











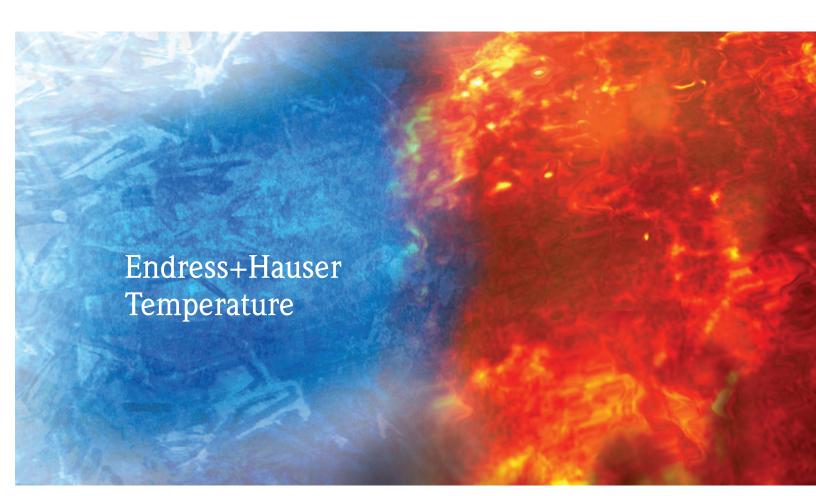






Temperature Measurement Catalog

Temperature assemblies, transmitters and thermowells





Introduction

About our capabilities and locations







Successful as Partners

Our field service engineers and service technicians are available to make a personal contribution to your enterprise's success in 85 countries worldwide. With the experience of more than 10 million equipped measurement points in all types of technical processes and industries we can claim with pride to be the "People for Process Automation".

For us co-operation with our customers consists of more than just selling. Our offer to you is a long-term partnership which arouses enthusiasm and generates creative solutions. The basic idea of this partnership is dialog. As only in dialog can we pass on knowledge and learn from the ideas and requirements of our customers.

Production close to the market

To be conversant with international requirements and regulations means to take these into account at the product design stage.

We develop powerful product-, productionand logistics concepts for our customers. A competence center optimized on efficiency and quality consistently develops the central components of Endress+Hauser temperature measurement:

- Primary sensor,
- electronics,
- software and
- mechanical precision parts.

Regional production plants use these assemblies and complete them according to your order.

Perfect timing

The desired product at the right time at the right place — worldwide. A masterly performance, that we go through daily, considering the large variety in temperature measurement instrumentation. With networked systems and efficient logistics partners we deliver equipment whenever you need them.

Smooth project completion

As a reliable partner we understand your processes and your projects as if they were ours.

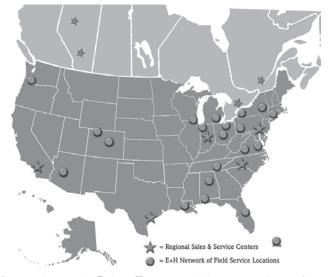
These experiences, projects dealt with successfully in many dozen countries worldwide, provide you with security. Individual contact persons and experienced project managers are available for you to be successful.

Competent partner with a strong presence near you

The right product at the right time at the right place – worldwide and all over North America!

With a network of sales representatives in all 50 states, regional sales offices, and a centrally located production plant in Greenwood, Indiana, Endress+Hauser delivers temperature measurement instrumentation at the time it is needed.

You are supported by local partners who understand your processes and your projects. Endress+Hauser offers you a long term partnership to generate solutions for saving cost and enhancing productivity and safety on your plant.

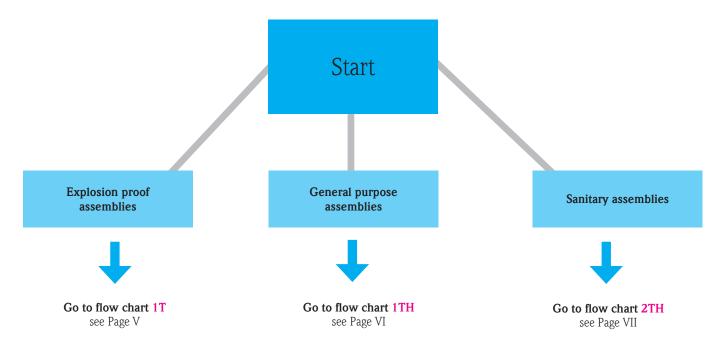


As a complete supplier, Endress+Hauser is a reliable partner in all areas of temperature measurement, all over North America and at the right time

