



Resistance Thermometers

Ignition Protection Exd



measuring
•
monitoring
•
analysing

TWL-Exd



- Measuring range: -80 ...+600 °C
- Pt 100-sensor class A respectively class B
- Output: resistance or analogue 4-20 mA
- Thermowells up to 1000, 3000 respectively 5000 mm (depending on model)
- Option: headtransmitter with HART®-protocol or PROFIBUS®/Fieldbus, display
- For ATEX applications, ignition protection Exd



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Description

The KOBOLD resistance thermometers comprise a rugged installation fitting made of stainless steel with thread, flange or weld-on connection, a connection head out of aluminium casting and a removable measuring element. The measuring insert can be replaced without emptying the installation, since the customised thermowell remains in the installation and seals the process. The instruments are supplied with the ignition protection Exd as a standard and therefore can be installed in relevant hazardous areas.

A Pt100 temperature sensor according to IEC 751, category A or B is fitted in the measuring insert as standard. Depending on customer request the temperature sensor can be carried out as 2-, 3- or 4-wire circuit.

Alternatively these sensors can be designed as single or double resistance thermometers. Exceptional the 4-wire version, which can only be built with one Pt100 due to lack of space.

As an option the resistance thermometers can be supplied with a head transmitter. Transmitter with a standard 4-20 mA signal, with HART® protocol or with PROFIBUS®/Fieldbus are there to choose from.

Beside the available resistance thermometers according to DIN-standard, there are customised versions relating to the immersion length, the connection head, the materials, the process connection or the tolerance classes deliverable on request.

Head Transmitter

Resistance thermometers with head transmitter are used whenever a measuring signal must be transported long distance without any disturbance.

The head transmitter which is encapsulated in epoxide resin is located right in the connection head and delivers a temperature-linear output signal of 4-20 mA. The head transmitter is available with standardised communication systems just like HART® protocol or PROFIBUS®/Fieldbus.


Applications

The resistance thermometers with thread-, flange- or weld-on connection are favourably used for the temperature measurement in liquids, solids and gaseous media. The reliable watertightness of these installation methods for gauge pressure and vacuum is an important criteria for selection.

Application areas are located in the air-conditioning and cooling industry, the heating-, furnace-, mechanical- and apparatus-construction as well as in the complete industry.

For all applications in hazardous areas, the instruments are supplied with the ignition protection Exd.

Technical Details

Meas. principle:	temperature depending resistor
Meas. range:	-30...+550 °C or -80...+600 °C (others on request)
Sensor:	Pt 100 single- or double-sensor (1x Pt100 or 2x Pt100)
Accuracy:	class A or class B (others on request)
Ambient temperature:	-40...+150 °C with ceramic terminal base (without transmitter) -40...+85 °C (with transmitter) -20...+70 °C (with LCD display) -20...+80 °C (with LED display)
Operating pressure:	up to 250 bar (depending on thermowell) TWL-1: pressureless
Connection head:	form XD with chain
Cable entry:	M 20 x 1.5 standard (others on request)
Materials:	
- Sensor:	stainless steel 1.4404
- Thermowell:	stainless steel 1.4404 (others on request)
- Neckpipe:	stainless steel 1.4404
- Connection head:	aluminium, painted
- Terminal base:	ceramic (without transmitter)
Process connection:	
- Thread:	G ½ male, G ¾ male, G1 male, ½" NPT, ¾" NPT, 1" NPT
- DIN-flange:	DN15, 20, 25, 32, 40, 50
- ANSI flange:	½", ¾", 1", 1 ½", 2"
- Weld-in	¾", 1", 1 ¼"
Sensor wiring:	2-, 3- or 4-wire
Output:	resistance value
Protection:	connection head IP 54...68 depending on cable gland and sealing sensor IP 68
ATEX-approval:	 II 2 GD Ex d IIC T6



Technical Details continued

Head transmitter:

