

- **Constructed from durable, high-quality materials**
 - for use in heavy duty applications
- **Different hazardous area protection concepts available**
 - Ex certification according to ATEX with FM and CSA certified versions available
- **Low cost of ownership**
 - exchangeability of inserts while line or vessel is in service
- **Display option available**
 - enables on-the-spot measurement
- **Wide range of applications covered**
 - oil exploration and pipelines; offshore; petro-chem/chemical industries; machinery and protective measures
- **Fitted with industry-standard DIN Form B size transmitter**
 - enables mounting in a wide range of connection heads
- **Simple all-in-one coding structure**
 - provides complete sensor and transmitter assembly with a single part number



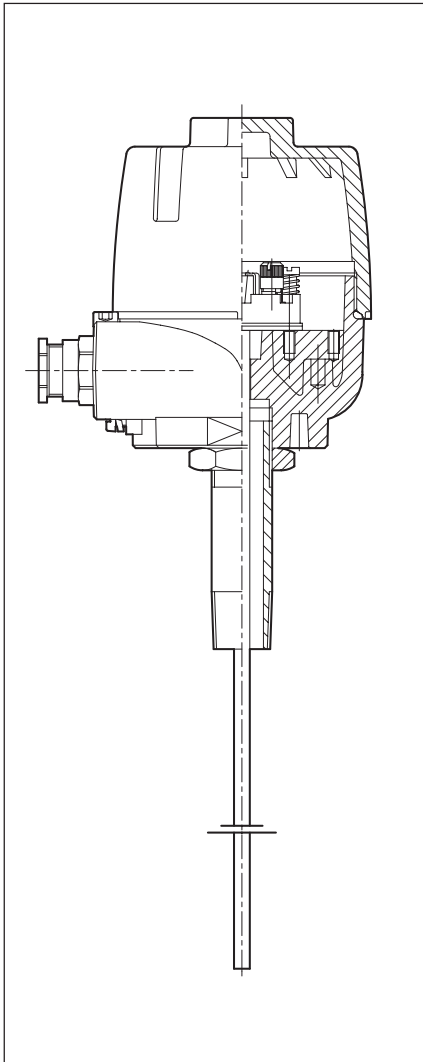
**Engineered solutions for optimized
and dependable process
measurements**

Description

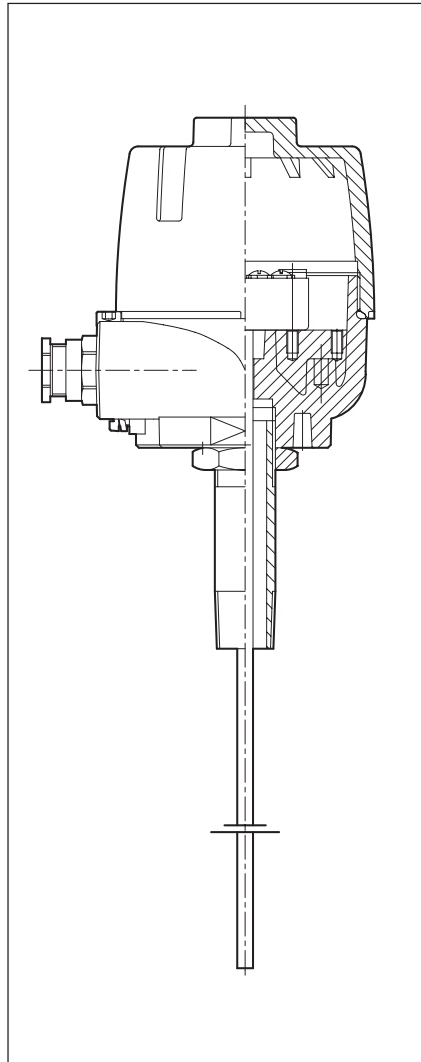
The SensyTemp Heavy Duty Temperature Sensor has been developed for applications in particularly arduous environmental conditions. In connection with special inserts, this sensor may be supplied as an intrinsically safe explosion-proof, or flameproof, version.

Global players can rely on one proven product concept worldwide, thus reducing their engineering, supply and storage costs.

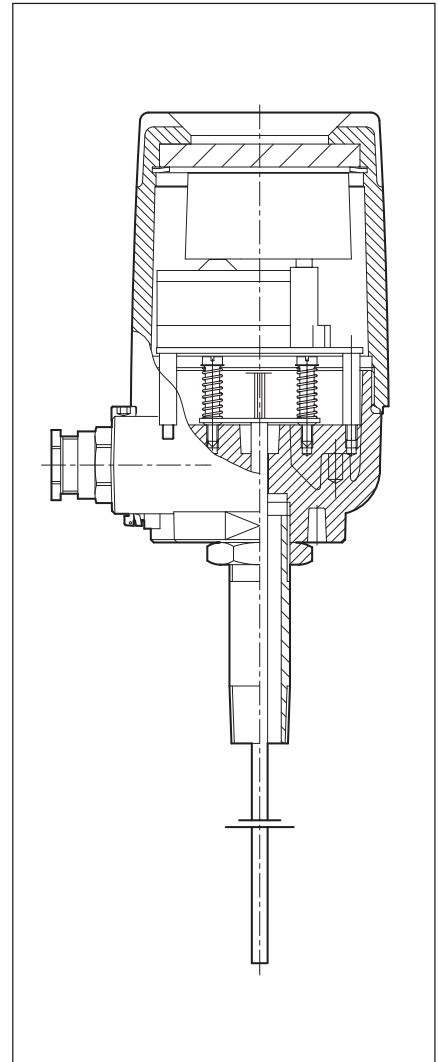
Connection Heads and Standard Assembly for Transmitters



