Data Sheet
SS/HDA_5

Heavy Duty Assembly for the Oil & Gas Industry

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

- **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

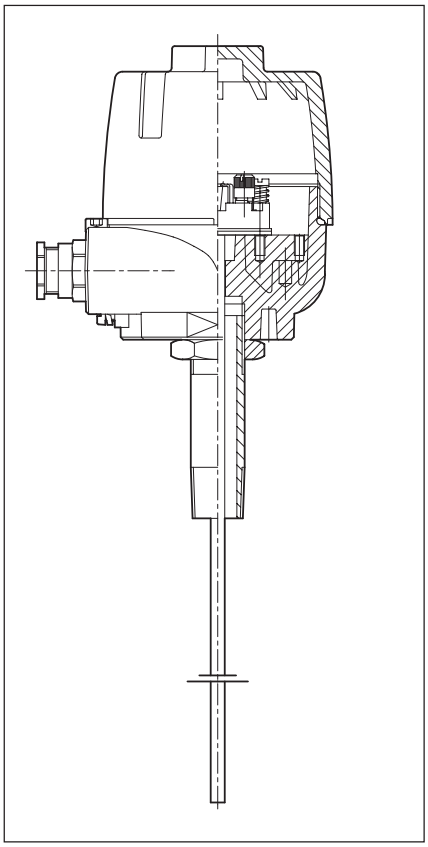
Engineered solutions for optimized and dependable process measurements

Description

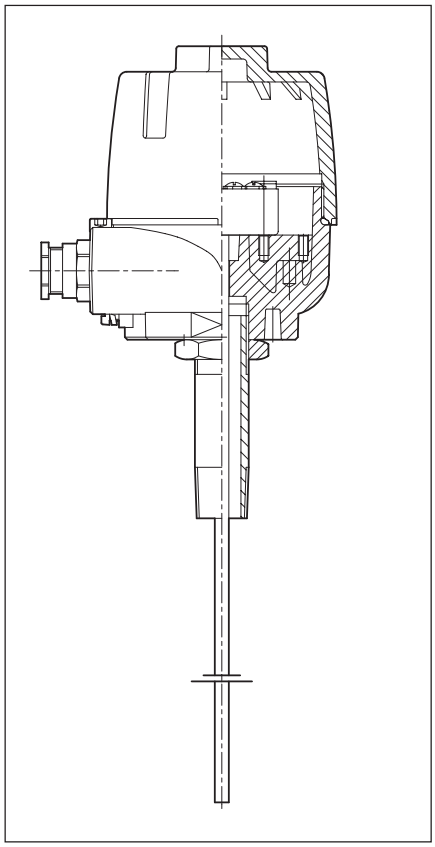
Our Heavy Duty Temperature Sensors have been developed for applications in particularly arduous environmental conditions. In connection with special inserts, this sensor may be supplied in an intrinsically safe (Zone 0), Flameproof (Zone 1) or non-sparking (Zone 2) concept.

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

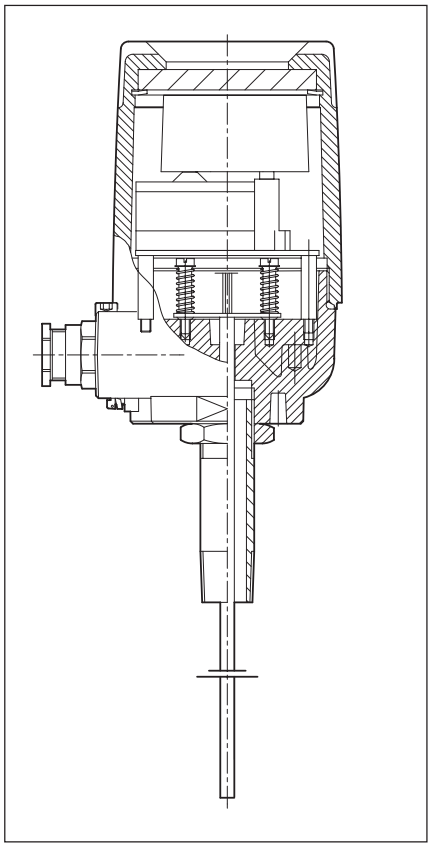
Connection Heads and Standard Assembly for Transmitters



With Ceramic Terminal Block



With Replaceable Transmitter Mounted on the Insert

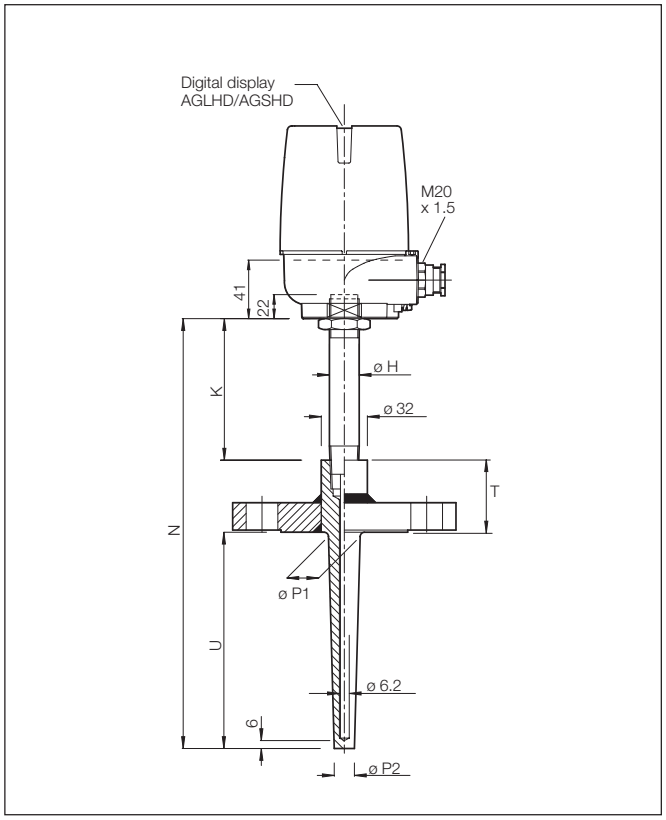


With Transmitter and Digital Display

Head-mounted Transmitters

Transmitter	EEx ia	EEx n	EEx d with Suitable containment
TR-04	✓	✓	✓
TH-01	✓	–	✓
TH-02	✓	✓	✓
TF-12	✓	–	✓
TF-02	✓	✓	✓