- Output: analogue output 4-20 mA
- Communication: HART®-protocol, PROFIBUS®/Fieldbus
- Minimum meas. span: standard transmitter 25 °K
transmitter with HART® 10 °K
transmitter with PROFIBUS®/Fieldbus 5 °K
- Supply voltage: 8-35 V_{DC} for standard transmitter and transmitter with HART®
9-32 V_{DC} for transmitter with PROFIBUS®/Fieldbus

Display:

- Type: 4 digit LCD or LED
- Supply: loop powered
- Voltage drop out: LCD max. 2.5 V
LED 3.3 V at 4 mA
3.7 V at 20 mA



Order Details (example: **TWL-112LNDN5CA1**)

Model	Sensor specification				
	Type	Sensor type	Sensor wiring	Connection head / transmitter	Process connection of sensor
TWL-	0 = without	0 = without 1 = 1 x Pt100, class B (-30...+550 °C) 2 = 2 x Pt100, class B (-30...+550 °C) 3 = 1 x Pt100, class B (-80...+600 °C) 4 = 2 x Pt100, class B (-80...+600 °C) 5 = 1 x Pt100, class A (-30...+550 °C) 6 = 2 x Pt100, class A (-30...+550 °C) 7 = 1 x Pt100, class A (-80...+600 °C) 8 = 2 x Pt100, class A (-80...+600 °C) X = special	0 = without	0 = without (for TWL-0/3)	N ²⁾ = ½" NPT male G = G ½" male X = special
	1 = standard 2 = with nipple union		2 = 2-wire 3 = 3-wire 4 ¹⁾ = 4-wire	L = ATEX Exd / without transmitter A = ATEX Exd/programmable 2-wire transmitter B = ATEX Exd/ 2-wire transmitter with HART® protocol C = ATEX Exd/transmitter with PROFIBUS®/Fieldbus X = special option (specify in clear text) for options A, B, C choose sensor wiring code "3"	
	3 = measuring insert		0 = without		

¹⁾ 4-wire only for 1 sensor

²⁾ choose "N" for TWL-2



Resistance Thermometers Model TWL Exd

Order Details continued

Thermowell specification				Length (sensor, thermowell, measuring insert) ⁴⁾ (see drawings)	Options
Thermowell type	Process connection	Process connection size	Nominal pressure (process connection)		
0 = without B = cylindrical, multipart, welded G = cylindrical, bar stock/drilled with stepped shank D = tapered shank, bar stock/drilled X = special option	0 = without (for TWL-3) G = G-thread N = NPT-thread	0 = without (for TWL-3) 4 = 1/2" (not for thermowell D) 5 = 3/4" 6 = 1" X = special	0 = without (for TWL-3) A = PN 25 (only for thermowell B) B = PN 100 (only for thermowell G) C = PN 250 (only for thermowell D)	only for TWL-0 (only thermowell) 0 = without lagging extension 1 = with lagging extension sensor with thermowells (only for TWL-1/TWL-2) A = with standard neckpipe/ without lagging ext. B = with standard neckpipe and with lagging extension C⁵⁾ = without neckpipe / with lagging extension D⁵⁾ = without neckpipe/ without lagging extension E = with special neckpipe length/ with lagging ext. F = with special neckpipe length/ without lagging ext. sensor without thermowells (only for TWL-1/TWL-2) G = with standard neckpipe length "HL" H = with special neckpipe length "HL" J = without neckpipe "HL" X = special option (specify in clear text) M = measuring insert (only for TWL-3, specify length ML)	0 = without 1 = with LCD display 2 = with LED display Y = special option (specify in clear text)
	S³⁾ = welded	5 = 3/4", only for thermowell G 6 = 1" 7 = 1 1/4", only for thermowell D X = special	B = PN 100 (only for thermowell G) C = PN 250 (only for thermowell D)		
	F = DIN flange	4 = DN 15 (not for thermo- well G/D) 5 = DN 20 6 = DN 25 7 = DN 32 8 = DN 40 9 = DN 50 X = special	1 = PN 6 2 = PN 16 3 = PN 40 4 = PN 100 (not for DN 15) X = special		
	A = ANSI flange	4 = 1/2" (not for thermowell G/D) 5 = 3/4" 6 = 1" 8 = 1 1/2" 9 = 2" X = special	5 = 150 lbs 6 = 300 lbs 7 = 600 lbs (not for 1/2") 8 = 900 lbs (not for 1/2") 9 = 1500 lbs (not for 1/2") X = special		