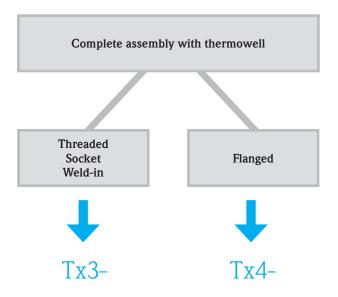
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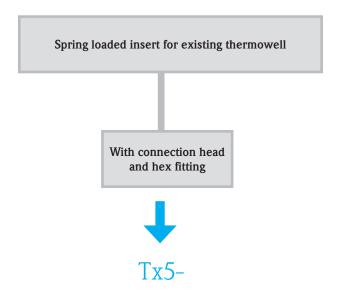
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General purpose TC assemblies with weather proof connection heads	TH5_1
General purpose TC assemblies with advanced TMT162 transmitter	TH5-162_
Explosion proof temperature assemblies	XP_1
Explosion proof RTD assemblies with weather proof connection heads	T1_1
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How to select the right assembly?



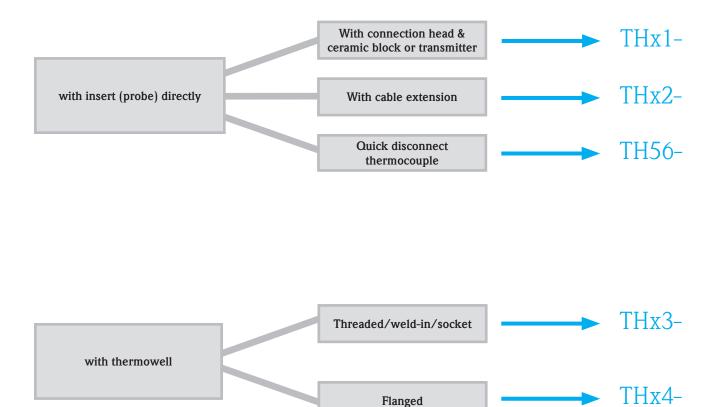
1T - Explosion proof assemblies





x = 1 for RTD x = 5 for TC

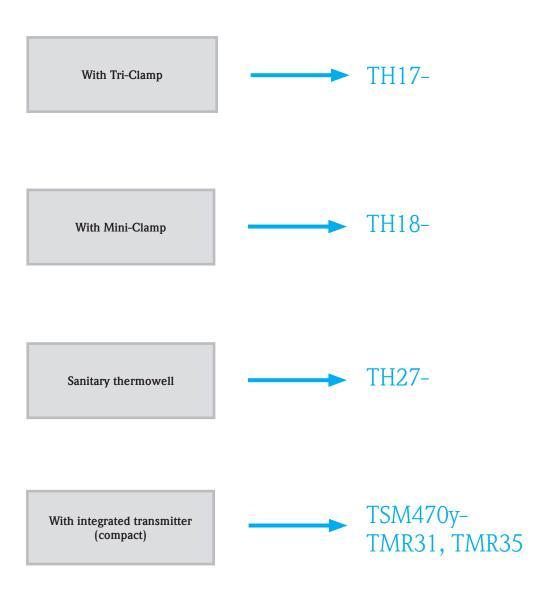
1TH - General purpose assemblies





x = 1 for RTD x = 5 for TC

2TH - Sanitary assemblies



y = G for threaded process connection

y = F (food) for Tri-clamp process connection

y = P (pharma) for Mini-clamp process connection

General specifications of GP and XP temperature assemblies

Sensor Styles: As per ASTM 14.03, E230	RTD: Single or dual element (3 wire only) Pt 100, class A or class B -50 to +260 °C (-58 to 500 °F), low temp -50 to +200 °C (-58 to 390 °F), in continuous operation -200 to +600 °C (-328 to 1110 °F), high temp T/C: Type J, type K, type E, type N or type T Ungrounded, grounded, single or dual Type J 0 to +760 °C (+32 to 1400 °F) Type K -200 to +1260 °C (-328 to 2300 °F) Type E -200 to +870 °C (-328 to 1600 °F) Type N -200 to +1260 °C (-328 to 2300 °F) Type T -200 to +370 °C (-328 to 700 °F)
Process connection:	Flanged, socket weld, weld in or threaded thermowell
Thermowell style:	Tapered, straight, or stepped bar stock. Straight and reduced fabricated thermowells and protection tubes
Materials:	Standard is 316SS, available materials include Chrom Moly steels, Nickel alloys, Titanium etc. For a complete list see chapter 'Thermowells: Material availability guide'
Pressure rating:	Up to 2500 lbs ASME VIII & ANSI B16.5 (with flanged connection)
Electrical approvals:	CSA, FM, ATEX, NEPSI, JIS – options
Welding:	ASME IX