Sensor Design



Key

N = Nominal length

K = Extension length

U = Immersion length

P1 = Stem diameter (see Table)

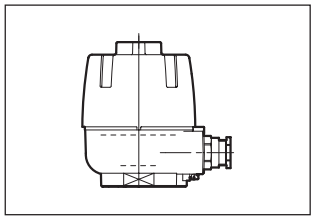
P2 = Stem diameter at tip (see Table)

T = Lagging length

Flange	Thread	P1	P2
1 in.	3/4 in.	20 mm	16 mm
1 1/2 in....2 in.	1 in.	25 mm	20mm

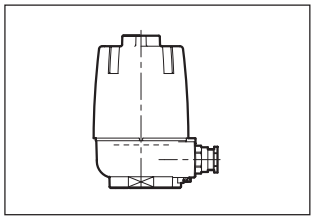
Connection Heads

Without Display



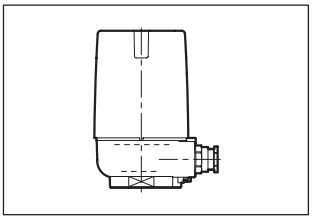
AGL *Aluminium Alloy*
Epoxy coating, 70 µm
AGS *stainless steel*

Without Display



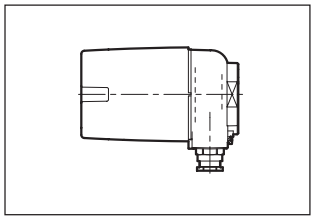
AGLH *Aluminium Alloy*
Epoxy coating, 70 µm
AGSH *stainless steel*

With Digital Display



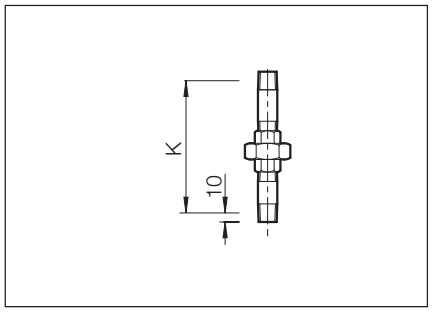
AGLHD *Aluminium Alloy*
Epoxy coating, 70 µm
AGSHD *stainless steel*

With Digital Display

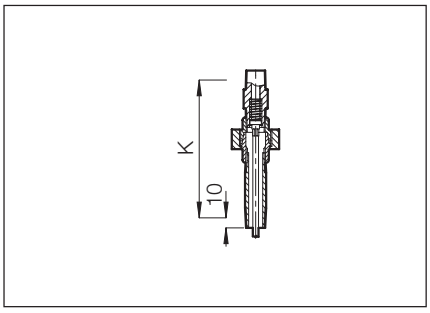


AGLFD *Aluminium Alloy*
Epoxy coating, 70 µm
AGSFD *Stainless Steel*

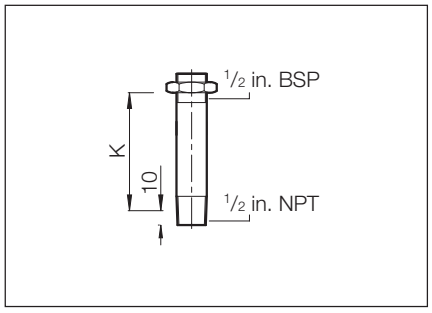
Extension Connections Assemblies



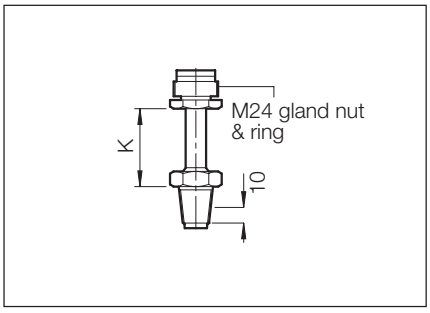
E1S nipple & union
2 x ½ in. NPT



E1S nipple/union & spring
2 x ½ in. NPT



E2S or E3S nipple
½ in. BSP x ½ in. NPT



E4S Gland nut & ring
M24 x ½ in. NPT

Key
K = Extension length

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:

- perfect concentricity of the bore with respect to the outside diameter
- a consistent wall-thickness over the full length of the thermowell
- 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 suppliersÕ materials certificates are provided (to EN10204 3.1). 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 to the PED (97/23/EC SEP).

Materials

ABB is experienced in the handling, machining and welding of all types of stainless steel and special alloys, such as Monel, Inconel, Incolloy, Duplex, Super Duplex 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 RA 3.2 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., Stellite, 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 from release of materials through manufacture, including material analysis checks and ultrasonic examination.

Final inspection includes the following:

- Full dimensional check
- Bore concentricity check
- Hydro testing to 1.5 x flange rating
- Dye penetrant test if required
- Radiography if required
- Ultrasonic testing if required
- Ferrite scope testing if required
- PMI (qualitative and quantitative) if required
- Thermowell calculations in accordance with Murdock are available.

All thermowells are thoroughly cleaned and degreased prior to despatch.

Documentation

Each instrument is supplied with 3.1 certification to EN10204 3.1, wetted parts only, and a certificate of conformity and a Declaration of the Safe Conditions of Use.

Where a tag number is provided by the customer ABB will engrave this onto the Thermowell and a stainless steel tag plate which will be wired to the connection head.

Aditional documentation to Customer's specification is available on request.

Selection of Dimensions and Profiles

1) 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) Stepped Profile.

   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.

4) Choose immersion Length (U) to ensure that the sensing element protrudes sufficiently into the medium whose temperature is to be detected, to give a representative 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 1/3 of the pipe diameter in from the outer skin.

5) **Response Times**

   EM 60751 describes response times in terms of a step change in temperature of water flowing at 0.4 m/s in the range of 25 ¡C...35 ¡C. For solid-drilled stainless steel thermowells of the tapered design the response to T 0.5 is of the order of 15 s and to T 0.9 is in the order of 45 s.

   For parallel design thermowells the response to T 0.5 and T 0.9 is in the order of 30 s and 60 s respectively. A reduced tip design responds faster than the tapered design, T 0.5 10 s typically T 0.9 25 s typically.