With Ceramic Terminal Block



With Replaceable Transmitter Mounted on the Insert



With Transmitter and Digital Display

Head-mounted Transmitters

for Ex d and Non-Ex-Applications

TR-04 Eco Fixed Range

TH-01 Programmable

TH-02 Programmable HART

TF-12 Profibus PA

TF-02 Foundation Fieldbus

for Ex i Applications

TR-04-Ex Fixed Range

TH-01-Ex Programmable

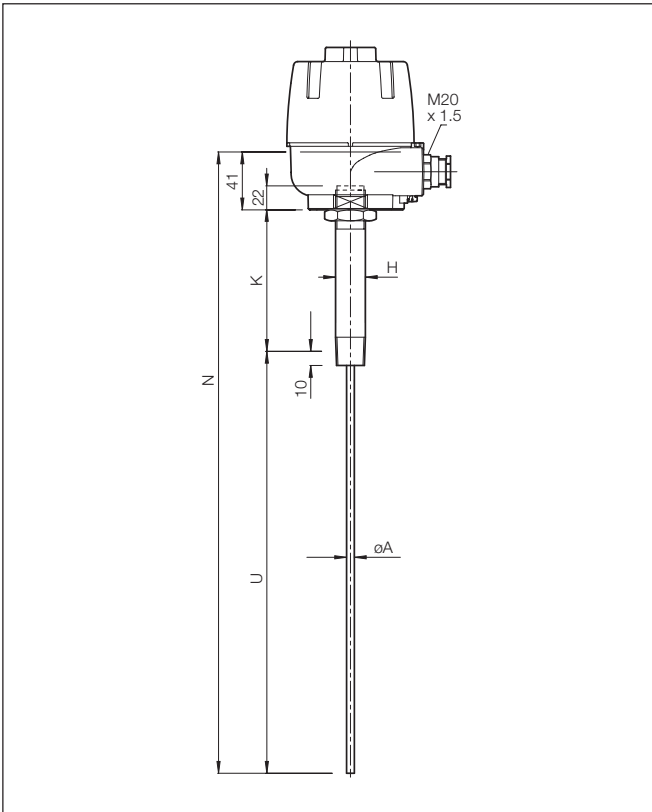
TH-02-Ex Programmable HART

TF-12-Ex Profibus PA

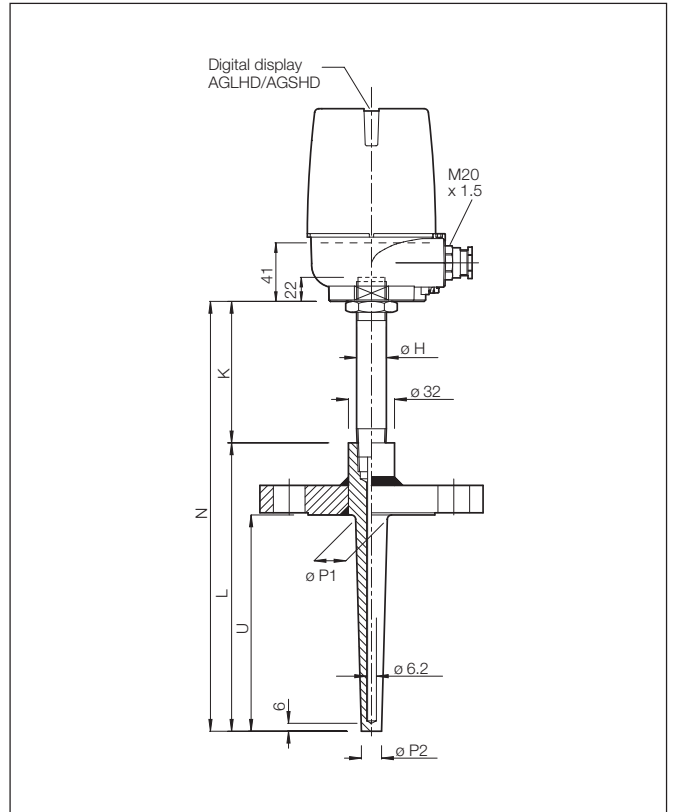
TF-02-Ex Foundation Fieldbus

Sensor Design

Example 1



Example 2



Key

N = Nominal length

K = Extension length

U = Insertion length

H = Extension diameter ≥ 14 mm

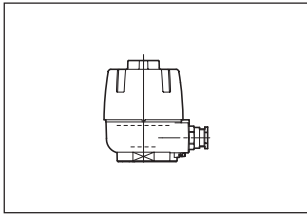
P1 = Stem diameter

P2 = Stem diameter at tip

L = Thermowell length

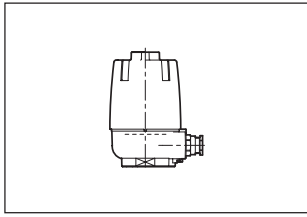
Connection Heads

Without Display



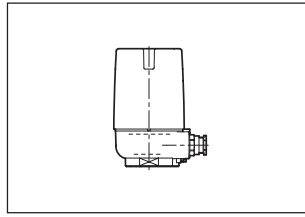
AGL Aluminium Alloy
Epoxy coating, 70µm
AGS stainless steel

Without Display

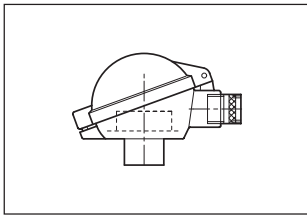


AGLH Aluminium Alloy
Epoxy coating, 70µm
AGSH stainless steel

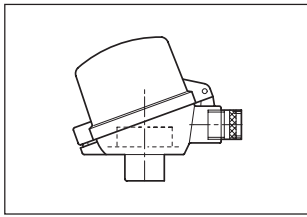
With Digital Display



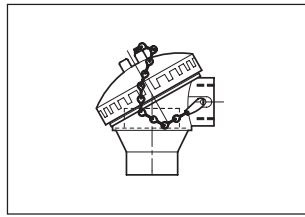
AGLHD Aluminium Alloy
Epoxy coating, 70µm
AGSHD stainless steel