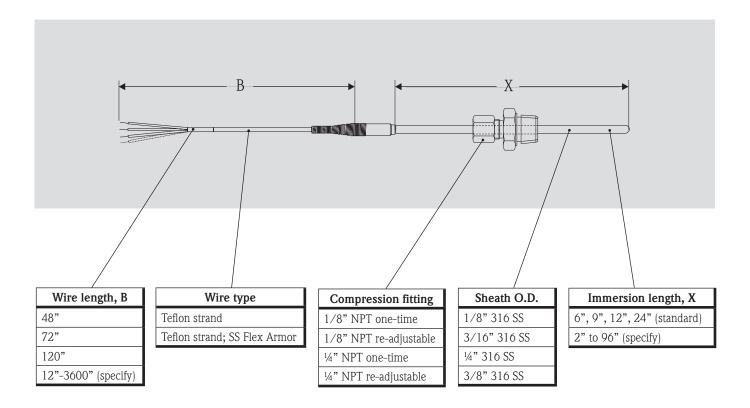
Options include:

- Material Certificate
- Silicon free assemblies
- Dye penetrant tests
- PMI (Positive Material Identification) testing
- Surface finishing to 3A and ASME BPE (animal fat free)
- Ultrasonic, hydrostatic testing
- NIST traceable calibration
- Oxygen service cleaning
- Customer specific tagging
- \blacksquare Callendar/Van Dusen sensor transmitter matching for RTD's

TH12 RTD with fiberglass, braided or armored extension lead wire, for use without thermowell or with remote installations

This is a common type of sensor in temperature applications such as ovens and furnaces. We use the strain relief spring design as a standard thus ensuring superior performance and long life. We use heavy duty RTD and extension grade wires, individually tested and inspected to deliver the highest quality product. The options found in the order code represent common industrial requirements. Custom built and other terminations and option are available on request.

- Different process connection such as compression fittings and bayonet fittings.
- Grounded and ungrounded thermocouples available as standard.
- Surface-mount options available.



Product Structure, General Purpose RTD with cable, TH12

Process Connection														
C Comp. fitting 1/8" NPT 316 SS, one time Comp. fitting 1/8" NPT 316 SS, re adjustable E Comp. fitting ¼" NPT 316 SS, one time F Comp. fitting ¼" NPT 316 SS, one time F Comp. fitting ¼" NPT 316 SS, re adjustable Bayonet and other Fittings available, consult your E+H sales representative Immersion Length (X) 2 to 96"														
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J 2 x Pt100, class B, 3 wire, -50-200°C (-58 to 392 °F)														
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L 2 x Pt100, class A, 3 wire, -50-200°C (-58 to 392 °F)														
M 2 x Pt100, class A, 3 wire, -200-600°C (-328 to 1112 °F)														
Wire/cable length (B)														
A 48"														
C 120"														
X " (Specify increment 12") (max 360", Consult E+H Sales representative for longer le	ngins)													
Wire type														
1 Teflon strand														
2 Teflon strand, SS flex armor														
Leadwire Termination														
B Leads stripped 2" + fork lugs														
Documentation requirements														
Standard														
	Additional option 1													
A Not selected	A Not selected B Sensor calibration certificate													
B Sensor calibration certificate														
Version	Version													
K Standard														
Additional option 2														
1 Not selected														
TH12- B 1 K 1 Enter desired product structure														

TH1x General Purpose, economical RTD assembly with weatherproof heads

The TH1x is a simple to configure, complete RTD assembly, for all temperature monitoring needs.

Key features include:

- Ultra low copper heads with dual epoxy powder coats ensures high resistance to corrosive environments like salt water
- Patented Endress+Hauser design heads for easy wiring.
- Highly reliable and individually tested sensor.
- Use of high quality certified materials such as MgO cable, Pipes and Bar stock.
- Economical thin film sensor for application in the temperature range from -50 °C to +260 °C.
- Robust wire wound sensor for applications requiring a wide temperature range of -200 °C to +600 °C.