   Response times in operation are affected by many factors including the conductivity of materials*, the specific heat capacity of materials*, the thermal gradient, the flow rate of the medium and the pressure of a gas.

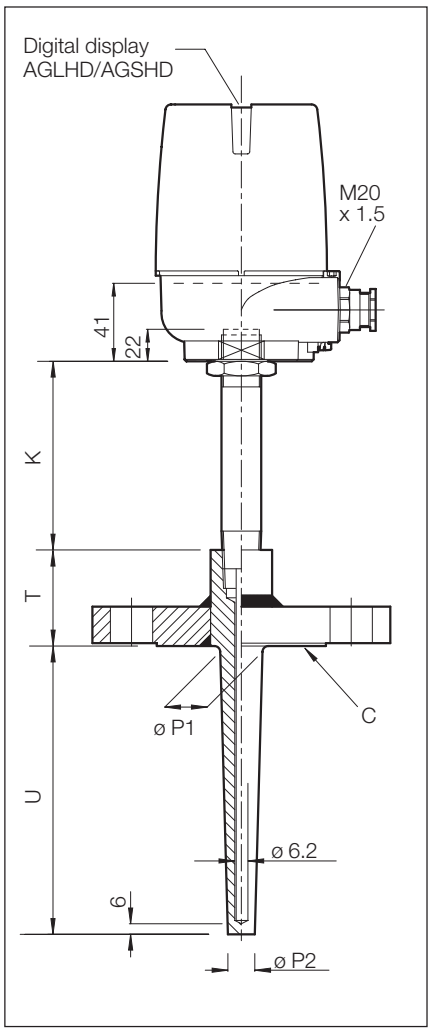
   * Materials of construction and fluid under test.

6) **Mechanical Stress and Vibration**

   Solid-drilled thermowells are extremely strong devices designed for use in the most demanding and arduous environments. Should concern exist as to the sensitivity of a particular themowell please consult our engineering team for advice. Calculations of the thermowell assemblies to withstand static, kinetic and harmonic stresses are available to the Murdock Standard.

Sensor Design

Example



Key

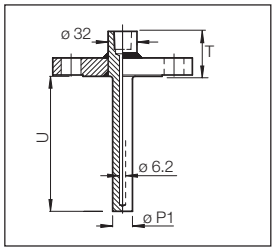
K = Extension length

U = Immersion length

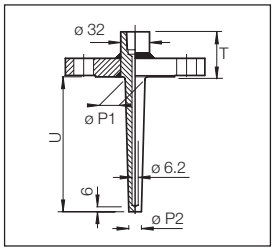
T = Lagging Length

C = Process Connection

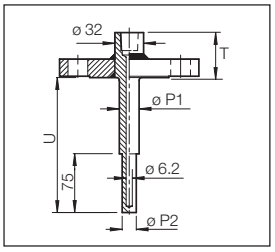
Thermowell



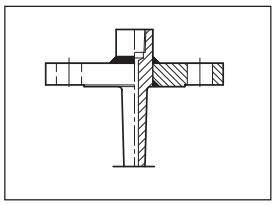
Type F1 Straight Profile Flanged



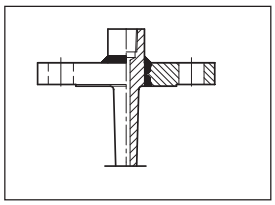
Type F2 Taper Profile Flanged



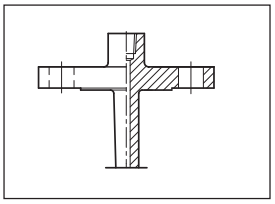
Type F3 Stepped Profile Flanged



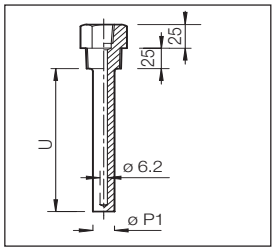
Welded on Flange Fillet & Groove



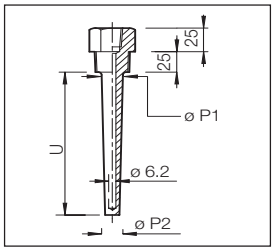
Welded on Flange Full Penetration Weld



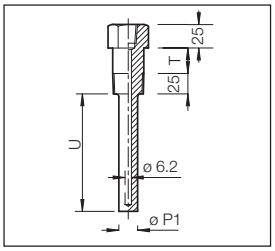
Forged Thermowell



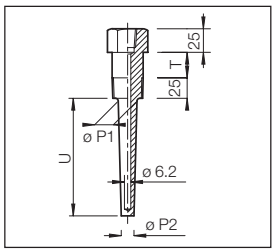
Type S1 Straight Profile Screwed



Type S2 Taper Profile Screwed



Type S4 Straight Profile Screwed



Type S5 Taper Profile Screwed

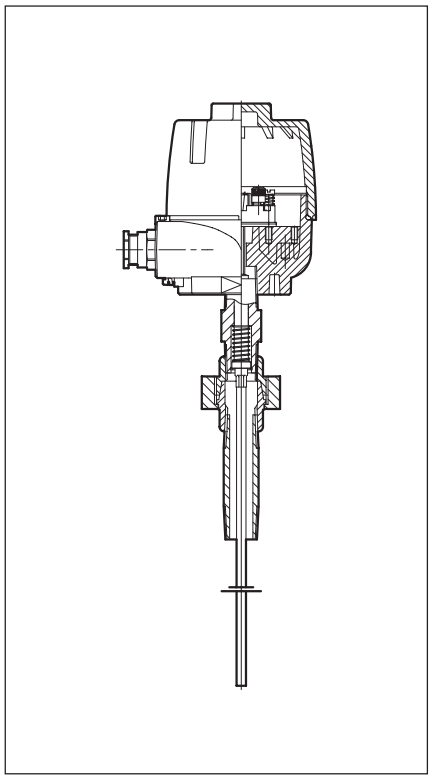
Alternative Version with Center Spring according to US Standards