³⁾ not for thermowell type B

⁴⁾ Immersion length "U" and hole diameter "i" (when ordering a/with thermowell) or "EL" (when ordering without thermowell), neckpipe length "HL" (when different from stdd. i.e. for TWL-1 stdd. is 130 mm, for TWL-2 standard is 150 mm), lagging extension "T" (if ordered) and measuring insert length "ML" (when ordering TWL-3) must be specified in clear text when ordering.

Pls. check lengths very precisely in order to ensure a perfect match between sensor and thermowell.

⁵⁾ not for TWL-2



Order Details for Ordering only the Thermowell (example: **TWL-0000NBG4000**)

Model	Sensor type	Sensor type/class	Sensor Wiring	Connection head / transmitter	Process connection of temperature sensor ¹⁾
TWL-	0 = without	0 = without	0 = without	0 = without	N ¹⁾ = 1/2" NPT male G = G 1/2" male X = special

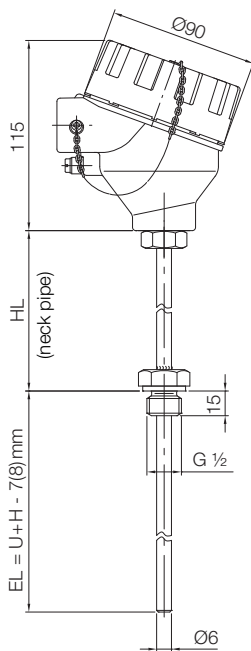
¹⁾ choose N for nipple and union version

Order Details for Ordering only the Thermowell continued:

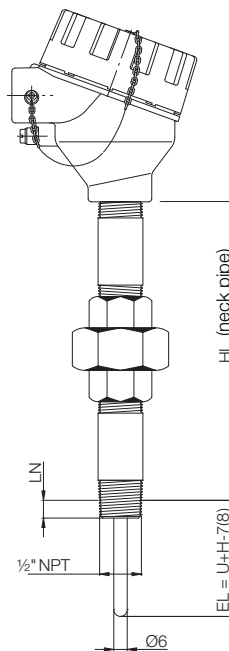
Thermowell specification				Immersion length and lagging extension length ¹⁾	Special option
Thermowell type	Process connection size	Nominal pressure (process connection)	Pressure rating for flange connection		
Please use the specification codes according to order table shown on page 4				0 = without lagging extension 1 = with lagging extension	0 = without Y = option acc. specification

¹⁾ Immersion length "U", hole diameter "i" and lagging extension "T" must be specified in writing. Please check lengths very precise in order to ensure a perfect match of sensor and thermowell.

Dimensions Temperature Sensor TWL-1



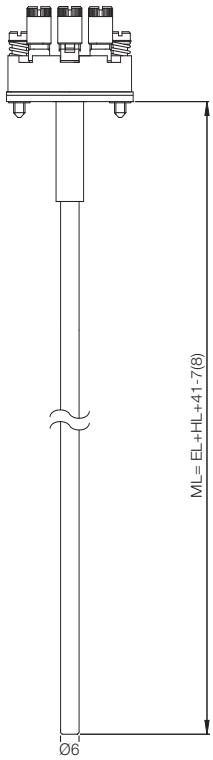
Dimensions Temperature Sensor TWL-2



- HL** = neckpipe length
standard 130 mm for TWL-1
standard 150 mm for TWL-2
- EL** = immersion length
EL = U+H-7 mm for thermowell type B
U+H-8 mm for thermowell type G/D