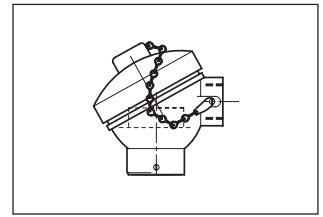
BUZ Aluminium Alloy



BUZH Aluminium Alloy

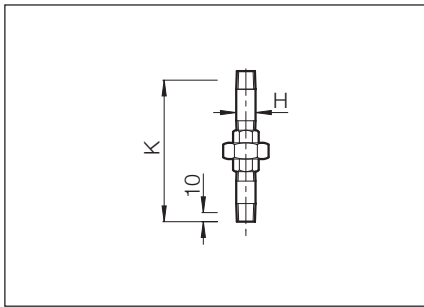


KNE Aluminium Alloy

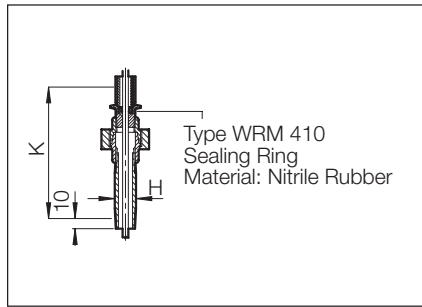


KI Cast Iron

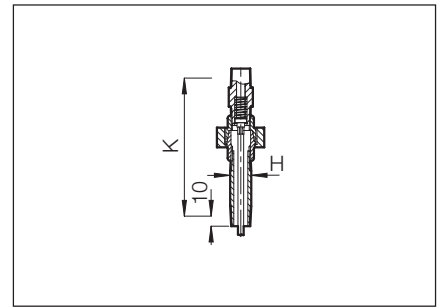
Extension Connections Assemblies



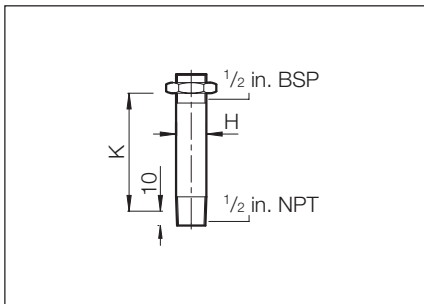
*E1S nipple & union
2 x 1/2 in. NPT*



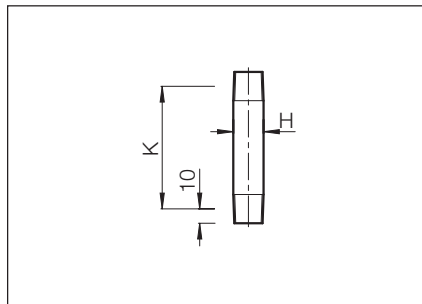
*E1S nipple/union & oil seal
2 x 1/2 in. NPT*



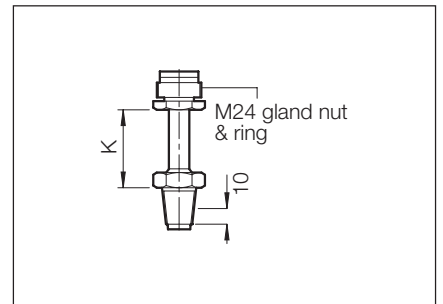
*E1S nipple/union & spring
2 x 1/2 in. NPT*



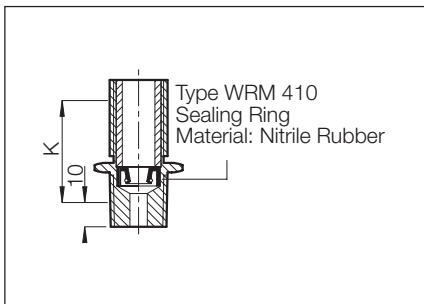
*E2S or E3S nipple
1/2 in. BSP x 1/2 in. NPT*



*E2S or E3S nipple
2 x 1/2 in. NPT*



*E4S Gland nut & ring
M24 x 1/2 in. NPT*

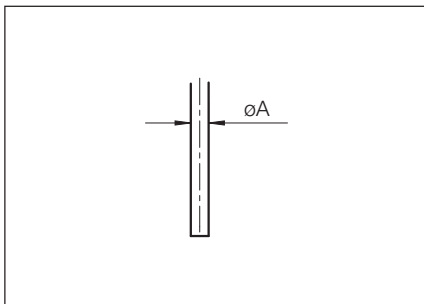


*E7S Hex nipple & oil seal
1/2 in. BSP x 1/2 in. NPT*

Key

- N = Nominal length
- K = Extension length
- U = Insertion length
- H = Extension diameter ≥ 14 mm
- P1 = Stem diameter
- P2 = Stem diameter at tip
- L = Thermowell length

Sensor tip



Note.

The thermometer SensyTemp Heavy Duty is appropriate for installation into a suitable thermowell. Only in this configuration, can explosion prevention and pressure strength be fulfilled.

Solid Drilled Thermowells

Introduction

Thermowells manufactured by ABB are machined from solid bars or forgings. They can be used with all Resistance Thermometers, Thermocouples, Filled Systems and Dial Thermometer Indicators, as well as for test purposes.

They are used extensively throughout the Power, Process and Petrochemical industries to protect the sensors from the process fluid and to enable servicing, or replacement, of sensors without the need for plant shut down.

All thermowells are machined on special-purpose high-accuracy machines and, with careful quality control, ensure:

- (a) perfect concentricity of the bore with respect to the outside diameter
- (b) a consistent wall-thickness over the full length of the thermowell
- (c) a wide selection of profiles are available from our vast CAD/CAM library.

Materials selected for the manufacture of solid-drilled thermowells are of the highest quality. Strict quality control is applied to both materials selection and the manufacturing processes. Full certification, including original mill and suppliers' materials certificates can be provided. The requirements of NACE Standard MR-01-75 can also be met if specified.

Design

Thermowells supplied by ABB are designed to generally comply with the codes of practice as laid down by the British Standards Institution, DIN, ASME and other authorities. For more detailed advice the relevant code of practice, or standard, should be consulted.

All thermowells are manufactured to conform with the PED requisition No. C/971

Materials

ABB is experienced in the handling, machining and welding of all types of steel and special alloys, such as Monel, Inconel, Incolloy and Hastelloy, as well as Titanium, Nickel and other materials. Thermowells can be manufactured in all these materials from bar or forgings as appropriate.

Guidance on the selection of materials for a particular application is readily available from our Engineering Department.

Surface Finish

Thermowells are normally supplied with a fine-machined surface finish, equal to 32 C.L.A. or better. Polished or other finishes may be supplied on request. Special corrosion or wear-resistant coatings can be applied to the immersed length of flanged thermowells, e.g., PTFE, Tungsten Carbide, Tantalum etc.