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

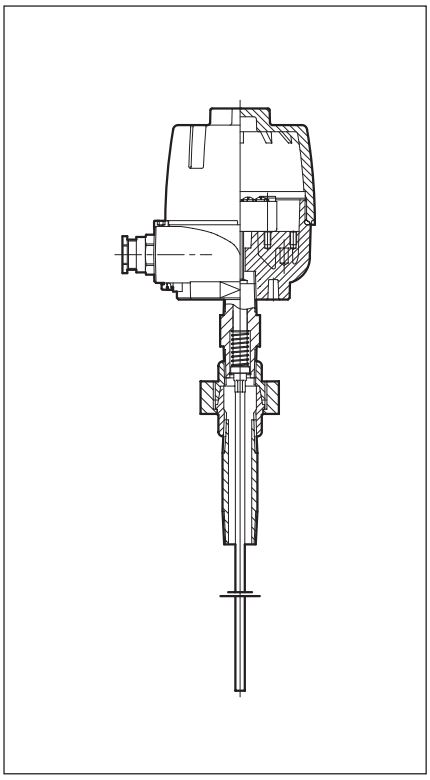
Even though the exchange of the measuring-insert requires more effort; one solution is the application of integral sensor assemblies, in conjunction with field-mounted temperature transmitters. This option enables the observation of the display at a 90¡ angle in relation to the thermowell.