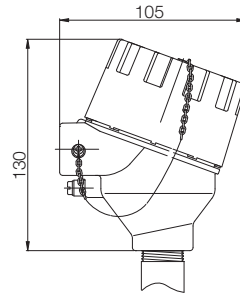
- U** = immersion length thermowell (see drawing thermowell)
- H** = length see thermowell
- LN** = screw-in-length by hand (approx. 8.1 mm at 1/2" NPT)

Dimensions Measuring Insert TWL-3

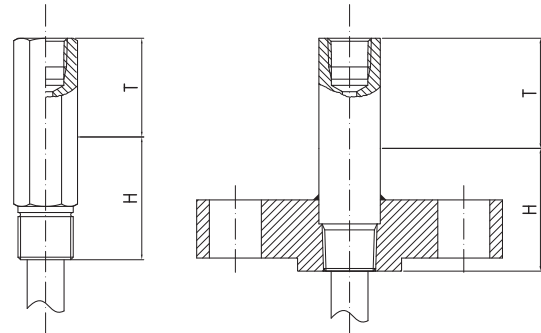


HL = neckpipe length
 EL = immersion length
 ML = measuring insert length

Dimensions Connection Head with Display

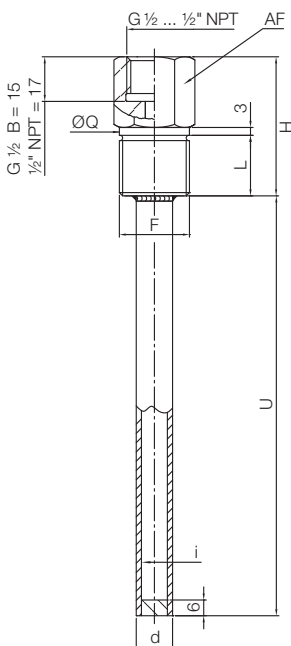


Lagging Extension "T"



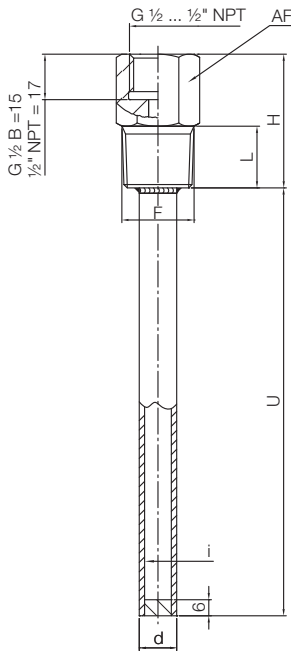
Dimensions Thermowell

Cylindrical thermowell, welded, with process connection G-thread (max. PN 25 at 400 °C)



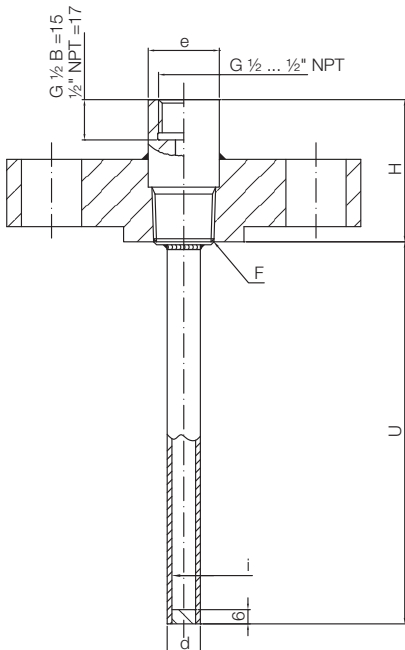
Process connection	Max. total length	AF	F	i	d	H	L	Q
G-thread	5000 mm	27	G 1/2 B	10	12	36	14	26
				12	14			
		32	G 3/4 B	10	12	38	16	31.7
				12	14			
		41	G 1 B	10	12	40	18	39
				12	14			