Heat Treatment

All thermowells can be heat-treated to individual requirements.

Quality Assurance – Inspection

Full traceability of all materials is maintained. Inspection is carried out at various stages of release of materials and manufacture, including material analysis checks and ultrasonic examination.

Final inspection includes the following:

- (i) Full dimensional check
- (ii) Bore concentricity check
- (iii) Pressure testing up to maximum 10,000psi (690 bar) (standard) 75,000 psi (5170 bar) (special on request)
- (iv) Dye penetrant test as necessary
- (v) Radiography as required
- (vi) Thermowell calculations in accordance with Murdock are available.

All thermowells are thoroughly cleaned and degreased prior to despatch.

Full documentation is available for all thermowells manufactured by ABB to comply with most National and International Standards.

Selection of Dimensions and Profiles

- 1) Top Connection (A) and Process Connection (C) should be selected to suit the particular application and plant standard being used.
- 2) Select a thermowell with a Lagging Length (T) where either the thermowell has to pass through an insulation or 'lagging' layer, or where it is desirable to position the assembly connection head away from the pipe or tank whose temperature is being measured. Screwed thermowells may be supplied without lagging length (T).
- 3) The Immersion Profile selected should take account of the fluid flow characteristics, strength of thermowell required and depth of immersion.

Preferred profiles are:

- (a) Parallel Profile
- (b) Taper Profile
- (c) Parallel Profile – Taper Tip

Use profile (b) for short to medium length thermowells, profiles (a) and (c) for longer thermowells.

Care should be taken, when selecting a thermowell having a Sensitive Tip, to ensure that the reduction in metal thickness around the tip (P2) does not lead to permissible stresses being exceeded. Consult our technical department for advice.

For parallel profiles dimension (P1) max. is the process connection thread root diameter minus 3mm and is equal to (P2).

For taper profiles dimension (P1) max. is the process connection root diameter minus 9mm (0.35 in.).

- 4) The bore of the thermowell should be chosen to suit the sensing device to be used, with as little free air-space around the device as possible, consistent with ease of removal and insertion of the sensing device.

When choosing an appropriate bore the outside diameter specified should give a Minimum Wall Thickness of 3mm (0.12 in.) (or 1.5mm [0.06 in.] where a sensitive tip is required).

- 5) Tip Profiles should be selected in accordance with the specific application of the thermowell. As a rough guide Flat Profiles may be used in lower-pressure applications, where flow characteristics around the thermowell are not important.

A Domed Profile may be used in medium- to higher-pressure applications and a Spherical Profile may be used in all high-pressure applications where flow characteristics around the thermowell are important.

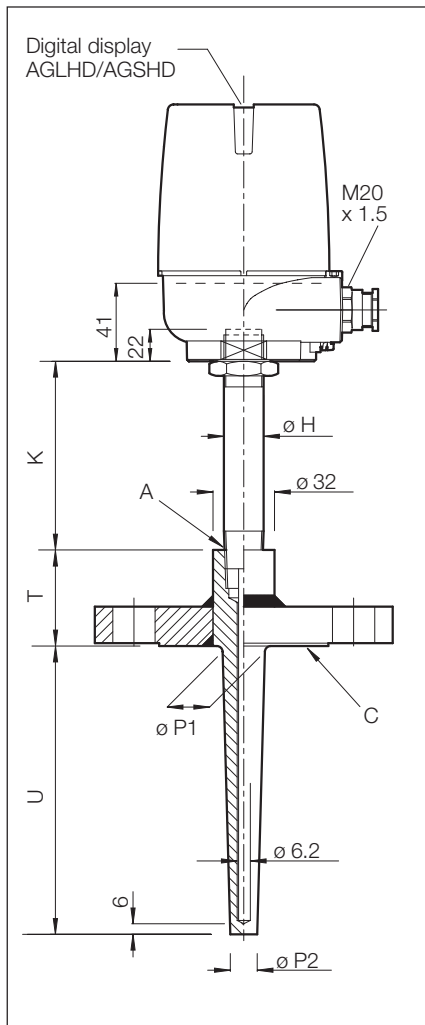
- 6) Choose immersion Length (U) to ensure that the sensing element protrudes sufficiently into the medium whose temperature is to be detected, to give an accurate measurement and to ensure that the sensing element is sufficiently remote from outside influences as to be unaffected by them.

For pipes the sensing element should be positioned as near to the centre line as possible but at least $\frac{1}{3}$ of the pipe diameter in from the outer skin.

In the case of tanks, the depth of immersion can obviously vary considerably, but care should also be taken to ensure that the assembly is not positioned too near to adjacent tank walls, in order to provide minimum all-round immersion.

Sensor Design

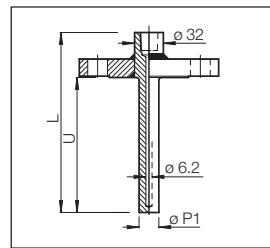
Example



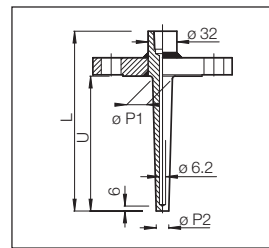
Key

- K = Extension length
- U = Insertion length
- H = Extension diameter $\geq 14\text{mm}$ (0.55 in.)
- P1 = Stem diameter
- P2 = Stem diameter at tip
- T = Lagging Length
- C = Process Connection
- A = Internal thread