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

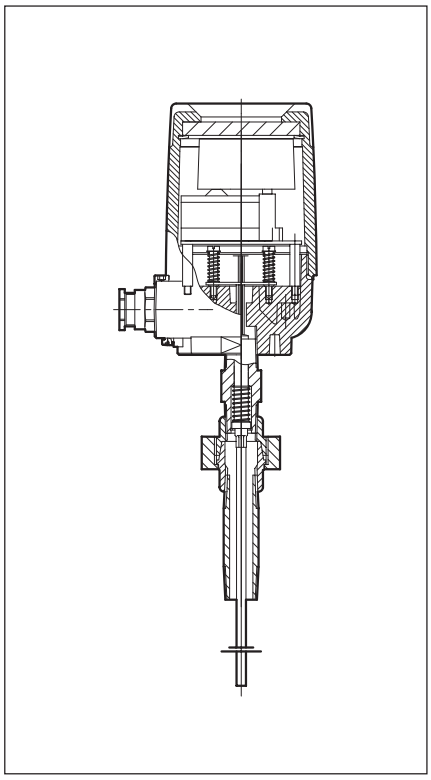
Axial Head Mounting



With Ceramic Terminal Block



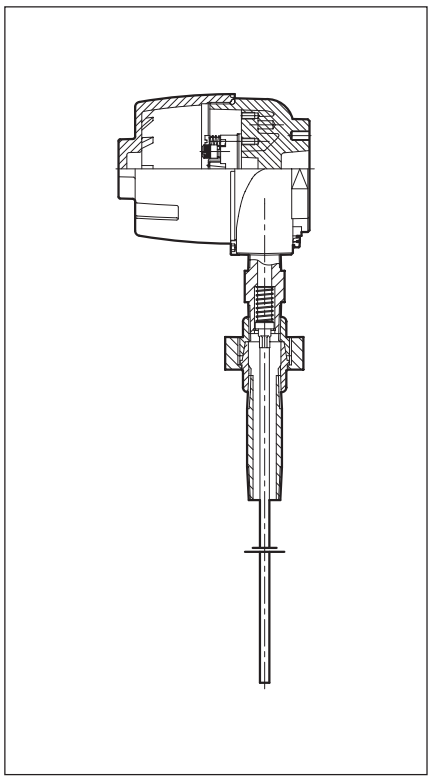
With Transmitter



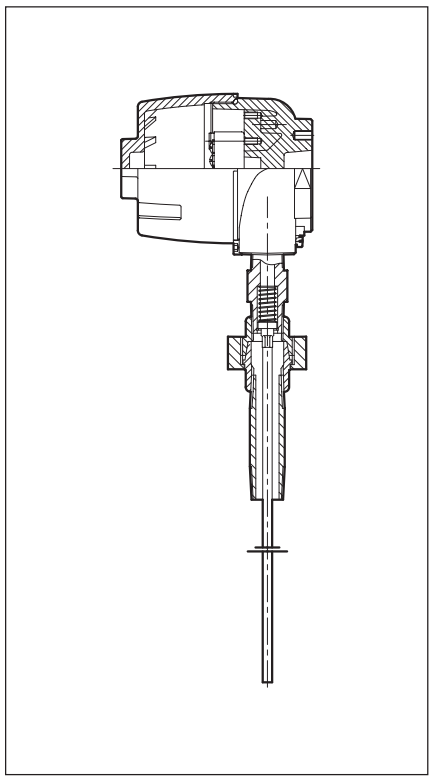
With Transmitter and Digital Display

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

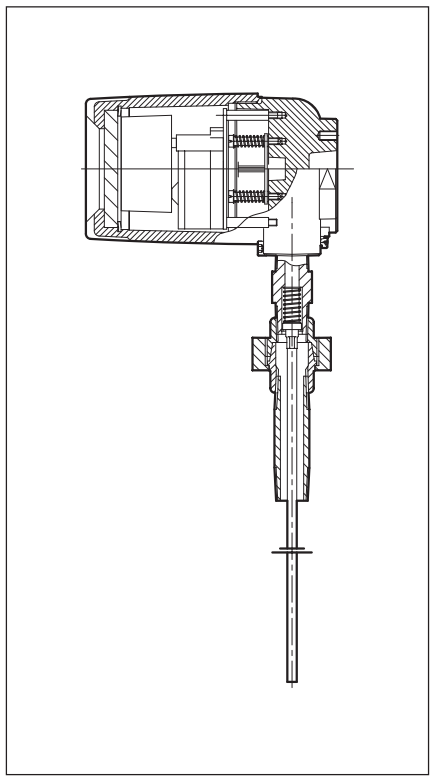
Radial Head Mounting



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...1000/20K Ni100, Ni500/20K	Pt50 to Pt100 ...Pt1000/20k Ni100/20k	Pt50 to Pt100...Pt1000 Ni50 to Ni100...Ni1000	Pt10 to Pt100...Pt1000 Ni50 to Ni100...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...200mV		–15...15mV	–100...200mV
Resistance	–	0...5000Ω		0...400Ω/0...4000Ω	0...500Ω/0...4000Ω
Electrical Isolation (Input/Output)	–	Yes		Yes	Yes
Supply Voltage	10.5...30V DC Ex 10.5...29.4V DC	11.5...30V DC Ex 11.5...29.4V DC	8.5...30V DC Ex 8.5...29.4V DC	9...32V Ex 9...17.5V	9...32V Ex 9...24V
Output	4...20mA	4...20mA	4...20mA + HART signal	Up to 3 digital values + status	Up to 2 digital values + status
Explosion Protection					
Ex-n Non-sparking	**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 1 Div. 2 Groups A, B, C, D, T6	–	**FM, CSA** (applied) Class 1: 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		Class 1, Div. 1 Groups A, B, C, D, T6 and Zone 0	–	**FM, CSA** (applied for)
Special Features	–	Diagnostics, arithmetic functions (mean, difference) custom linearization 64 capabilities	custom linearization 32 capabilities	Dual channel, diagnostics, redundancy, arithmetic functions, custom linearization	One or dual channel parametry, diagnostics, custom linearization
Indicator/ Local Configurator	Yes [2]/No	Yes [2]/No	Yes [2]/Yes [2]	No	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.

Ordering Information – Solid Drilled Thermowell

Heavy Duty Thermowell Assemblies (Solid Drilled)	Model No. V10681/	X	XX	XX	XXX	X
		CODE No. PART 1				
Material						
316 Stainless Steel UNSS31603/ASME IX (Standard)		L				
304 Stainless Steel UNSS30403/ASME IX		H				
321 Stainless Steel UNSS32103/ASME IX		M				
Hastelloy C276 UNSN10276/ASME IX	(Note 14)	P				
Hastelloy B2 UNSN10665/ASME IX	(Note 14)	B				
Monel Alloy 400 UNSN04400/ASME IX	(Note 14)	A				
Inconel Alloy 600 UNSN06600ASME IX	(Note 14)	U				
Incoloy Alloy 800 UNSN08800/ASME IX	(Note 14)	C				
Duplex UNSNOS31803/ASME IX	(Note 14)	D				
Super Duplex UNSNOS32550/ASME IX	(Note 14)	S				
Other Materials		X				
Process Connection						
1 in. 150 lb RF Flange – Fillet & Seal weld			F1			
1 in. 300 lb RF Flange – Fillet & Seal weld			F2			
1½ in. 150 lb RF Flange – Fillet & Seal weld			F3			
1½ in. 300 lb RF Flange – Fillet & Seal weld			F4			
1½ in. 600 lb RF Flange – Fillet & Seal weld			F5			
1½ in. 150 lb RF Flange – Full penetration weld	(Note 15)		P3			
1½ in. 300 lb RF Flange – Full penetration weld	(Note 15)		P4			
1½ in. 600 lb RF Flange – Full penetration weld	(Note 15)		P5			
1½ in. 900 lb RF Flange – Full penetration weld	(Note 15)		P6			
1½ in. 600 lb RTJ Flange – Full penetration weld	(Note 15)		R1			
1½ in. 900 lb RTJ Flange – Full penetration weld	(Note 15)		R2			
2 in. 150 lb RF Flange – Fillet & Seal weld			F7			
2 in. 300 lb RF Flange – Fillet & Seal weld			F8			
2 in. 600 lb RF Flange – Fillet & Seal weld			F9			
2 in. 150 lb RF Flange – Full penetration weld	(Note 15)		P7			
2 in. 300 lb RF Flange – Full penetration weld	(Note 15)		P8			
2 in. 600 lb RF Flange – Full penetration weld	(Note 15)		P9			
2 in. 600 lb RTJ Flange – Full penetration weld	(Note 15)		R3			
Other flanged			FX			
½ in. BSP Screwed Thread Parallel			S1			
½ in. NPT Screwed Thread Tapered			S2			
¾ in. BSP Screwed Thread Parallel			S3			
¾ in. NPT Screwed Thread Tapered			S4			
1 in. BSP Screwed Thread Parallel			S5			
1 in. NPT Screwed Thread Tapered			S6			
Other Screwed			SX			
Stem Design						
Solid Drilled – Straight Flanged	(Note 1)			F1		
Solid Drilled – Tapered Flanged	(Note 1)			F2		
Solid Drilled – Reduced Tip Flanged	(Note 1)			F3		
Solid Drilled – Screwed Tapered No Lag	(Note 2)			S1		
Solid Drilled – Screwed Straight No Lag	(Note 2)			S2		
Solid Drilled – Screwed Straight Lag Length 'T'	(Note 2)			S4		
Solid Drilled – Screwed Tapered Lag Length 'T'	(Note 2)			S5		
Immersion Length (mm) 'U' to be stated in 10 mm increments						
Length 100 (Example 100 = 100 mm)					100	
↓					↓	
Length 990 (Example 990 = 990 mm)					990	
Length 999 (Example 999 = 1000 m)					999	
Lagging Length 'T' (mm)						
0	(Note 3)					0
50 mm (Standard for Flanged Thermowells up to 600 lb)	(Note 4)					5
70 mm (Standard for Flanged Thermowells above 600 lb)	(Note 4)					7
10 mm	(Note 5)					1
20 mm	(Note 5)					2
30 mm	(Note 5)					3
40 mm	(Note 5)					4
60 mm	(Note 4)					6
80 mm	(Note 4)					8
90 mm	(Note 4)					9

For Notes refer to page 17

Continued on next page.