Cylindrical thermowell, welded, with process connection NPT-thread (max. PN25 at 400 °C)



Process connection	Max. total length	AF	F	i	d	H	L
NPT-thread	5000 mm	24	1/2 NPT	10	12	42	17
				12	14		
		27	3/4 NPT	10	12	43	18
				12	14		
		36	1 NPT	10	12	46	21
				12	14		

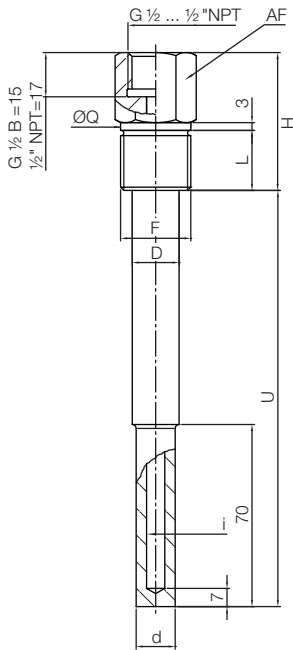
Cylindrical thermowell, welded, with process connection flange acc. DIN or ANSI (max. PN6...40 at 400 °C)



Process connection	Max. total length	F	i	d	H	e
with flange	5000 mm	1/2 NPT	10/12	12/14	40	30
		1/2 NPT				
		3/4 NPT				
		1 NPT	10/12	12/14	40	35
		1 NPT				
		1/2 NPT				
		DIN DN 15	10/12	12/14	40	30
		DIN DN 20				
		3/4 NPT				
		DIN DN 25	10/12	12/14	40	35
		1 NPT				
		1 NPT				
DIN DN 40	10/12	12/14	40	35		
DIN DN 50						

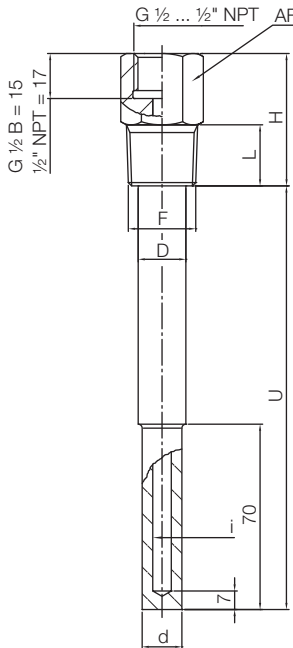
Dimensions Thermowell Model TWL-...G...

Cylindrical thermowell, bar stock/drilled with stepped shank and process connection G-thread (max. PN 100 at 400 °C)



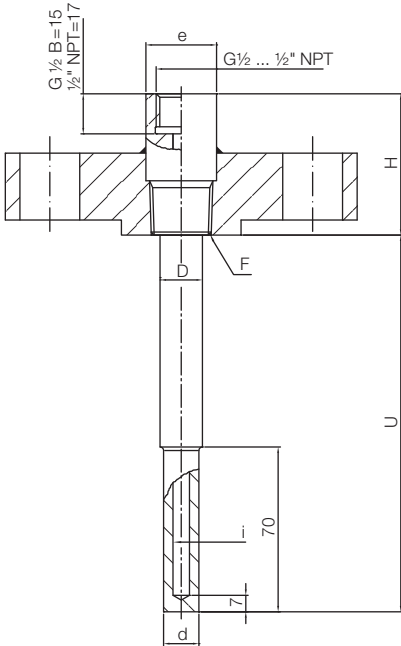
Process connection	Max. total length	SW	F	i	d	D	H	L	Q
G-thread	1000 mm	27	G 1/2 B	7-8-9	15	17.5	46	20	26
				10-12	17.5	17.5			
		36	G 3/4 B	7-8-9	15	18	51	39	
				10-12	18	21			
		41	G 1 B	7-8-9	15	21	51	39	
				10-12	18	25			