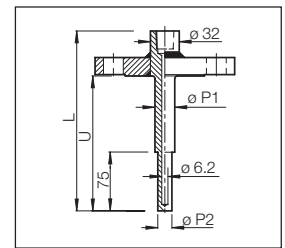
Thermowell



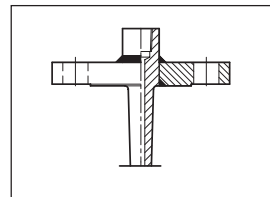
Type F1 Straight Profile Flanged



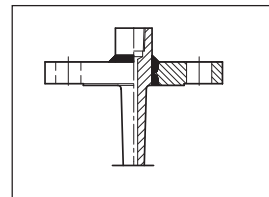
Type F2 Taper Profile Flanged



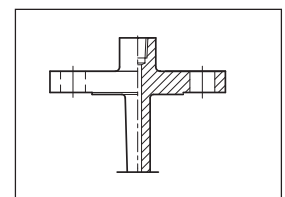
Type F3 Stepped Profile Flanged



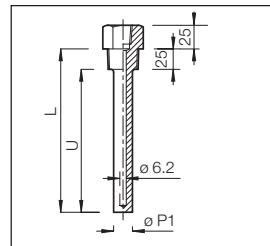
Welded on Flange Fillet & Groove



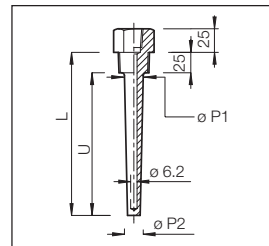
Welded on Flange Full Penetration Weld



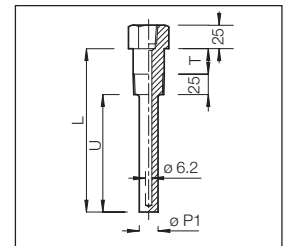
Forged Thermowell



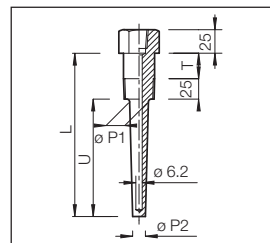
Type S1 Straight Profile Screwed



Type S2 Taper Profile Screwed

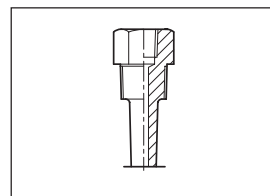


Type S4 Straight Profile Screwed



Type S5 Taper Profile Screwed

Process Connections 'C'



Threaded Thermowell

Alternative Version with Center Spring according to US Standards

Measuring-inserts with a spring-loading in the extension are widespread in the American market. The versions listed below provide this feature.

Even the exchange of the measuring-insert requires more effort; one solution is the application of integral sensor assemblies, in conjunction with field-mounted temperature transmitters. This option enables the observation of the display at a 90° angle in relation to the thermowell.

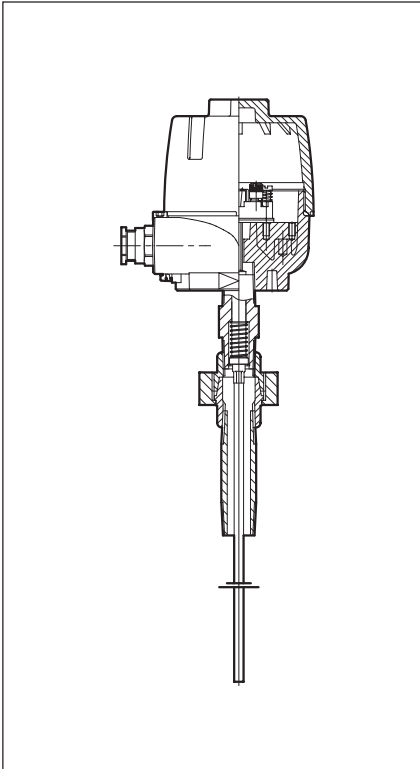
Devices with a central spring are available as Non-Ex, Intrinsically safe (EEx i) and explosion-proof (EEx d) versions, according to ATEX.

For field-housing devices without sensors approved by ATEX/FM/CSA, refer to data sheets:

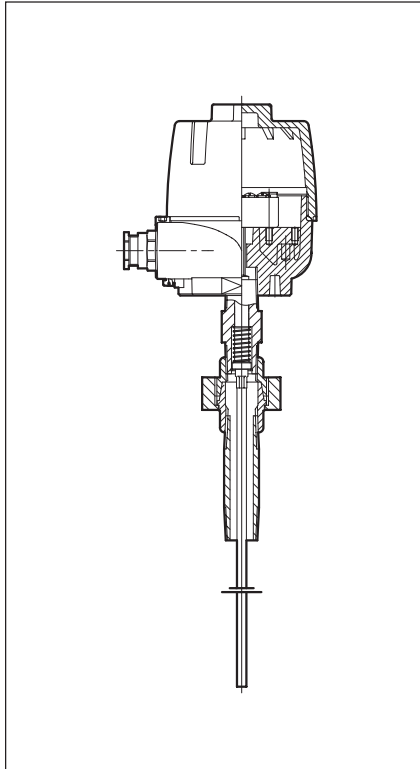
10/11-8.64 EN programmable, HART

10/11-8.70 EN Profibus PA

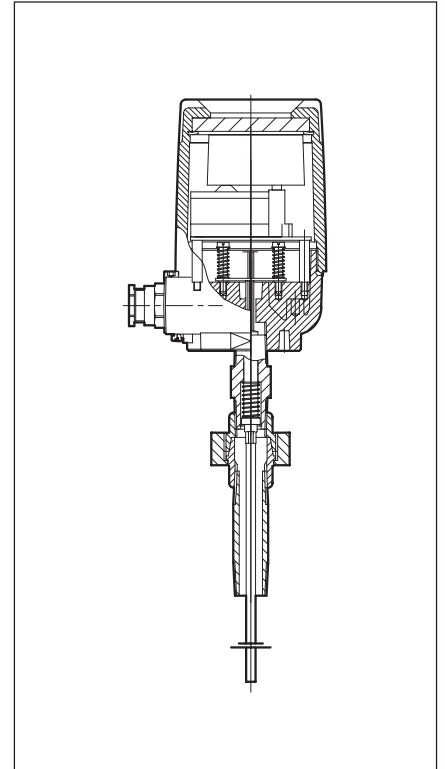
Axial Head Mounting



With Ceramic Terminal Block



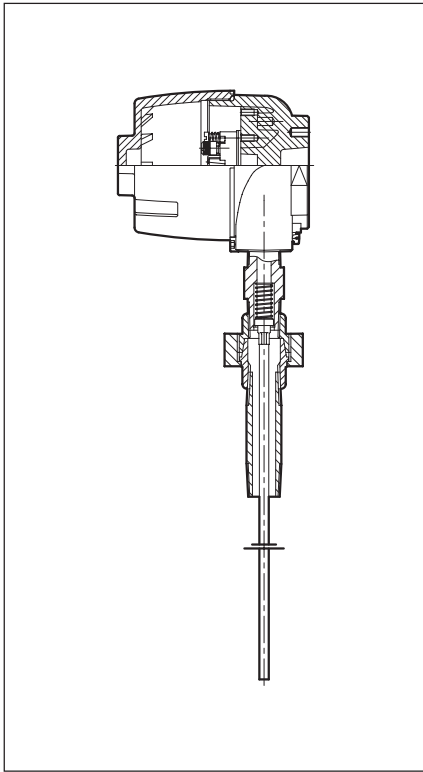
With Transmitter



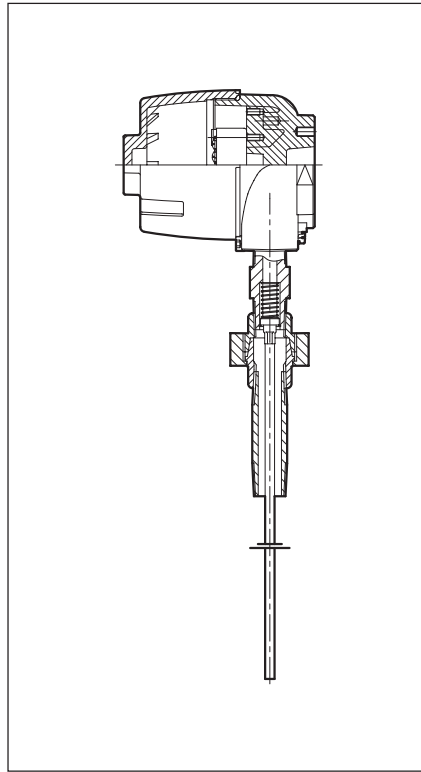
With Transmitter and Digital Display

...Alternative Version with Center Spring according to US Standards

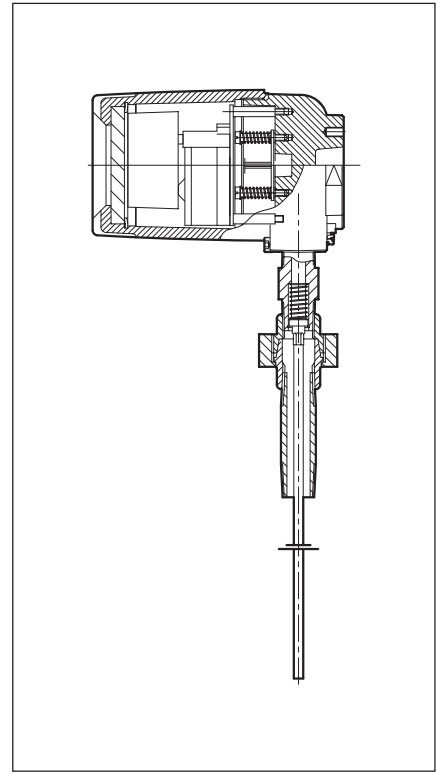
Radial Head Mounting



With Ceramic Terminal Block

















With Transmitter



With Transmitter and Digital Display

Head-mounted Temperature Transmitters

	Analog Fixed Range	Digital Programmable	Digital HART™	Digital Fieldbus PROFIBUS PA	Digital Fieldbus FOUNDATION Fieldbus
			 	 	 
	TR04-Eco/TRO4	TH01/TH01-Ex	TH02/TH02-Ex	TF12/TF12-Ex	TF02/TF02-Ex
Input (Sensor Type)					
RTD type (2-, 3- and 4-wire)/ min. span	Pt100/40K	Pt100 to 1000/20K Ni100, Ni500/20K	Pt50 to Pt100 to Pt1000/20k Ni100/20k	Pt50 to Pt100 to Pt1000 Ni50 to Ni100 to Ni1000	Pt10 to Pt100 to Pt1000 Ni50 to Ni100 to Ni1000 Cu10, Cu100
THC type (internal CJC)	–	B, E, J, K, L, N, R, S, T, U		B, E, J, K, R, S, T, N, C, D, L, U	B, C, D, E, J, ,K L, N, R, S, T, ,U
Voltage	–	–125 to 1200mV		–15 to 115mV	–100 to 1200mV
Resistance	–	0 to 5000Ω		0 to 400Ω/0 to 4000Ω	0 to 500Ω/0 to 4000Ω
Electrical Isolation (Input/Output)	–	Yes		Yes	Yes
Supply Voltage	10.5 to 30V DC Ex 10.5 to 29.4V DC	11.5 to 30V DC Ex 11.5 to 29.4V DC	8.5 to 30V DC Ex 8.5 to 29.4V DC	9 to 32V Ex 9 to 17.5V	9 to 32V Ex 9 to 24V
Output	4 to 20mA	4 to 20mA + digital signal	4 to 20mA + HART signal	Up to 3 digital values + status	Up to 2 digital values + status
Explosion Protection					
Ex-N	PTB: ATEX  II 3G EEx N A IIC T6			–	DMT:ATEX (in prep.) II 3G EEx n A II T6
Non-incendive	–	–	FM, CSA Class I Div. 2 Groups A, B, C, D	–	FM, CSA (applied) Class I: Div. 2 Group A, B, C, D
Intrinsically Safe	PTB: ATEX  II 2(1) G EEx ia IIC T6	PTB: ATEX  II 2(1) G EEx [ia] ib IIC T6	PTB: ATEX  II 291)G EEx [ia] ib IIC T6	Zelm: ATEX  II 2 G EEx ia IIC T6	DMT: ATEX  II 1 G EEx ia IIC T6
	FM, CSA: Class 1, Div. 1, Groups A, B, C, D; T6; IS and Zone 1 or 0			–	FM, CSA (applied for)
Special Features	–	Diagnostics, arithmetic functions (mean, difference) custom linearization 64 capabilities		Dual channel, diagnostics, redundancy, arithmetic functions, custom linearization	One or dual channel parametry, diagnostics, custom linearization
Indicator/ Local Configurator	Yes ²⁾ /–	Yes ²⁾ /–	Yes ²⁾ /Yes ²⁾	No /Yes	Planned
Configuration – Software Tools	–	SMART VISION	SMART VISION AMS, DTM for FDT 0.98-1	DTM for HDT 0.98-1 and SMART VISION SIEMENS Simatic PDM-driver	Configuration with DD and CFF file
Configuration – Handheld	–	STT04	691HT, STT04, HHT275	–	–

1) The above are the more common ranges of transmitter, other ranges are available details of which can be obtained on application.