		CODE No. PART 1					*PART 2*					
Heavy Duty Thermowell Assemblies (Solid Drilled)	**Model No. V10681/**	X	XX	XX	XXX	X	X	X	X	X	X	X
Extension Type												
E1S – 2 Nipples & 1 Union – 1/2 in. NPT Head with 1/2 in. NPT Thermowell E = 150 mm Stainless Steel							D					
E1S – Spring Version – 1/2 in. NPT Head with 1/2 in. NPT Thermowell E = 150 mm Stainless Steel							H					
E2S – Nipple with Locknut – 1/2 in. BSP Head with 1/2 in. NPT Thermowell E = 75 mm Stainless Steel							J					
E3S – Nipple with Locknut – 1/2 in. BSP Head with 1/2 in. NPT Thermowell E = 50 mm Stainless Steel							L					
E4S – Fabricated – M24 x 1.5 Head with 1/2 in. NPT Thermowell E = 30 mm Stainless Steel							M					
E5S – Nipple with Locknut – 1/2 in. BSP Head with 1/2 in. NPT Thermowell E = 34 mm Stainless Steel							N					
Sensor												
1 x Pt100, 3-wire Sensor with Sheath in Stainless Steel								2				
1 x Pt100, 4-wire Sensor with Sheath in Stainless Steel								3				
2 x Pt100, 2-wire Sensor with Sheath in Stainless Steel								4				
2 x Pt100, 3-wire Sensor with Sheath in Stainless Steel								5				
1 x Type K (Insulated Hot Junction) Sensor with Sheath in Stainless Steel								A				
2 x Type K (Insulated Hot Junction) Sensor with Sheath in Stainless Steel								B				
1 x Type K (Insulated Hot Junction) Sensor with Sheath in Inconel								C				
2 x Type K (Insulated Hot Junction) Sensor with Sheath in Inconel								D				
1 x Type J (Insulated Hot Junction) Sensor with Sheath in Stainless Steel								E				
2 x Type K (Insulated Hot Junction) Sensor with Sheath in Stainless Steel								F				
1 x Type T (Insulated Hot Junction) Sensor with Sheath in Stainless Steel								G				
2 x Type T (Insulated Hot Junction) Sensor with Sheath in Stainless Steel								H				
Accuracy												
Pt100 ohm, Class B Accuracy – Standard Range	(Note 6)								B			
Pt100 ohm, Class A Accuracy – Specify Range	(Note 6)								A			
Thermocouple Class 1	(Note 7)								1			
Thermocouple Class 2	(Note 7)								2			
Connection Head												
AGL Connection Head in Aluminium with M20 Single Cable Entry IP65										G		
AGLH Connection Head in Aluminium with M20 Single Cable Entry IP65										H		
AGLFD (Not with TF transmitter) Radial Mounting Connection Head in Aluminium with Single Cable Entry IP66 with CoMeter	(Note 16)									V		
AGLFD (Not with TF transmitter) Radial Mounting Connection Head in Aluminium with Single Cable Entry IP66 with ProMeter	(Note 16)									W		
AGLHD (Not with TF transmitter) Connection Head in Aluminium with Single Cable Entry IP66 with ProMeter										K		
AGLHD (Not with TF transmitter) Connection Head in Aluminium with Single Cable Entry IP66 with CoMeter										R		
AGS Connection Head Stainless Steel with Single Cable Entry IP66										L		
AGSH Connection Head Stainless Steel with Single Cable Entry IP66										M		
AGSFD (Not with TF transmitter) Radial Mounting Connection Head in Stainless Steel with Single Cable Entry IP66 with CoMeter	(Note 16)									Y		
AGSFD (Not with TF transmitter) Radial Mounting Connection Head in Stainless Steel with Single Cable Entry IP66 with ProMeter	(Note 16)									Z		
AGSHD (Not with TF transmitter) Connection Head in Stainless Steel with Single Cable Entry IP66 with ProMeter										N		
AGSHD (Not with TF transmitter) Connection Head in Stainless Steel with Single Cable Entry IP66 with CoMeter										T		
Cable Entry												
1 x M20 x 1.5 (Standard)											0	
2 x M20 x 1.5	(Note 8)										1	
1 x 1/2 in. NPT											2	
2 x 1/2 in. NPT	(Note 8)										3	
Certification												
(EEx d) Explosion-proof suitable for Zone 1												D
(EEx n) Increased safety suitable for Zone 2												N
(EEx ia) (Transmitter only see associated data sheets* for details). Suitable for Zone 0												A
Safe												S

* Data sheet Pt. No. 10/11–8.14EN Head-mounted Temperature Transmitter TR04-Eco/TR04-Ex
Data sheet Pt. No. 10/11–8.19EN Head-mounted Temperature Transmitter TH02/TH02-Ex
Data sheet Pt. No. 10/11–8.25EN Head-mounted Temperature Transmitter TF02/TF02-Ex
Data sheet Pt. No. 10/11–8.26EN Head-mounted Temperature Transmitter TF12/TF12-Ex
Data sheet Pt. No. 3KDE115080R1001 Head-mounted Temperature Transmitter TH01/TH01-Ex

For Notes refer to page 17

Continued on next page.

		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	X	XX
Head-mounted Transmitter															
Without (terminal block fitted)													0		
4...20 mA Fixed Range Pt 100 Ω only TR-04-Eco							(Notes 9, 6)						1		
4...20 mA Fixed Range Pt 100 Ω only TR-04-Ex (EEx ia Zone 0)							(Note 6)						A		
4...20 mA Programmable Range TH-01							(Note 9)						6		
4...20 mA Programmable Range TH-01-Ex (EEx ia Zone 0)													F		
Programmable Range Hart Protocol & 4...20 mA TH-02							(Notes 9)						9		
Programmable Range Hart Protocol & 4...20 mA TH-02-Ex (EEx ia Zone 0)													J		
Profibus PA only (No indication) TF-12							(Note 9, 10)						K		
Profibus PA only (No indication) TF-12-Ex (EEx ia Zone 0)							(Note 10)						L		
Foundation Fieldbus only (No indication) TF-02							(Notes 9, 10)						M		
Foundation Fieldbus only (No indication) TF-02 (EEx ia Zone 0)							(Note 10)						N		
Fixed Transmitter Ranges TR 04															
Standard Fixed range –30...60 °C							(Note 11)							A	
Standard Fixed range –20...40 °C							(Note 11)							B	
Standard Fixed range 0...40 °C							(Note 11)							C	
Standard Fixed range 0...60 °C							(Note 11)							D	
Standard Fixed range 0...100 °C							(Note 11)							E	
Standard Fixed range 0...120 °C							(Note 11)							F	
Standard Fixed range 0...150 °C							(Note 11)							G	
Standard Fixed range 0...200 °C							(Note 11)							H	
Standard Fixed range 0...250 °C							(Note 11)							J	
Standard Fixed range 0...300 °C							(Note 11)							K	
Standard Fixed range 0...400 °C							(Note 11)							L	
Standard Fixed range 0...600 °C							(Note 11)							M	
Non-standard range (fixed)							(Note 11)							X	
Programmed Range															
Default Factory Settings (Pt100 Ω, 0...100 °C, 4-wire)							(Note 12, 13)							O	
Defined Range (Specify from… to …)							(Note 13)							P	