Cylindrical thermowell, bar stock/drilled with stepped shank and process connection NPT-thread (max. PN 100 at 400 °C)



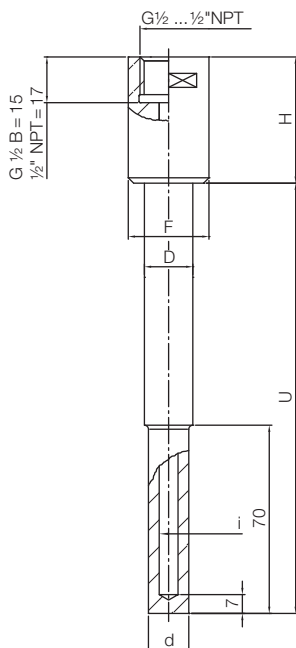
Process connection	Max. total length	AF	F	i	d	D	H	L
NPT-thread	1000 mm	24	1/2 NPT	7-8-9	15	17.5	46	20
				10-12	17.5	17.5		
		27	3/4 NPT	7-8-9	15	18	51	25
				10-12	18	21		
		36	1 NPT	7-8-9	15	21	51	25
				10-12	18	25		

Cylindrical thermowell, bar stock/drilled with stepped shank and process connection flange acc. DIN or ANSI (max. PN 100 at 400°C)



Process connection		Max. total length	F	i	d	D	H	e		
flange	ANSI 3/4"	1000 mm	1/2 NPT	7-8-9	15	17.5	60	30		
				10-12	17.5	17.5				
	ANSI 1"		3/4 NPT	7-8-9	15	18			35	
				10-12	18	21				
	ANSI 1 1/2"		1 NPT	7-8-9	15	21		60		35
				10-12	18	25				
	ANSI 2"		1 NPT	7-8-9	15	21	60		30	
				10-12	18	25				
	DIN DN 20		1/2 NPT	7-8-9	15	17.5		60		30
				10-12	17.5	17.5				
	DIN DN 25		3/4 NPT	7-8-9	15	18	35			
				10-12	18	21				
DIN DN 32	1 NPT	7-8-9	15	21	60	35				
		10-12	18	25						
DIN DN 40	1 NPT	7-8-9	15	21			60	35		
		10-12	18	25						
DIN DN 50	1 NPT	7-8-9	15	21	60	35				
		10-12	18	25						

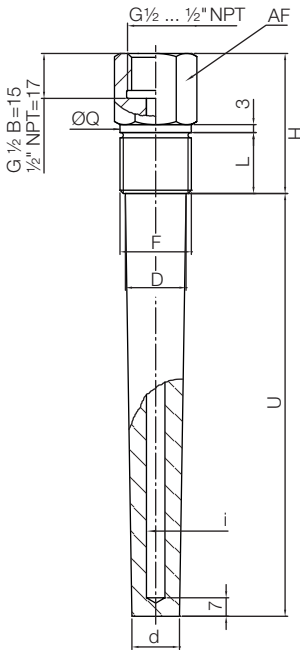
Cylindrical thermowell, bar stock/drilled with stepped shank and process connection for weld-on (max. PN 100 at 100°C)



Process connection		Max. total length	F	i	d	D	H
for weld-on	DN 3/4"	1000 mm	26.9	7-8-9	15	19	46
				10-12	18		
	DN 1"		33.4	7-8-9	15	22	51
				10-12	18		

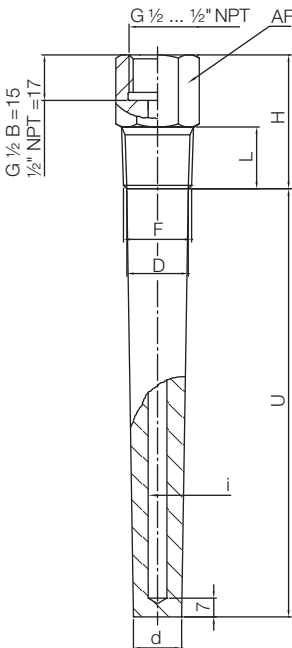
Dimensions Thermowell Model TWL-...D...