2) Displays and meters are available in conjunction with complete sensor assemblies only.

General information

Accessories

Removable inserts are already available and are listed in a separate Data Sheet.

Delivery time

For scope of catalog – 3 weeks, customized versions upon request.

Options

- other process connection
- other type of protection tube
- other tube material
- certification/tests
(refer to Data Sheet 10/10-3.81 EN)

Further Versions

The available Data Sheet represents our standard delivery program. For further technical data see Data Sheet 10-3.03 EN. Other models are available on request.

- Special versions, with drilled thermowells, are also available with FM/CSA certification.
- As an option, a second cable entry is available
- Over-voltage protection available on request

Hints for cost-effective engineering

The use of standard components and lengths reduces price and delivery time.

Please consider the use of standardized nominal lengths and emphasize the importance of the insertion length.

Applying welded tubes, for example, allows a free choice of insertion length. As a result, the extension length results from the difference between nominal and insertion lengths. Note that the extension length must not be less than 45mm (1.78 in.).

Reliability, Availability, Security

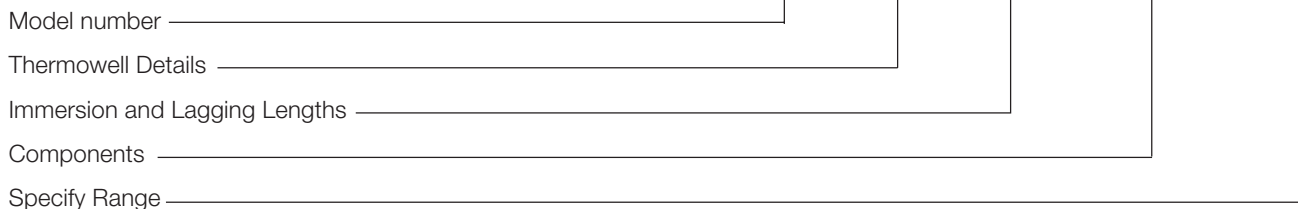
The SensyTemp Heavy Duty has been designed for arduous environmental conditions. In order to fulfill these requirements, we use only pre-selected and tested components.

Please note the following limitations with regards to the design:

- Extension diameter min. 14mm (0.55 in.)
- Process connection min. 1/2 in. or comparable
- Only applicable thermowells to be used

Example – Ordering Code

V10681 – LF3F2 – 150 – 5 – D2BG0D9P – 0...250°C



Ordering Information

CODE No. PART 1

Heavy Duty Thermowell Assemblies (Solid Drilled)		Model No. V10681/	X	XX	XX	XXX	X
Material							
304 stainless steel			H				
316 stainless steel			L				
321 stainless steel			M				
Hastelloy C276 *			P				
Hastelloy B2 *			B				
Monel alloy 400 *			A				
Inconel alloy 600 *			U				
Incoloy alloy 800 *			C				
Other materials			X				
Process Connection		Size	Rating (lb)	Facing			
Flange fillet & seal weld	1 in.	150	RF or RTJ	F1			
Flange fillet & seal weld	1 in.	300	RF or RTJ	F2			
Flange fillet & seal weld	1 1/2 in.	150	RF or RTJ	F3			
Flange fillet & seal weld	1 1/2 in.	300	RF or RTJ	F4			
Flange fillet & seal weld	1 1/2 in.	600	RF or RTJ	F5			
Flange full penetration weld **	1 1/2 in.	150	RF or RTJ	P3			
Flange full penetration weld **	1 1/2 in.	300	RF or RTJ	P4			
Flange full penetration weld **	1 1/2 in.	600	RF or RTJ	P5			
Flange full penetration weld **	1 1/2 in.	900	RF or RTJ	P6			
Flange fillet & seal weld	2 in.	150	RF or RTJ	F7			
Flange fillet & seal weld	2 in.	300	RF or RTJ	F8			
Flange fillet & seal weld	2 in.	600	RF or RTJ	F9			
Flange full penetration weld **	2 in.	150	RF or RTJ	P7			
Flange full penetration weld **	2 in.	300	RF or RTJ	P8			
Flange full penetration weld **	2 in.	600	RF or RTJ	P9			
No flange weld-in				W1			
Screwed thread	1/2 in. BSP			S1			
Screwed thread	1/2 in. NPT			S2			
Screwed thread	3/4 in. BSP			S3			
Screwed thread	3/4 in. NPT			S4			
Screwed thread	1 in. BSP			S5			
Screwed thread	1 in. NPT			S6			
Stem Design							
Solid drilled straight flanged				F1			
Solid drilled tapered flanged				F2			
Solid drilled reduced tip flanged				F3			
Solid drilled screwed tapered no lag				S1			
Solid drilled screwed straight no lag				S2			
Solid drilled screwed straight lag length 'T'				S4			
Solid drilled screwed tapered lag length 'T'				S5			
Special design				XX			
Insertion Length (mm) 'U' to be stated in 10mm increments							
Length 100 (Example 100 = 100mm)						100	
↓						↓	
Length 990 (Example 990 = 990mm)						990	
Lagging Length 'T' (mm)							
0							0
10							1
20							2
30							3
40							4
50 (standard for flanged thermowells up to 600lb)							5
60							6
70 (standard for flanged thermowells above 600lb)							7
80							8
90							9

* Wetted parts only stainless steel backing flange.