Options	**Call Factory for Details**
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	

For Notes refer to page 17

Ordering Information – Forged Thermowell

CODE No. PART 1

Heavy Duty Thermowell Assemblies (Forged)	Model No. V10682/	X	XX	XX	XXX	X
Material						
316 Stainless Steel UNSS31603 (Standard)		L				
304 Stainless Steel UNSS30403		H				
321 Stainless Steel UNSS32103		M				
Hastelloy C276 UNSN10276	(Note 14)	P				
Hastelloy B2 UNSN10665	(Note 14)	B				
Monel Alloy 400 UNSN04400	(Note 14)	A				
Inconel Alloy 600 UNSN06600	(Note 14)	U				
Incoloy Alloy 800 UNSN08800	(Note 14)	C				
Duplex UNSNOS31803	(Note 14)	D				
Super Duplex UNSNOS32550	(Note 14)	S				
Other materials		X				
Process Connection						
1 in. 150 lb RF Flange			A1			
1 in. 300 lb RF Flange			A3			
1½ in. 150 lb RF Flange			B1			
1½ in. 300 lb RF Flange			B3			
1½ in. 600 lb RF Flange			B6			
1½ in. 600 lb RTJ Flange	(Note 15)		B7			
2 in. 150 lb RF Flange	(Note 15)		C1			
2 in. 300 lb RF Flange	(Note 15)		C3			
2 in. 600 lb RF Flange	(Note 15)		C6			
2 in. 600 lb RTJ Flange			C7			
Stem Design						
Solid Drilled – Straight Flanged				F1		
Solid Drilled – Tapered Flanged				F2		
Solid Drilled – Reduced Tip Flanged				F3		
Immersion Length (mm) 'U' to be stated in 10mm increments						
Length 100 (example 100 = 100mm) ↓ Length 400 (example 400 = 400mm)					100 ↓ 400	
Lagging Length 'T' (mm)						
50 mm (Standard for Flanged Thermowells up to 600 lb)						5
70 mm (Standard for Flanged Thermowells above 600 lb)						7
60 mm						6
80 mm						8
90 mm						9

For Notes refer to page 17

Continued on next page.

		CODE No. PART 1					*PART 2*					
Heavy Duty Thermowell Assemblies (Forged)	**Model No. V10682/**	X	XX	XX	XXX	X	X	X	X	X	X	X
Extension Type												
E1S – 2 Nipples & 1 Union – 1/2 in. NPT Head with 1/2 in. NPT Thermowell E = 150 mm Stainless Steel							D					
E1S – Spring Version – 1/2 in. NPT Head with 1/2 in. NPT Thermowell E = 150 mm Stainless Steel							H					
E2S – Nipple with Locknut – 1/2 in. BSP Head with 1/2 in. NPT Thermowell E = 75 mm Stainless Steel							J					
E3S – Nipple with Locknut – 1/2 in. BSP Head with 1/2 in. NPT Thermowell E = 50 mm Stainless Steel							L					
E4S – Fabricated – M24 x 1.5 Head with 1/2 in. NPT Thermowell E = 30 mm Stainless Steel							M					
E5S – Nipple with Locknut – 1/2 in. BSP Head with 1/2 in. NPT Thermowell E = 34 mm Stainless Steel							N					
Sensor												
1 x Pt100, 3-wire Sensor with Sheath in Stainless Steel								2				
1 x Pt100, 4-wire Sensor with Sheath in Stainless Steel								3				
2 x Pt100, 2-wire Sensor with Sheath in Stainless Steel								4				
2 x Pt100, 3-wire Sensor with Sheath in Stainless Steel								5				
1 x Type K (Insulated Hot Junction) Sensor with Sheath in 310 Stainless Steel								A				
2 x Type K (Insulated Hot Junction) Sensor with Sheath in 310 Stainless Steel								B				
1 x Type K (Insulated Hot Junction) Sensor with Sheath in Inconel								C				
2 x Type K (Insulated Hot Junction) Sensor with Sheath in Inconel								D				
1 x Type J (Insulated Hot Junction) Sensor with Sheath in 321 Stainless Steel								E				
2 x Type K (Insulated Hot Junction) Sensor with Sheath in 321 Stainless Steel								F				
1 x Type T (Insulated Hot Junction) Sensor with Sheath in 321 Stainless Steel								G				
2 x Type T (Insulated Hot Junction) Sensor with Sheath in 321 Stainless Steel								H				
Accuracy												
Pt100 ohm, Class B Accuracy	(Note 6)								B			
Pt100 ohm, Class A Accuracy – Specify Range	(Note 6)								A			
Standard (Thermocouple Class 2)	(Note 7)								2			
Thermocouple Class 1	(Note 7)								1			
Connection Head												
AGL Connection Head in Aluminium with Single Cable Entry IP66										G		
AGLH Connection Head in Aluminium with Single Cable Entry IP66										H		
AGLFD (Not with TF transmitter) Radial Mounting Connection Head in Aluminium with Single Cable Entry IP66 with CoMeter										V		
AGLFD (Not with TF transmitter) Radial Mounting Connection Head in Aluminium with Single Cable Entry IP66 with ProMeter										W		
AGLHD (Not with TF transmitter) Connection Head in Aluminium with Single Cable Entry IP66 with ProMeter	(Note 16)									K		
AGLHD (Not with TF transmitter) Connection Head in Aluminium with Single Cable Entry IP66 with CoMeter	(Note 16)									R		
AGS Connection Head in Stainless Steel with Single Cable Entry IP66												
AGSH Connection Head in Stainless Steel with Single Cable Entry IP66										L		
AGSFD (Not with TF transmitter) Radial Mounting Connection Head in Stainless Steel with Single Cable Entry IP66 with CoMeter										Y		
AGSFD (Not with TF transmitter) Radial Mounting Connection Head in Stainless Steel with Single Cable Entry IP66 with ProMeter										Z		
AGLSD (Not with TF transmitter) Connection Head in Stainless Steel with Single Cable Entry IP66 with ProMeter	(Note 16)									N		
AGLSD (Not with TF transmitter) Connection Head in Stainless Steel with Single Cable Entry IP66 with CoMeter	(Note 16)									T		
Cable Entry												
1 x M20 x 1.5 (Standard)											0	
2 x M20 x 1.5 (Only on AG versions)	(Note 8)										1	
1 x 1/2 in. NPT											2	
2 x 1/2 in. NPT (Only on AG versions)	(Note 8)										3	
Certification												
(EEx d) Explosion-proof suitable for Zone 1	(Note 8)											D
(EEx N) Increased safety suitable for Zone 2	(Note 8)											N
(EEx ia) (Transmitter only see associated data sheets* for details). Suitable for Zone 0												A
Safe												S