Tapered shank, bar stock/drilled thermowell with process connection G-thread (max. PN250 at 400 °C)



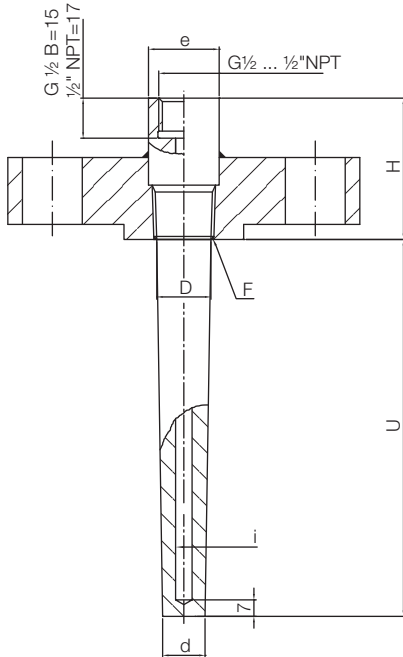
Process connection	Max. total length	AF	F	i	d	D	H	L	Q
G-thread	1000 mm	36	G 3/4 B	7-8-9	18	23	46	20	31.7
				10-12	21				
		41	G 1 B	7-8-9	18	29	51	25	39
				10-12	21				

Tapered shank, bar stock/drilled thermowell with process connection NPT-thread (max. PN250 at 400 °C)



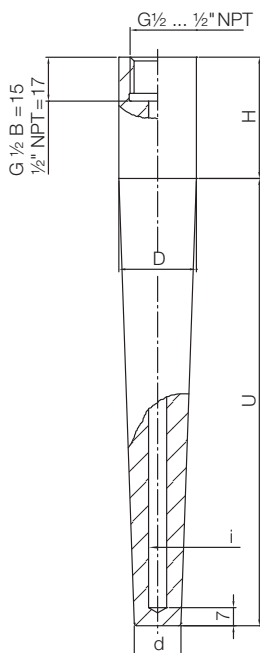
Process connection	Max. total length	AF	F	i	d	D	H	L
NPT-thread	1000 mm	27	3/4 NPT	7-8-9	18	23	46	20
				10-12	21			
		36	1 NPT	7-8-9	18	29	51	25
				10-12	21			

Tapered shank, bar stock/drilled thermowell with process connection flange acc. DIN or ANSI (max. PN250 at 400 °C)



Process connection		Max. total length	F	i	d	D	H	e		
flange	ANSI 1"	1000 mm	3/4 NPT	7-8-9	18	23	60	30		
				10-12	21					
	ANSI 1 1/2"		1 NPT	7-8-9	18	29		60	35	
				10-12	21					
	ANSI 2"		1 NPT	7-8-9	18	29			60	35
				10-12	21					
	DIN DN 25		3/4 NPT	7-8-9	18	23	60			30
				10-12	21					
	DIN DN 32		1 NPT	7-8-9	18	29		60		35
				10-12	21					
	DIN DN 40		1 NPT	7-8-9	18	29			60	35
				10-12	21					
DIN DN 50	1 NPT	7-8-9	18	29	60	35				
		10-12	21							

Tapered shank, bar stock/drilled thermowell with process connection for weld-on (max. PN250 at 400 °C)



Process connection		Max. total length	i	d	D	H
for weld-on	DN 1"	1000 mm	7-8-9	18	33.4	51
			10-12	21		
	DN 1 1/4"		7-8-9	18	38.1	51
			10-12	21		