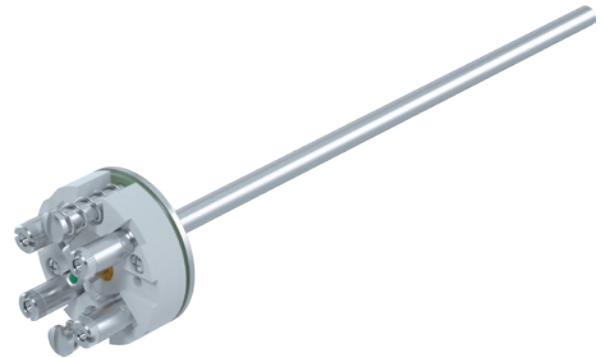
Technical key features

- Options
- 1x or 2x NiCr-Ni (type K) as per EN 60584
 - 1x or 2x Fe-CuNi (type J) as per DIN EN 60584
 - 1x or 2x Fe-CuNi (type L) as per DIN 43710
 - other types of thermocouples (e. g. type N) available
- Tolerances class 1 or 2,
insulated hot junction
max. temperature $850 \text{ }^{\circ}\text{C} / 454 \text{ }^{\circ}\text{F}$
for protection shells made of stainless steel

Protective tube	flexible mineral insulated cable, $\varnothing d = 3 \text{ mm}, 4.5 \text{ mm}, 6 \text{ mm}$ or 8 mm
Sheath material	for thermocouple NiCr-Ni of component 2.4816 (Inconel 600), for thermocouple Fe-CuNi of component 1.4541 (stainless steel)

Options

- Transmitters are usually mounted into the high cap of form BA-KLH heads. On request the transmitter can also be mounted instead of the ceramic terminal block.

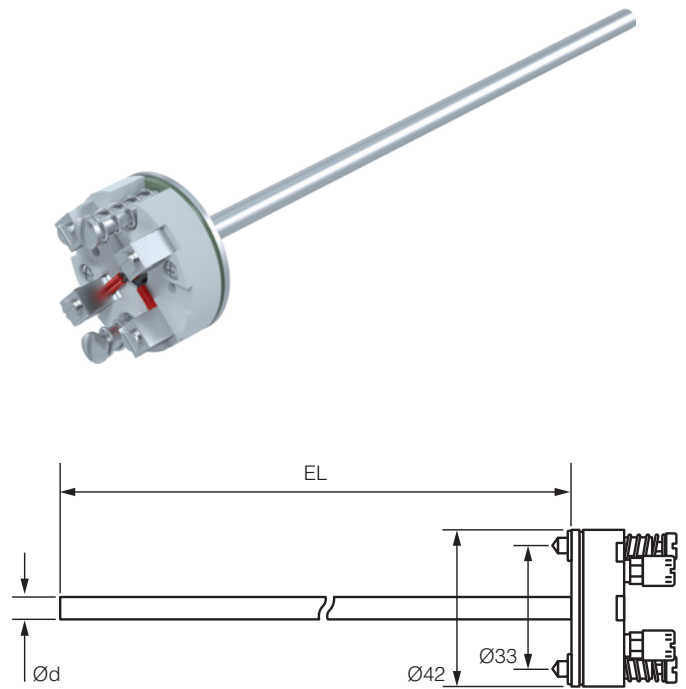


RTD measuring inserts

- Configured for all protective shells and connection heads with size B
- Ceramic terminal block \varnothing 42 mm with spring-loaded fastening screws
- by using those springs the measuring insert with correct length (see page 12 above) is pressed on the bottom of the protective shell for better heat transfer

Technical key features

Sensor types	1x or 2x Pt100 in 2-,3- or 4-wire circuit, class A or B, for temperatures from $-50\text{ }^{\circ}\text{C}$ / $-45\text{ }^{\circ}\text{F}$ or $-200\text{ }^{\circ}\text{C}$ / $-129\text{ }^{\circ}\text{F}$ up to $400\text{ }^{\circ}\text{C}$ / $204\text{ }^{\circ}\text{F}$, $600\text{ }^{\circ}\text{C}$ / $315\text{ }^{\circ}\text{F}$ or $850\text{ }^{\circ}\text{C}$ / $454\text{ }^{\circ}\text{F}$
Protective tube	flexible insulated cable with welded rigid sleeve, sheath and sleeve made of stainless steel (1.45541), sleeve length approx. 40 up to 60 mm \varnothing d = 3 mm or 6 mm (same diameter for cable and sleeve)

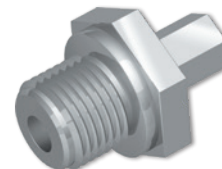


Options

- Transmitters are usually mounted into the high cap of form BA-KLH heads. On request the transmitter can also be mounted instead of the ceramic terminal block.

Compression fittings

- Made of steel or stainless steel
- for protection tubes
- \varnothing 9,11,12,14 or 15 mm





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