** Full penetration weld stainless steel flanges only

...Ordering Information

CODE No. PART 1

Heavy Duty Thermowell Assemblies (Solid Drilled)	Model No. V10681/	X	XX	XX	XXX	X
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PART 2

						X	X	X	X	X	X
Extension Type	Threads	Thermowell	Length 'E' (mm)	Material							
E1S – 2 nipples & 1 union	1/2 in. NPT	1/2 in. NPT	150	Stainless steel	D						
E1S – 2 nipples & 1 union (oil seals fitted)	1/2 in. BSP	1/2 in. NPT	150	Stainless steel	F						
E1S – spring version	1/2 in. NPT	1/2 in. NPT	150	Stainless steel	H						
E2S – nipple with locknut	1/2 in. BSP	1/2 in. NPT	150	Stainless steel	J						
E3S – nipple with locknut	1/2 in. BSP	1/2 in. NPT	75	Stainless steel	L						
E4S – fabricated	M24 x 1.5	1/2 in. NPT	50	Stainless steel	M						
E5S – nipple with locknut	1/2 in. BSP	1/2 in. NPT	30	Stainless steel	N						
E7S – hexagon (oil seal fitted)	1/2 in. BSP	1/2 in. NPT	34	Stainless steel	T						
	1/2 in. BSP/NPT		34								
Sensor	Sheath Material										
1 x Pt100, 2-wire	321 stainless steel					1					
1 x Pt100, 3-wire	321 stainless steel					2					
1 x Pt100, 4-wire	321 stainless steel					3					
2 x Pt100, 2-wire	321 stainless steel					4					
2 x Pt100, 3-wire	321 stainless steel					5					
1 x Type K (insulated hot junction)	310 stainless steel					A					
2 x Type K (insulated hot junction)	310 stainless steel					B					
1 x Type K (insulated hot junction)	Inconel					C					
2 x Type K (insulated hot junction)	Inconel					D					
1 x Type J (insulated hot junction)	321 stainless steel					E					
2 x Type J (insulated hot junction)	321 stainless steel					F					
1 x Type T (insulated hot junction)	321 stainless steel					G					
1 x Type T (insulated hot junction)	321 stainless steel					H					
Accuracy	Pt100Ω IEC 60.751										
Class 'B'	Standard									B	
Class 'A'	Specify range									A	
	Thermocouples										
Class 1						1					
Class 2	Standard					2					
Connection Head	Material	Cable Entry	I/P Rating	Remarks							
BUZ	Aluminium	M20 single	IP65							A	
BUZ 'H'	Aluminium	M20 single	IP65							B	
KNE	Aluminium	Single	IP66							C	
KI	Cast iron	Single	IP66							D	
AGL	Aluminium	Single	IP66							G	
AGLH	Aluminium	Single	IP66							H	
AGLHD (not with TF transmitter)	Aluminium	Single	IP66	With Prometer display						K	
AGLHD (not with TF transmitter)	Aluminium	Single	IP66	With Cometer						R	
AGS	Stainless steel	Single	IP66							L	
AGSH	Stainless steel	Single	IP66							M	
AgSHD (not with TF transmitter)	Stainless steel	Single	IP66	With Prometer display						N	
AgSHD (not with TF transmitter)	Stainless steel	Single	IP66	With CoMeter						T	
Cable Entry Thread											
M20 x 1.5	Standard										0
2 x M20 x 1.5 (only on AG version)											1
1/2 in. NPT											2
2 x 1/2 in. NPT (only on AG version)											3
Certification											
EEx 'd'											D
EEx 'N'											N
EEx 'ia'											A
Safe											S

Heavy Duty Assembly for the "Oil & Gas Industry"

Temperature Sensor for Arduous Environments – Ex certified including Ex d according to ATEX

SS/HDA_3

CODE No. PARTS 1 and 2											PART 3																																																			
Heavy Duty Thermowell Assemblies (Solid Drilled)		Model No. V10681/	X	XX	XX	XXX	X	X	X	X	X	X	X	X	XX																																															
Head-mounted Transmitter																																																														
Without (terminal block fitted)																																																														
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													<table border="1"> <thead> <tr> <th colspan="3">Measurement Range</th> </tr> <tr> <th>Zero</th> <th>Span</th> <th>C/F</th> </tr> </thead> <tbody> <tr> <td>N/A</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>N/A</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> </tr> </tbody> </table>			Measurement Range			Zero	Span	C/F	N/A	N/A	N/A	N/A	N/A	N/A	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?		
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TR-04-Eco	Fixed range Pt 100Ω only											1																																																		
TR-04-Ex	Fixed range Pt 100Ω only											A																																																		
TH-01	Programmable											6																																																		
TH-01-Ex	Programmable											F																																																		
TH-02	Programmable Hart Protocol											9																																																		
TH-02-Ex	Programmable Hart Protocol											J																																																		
TF-12	Profibus PA (no indication)											K																																																		
TF-12-Ex	Profibus PA (no indication)											L																																																		
TF-02	Foundation Fieldbus (no indication)											M																																																		
TF-02-Ex	Foundation Fieldbus (no indication)											N																																																		
Fixed Transmitter Ranges TR 04																																																														
Fixed range –30 to 60°C	Standard											A																																																		
Fixed range –20 to 40°C	Standard											B																																																		
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Fixed range 0 to 60°C	Standard											D																																																		
Fixed range 0 to 100°C	Standard											E																																																		
Fixed range 0 to 120°C	Standard											F																																																		
Fixed range 0 to 150°C	Standard											G																																																		
Fixed range 0 to 200°C	Standard											H																																																		
Fixed range 0 to 250°C	Standard											J																																																		
Fixed range 0 to 300°C	Standard											K																																																		
Fixed range 0 to 400°C	Standard											L																																																		
Fixed range 0 to 800°C	Standard											M																																																		
Non-standard range (fixed)												X																																																		
Programmed Range																																																														
Default factory settings (Pt 100Ω, 0 to 100°C, 4-wire)													O																																																	
Defined range ... to ...													P																																																	

Options	Call Factory for Price and Delivery
Bonded hot junction (single only)	
3000lb nipples and union	
Tag number on stainless steel tag	
Internal pressure test of thermowell	
External pressure test of thermowell	
Chain for lid of connection head (AGL & AGS only)	
Heat treatment (NACE NR 10-90)	
Dye penetrant test	
Clean for oxygen service	
Clean for chlorine service	
Frequency calculation (Murdock)	
Transmitter calibration @ 2 points	
Polished finish on stem	
Positive metal identification	
Full mechanical test certificate	
Other (please specify)	
Operating and maintenance instructions	

Heavy Duty Assembly for the "Oil & Gas Industry"

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