* Data sheet Pt. No. 10/11–8.14EN Head-mounted Temperature Transmitter TR04-Eco/TR04-Ex
Data sheet Pt. No. 10/11–8.19EN Head-mounted Temperature Transmitter TH02/TH02-Ex
Data sheet Pt. No. 10/11–8.25EN Head-mounted Temperature Transmitter TF02/TF02-Ex
Data sheet Pt. No. 10/11–8.26EN Head-mounted Temperature Transmitter TF12/TF12-Ex
Data sheet Pt. No. 3KDE115080R1001 Head-mounted Temperature Transmitter TH01/TH01-Ex

For Notes refer to page 17

Continued on next page.

		CODE No. PARTS 1 and 2											*PART 3*		
Heavy Duty Thermowell Assemblies (Forged)	**Model No. V10682/**	X	XX	XX	XXX	X	X	X	X	X	X	X	X	X	XX
Head-mounted Transmitter															
Without (terminal block fitted)													0		
4...20 mA Fixed Range Pt100 Ω only TR-04-Eco	(Notes 9, 6)												1		
4...20 mA Fixed Range Pt100 Ω only TR-04-Ex (EEx ia Zone 0)	(Note 6)												A		
4...20 mA Programmable Range TH-01	(Note 9)												6		
4...20 mA Programmable Range TH-01-Ex (EEx ia Zone 0)													F		
Programmable Range Hart Protocol & 4...20 mA TH-02	(Notes 9)												9		
Programmable Range Hart Protocol & 4...20 mA TH-02-Ex (EEx ia Zone 0)													J		
Profibus PA only (No indication) TF-12	(Note 9, 10)												K		
Profibus PA only (No indication) TF-12-Ex (EEx ia Zone 0)	(Note 10)												L		
Foundation Fieldbus only (No indication) TF-02	(Notes 9, 10)												M		
Foundation Fieldbus only (No indication) TF-02 (EEx ia Zone 0)	(Note 10)												N		
Fixed Transmitter Ranges TR04															
Without Transmitter														2	
Standard Fixed range –30...60 °C	(Note 11)													A	
Standard Fixed range –20...40 °C	(Note 11)													B	
Standard Fixed range 0...40 °C	(Note 11)													C	
Standard Fixed range 0...60 °C	(Note 11)													D	
Standard Fixed range 0...100 °C	(Note 11)													E	
Standard Fixed range 0...120 °C	(Note 11)													F	
Standard Fixed range 0...150 °C	(Note 11)													G	
Standard Fixed range 0...200 °C	(Note 11)													H	
Standard Fixed range 0...250 °C	(Note 11)													J	
Standard Fixed range 0...300 °C	(Note 11)													K	
Standard Fixed range 0...400 °C	(Note 11)													L	
Standard Fixed range 0...600 °C	(Note 11)													M	
Non-standard range (fixed)	(Note 11)													X	
Default factory settings (Pt100 Ω, 0...100 °C, 4-wire)	(Note 12, 13)													O	
Defined range (Specify from… to …)	(Note 13)													P	

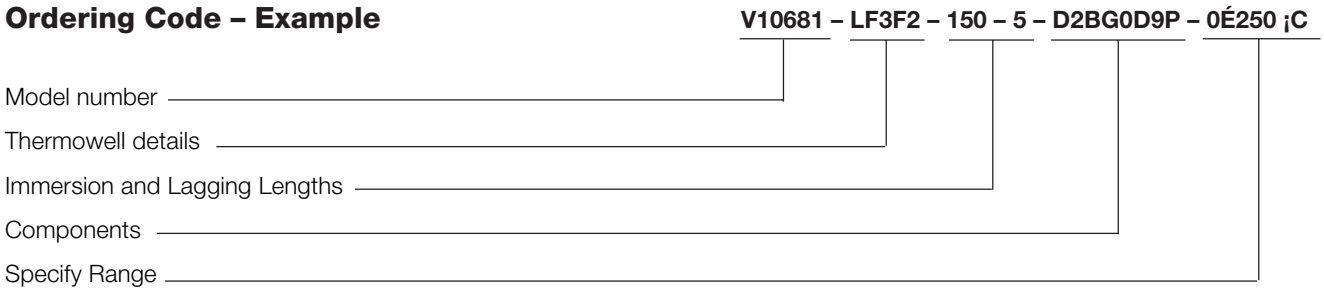
Options	**Call Factory for Details**
Bonded Hot Junction (Single 0nly)	
3000 lb Nipples and Union	
Tag Number on Stainless Steel Tag	
Internal Pressure Test of Thermowell	
External Pressure Test of Thermowell	
Chain for lid of connection head (AGL & AGS only)	
Heat Treatment (NACE NR 10-90)	
Dye Penetrant 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	

For Notes refer to page 17

Notes.

1. Not available with screwed process connection.
2. Not available with flanged process connection.
3. Not available with stem design code F1, F2, F3, S4, S5.
4. Not available with stem design code S1, S2.
5. Not available with stem design code F1, F2, F3, S1, S2.
6. Only available with Pt100 resistance sensor.
7. Only available with thermocouple sensor.
8. Double entry not available with radial connection heads.
9. Not for use with EEX ia systems.
10. Display options not available with Profibus and Fieldbus transmitters.
11. Only available with the TR04 transmitter.
12. Only available with 4-wire Pt100 sensor and not with the TR04 transmitter.
13. Not available with the TR04 transmitter.
14. Wetted parts only – stainless steel flange with raised face disc of material selected.
15. Full penetration weld stainless steel flanges only.
16. Only available with extension type H.

Ordering Code – Example



Notes.

Notes.

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