This style of TH1x assemblies offer the advantage of high quality measurement instrument with a low total cost of ownership, making them the perfect choice for all your monitoring applications.

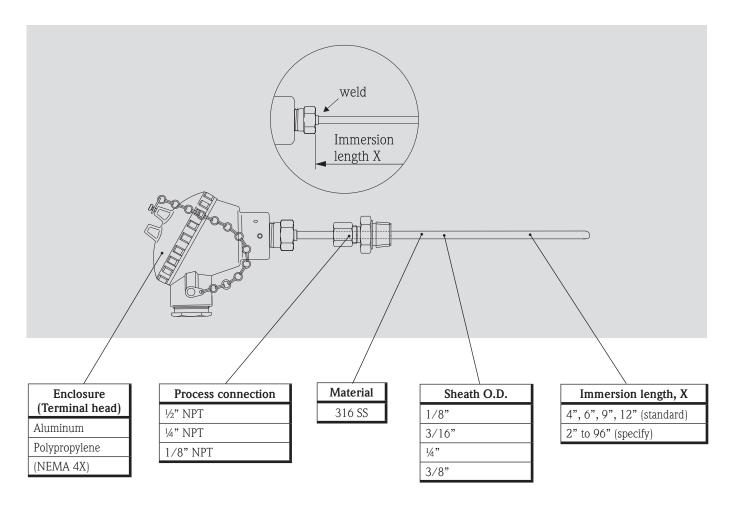
The assemblies are available with Endress+Hauser's robust TMT series of In-head DIN B size temperature transmitters with 4-20 mA, HART, Profibus PA and FOUNDATION™ Fieldbus outputs.

Customers with high pressure applications such as boilers and vessels will appreciate the pressure calculations available for the CRN registered designs.



TH11 RTD General Purpose

Welded insert, economical RTD assembly with weatherproof heads for direct measurement

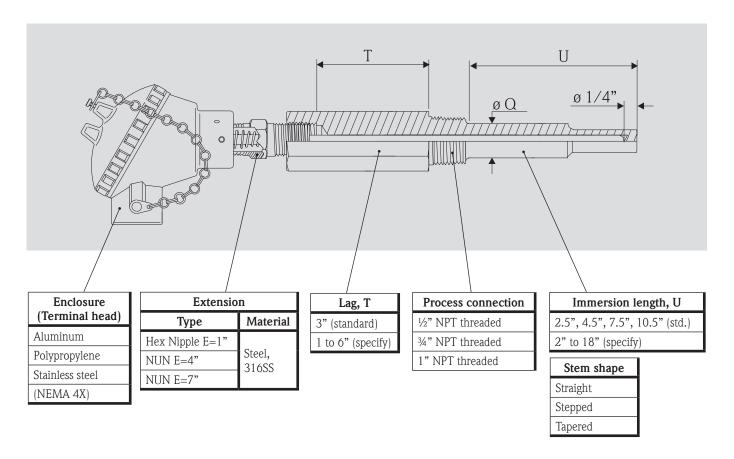


Product Structure, General Purpose RTD with connection head, TH11

TH11-	Ger	neral l	Purpo	ose I	RTD w	ith co	nnect	ion h	ead, T	H11							
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	A		select														
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	C	1			1/8 NI	PT 316	SS of	ne tim	P								
	D		-	-	1/8 NI												
	E				17 0 INI 14 NPT				JIUM								
	F							re adjustable									
	1						2 to 96"										
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		3)imensi												
		4			Dimen												
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			_		Diame												
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			С		; 316 5												
			F		8" redu		/16";	316 SS	5								
				_	nsor T												
				Е	1 x	Pt100,	class	B, -50	-200°	C (-58	to 392 °F)						
				F							28 to 1112 °F)						
				G	1 x	Pt100,	class .	A, -50)-200°	°C (-58	to 392 °F)						
		İ		Н	1 x	Pt100,	class .	A, -20	00-600	0°C (-3	28 to 1112 °F)						
				J	2 x	Pt100,	, class P, -50-200°C (-58 to 392 °F)										
				K	2 x	Pt100,	class	B, -20	00-600)°C (-3	28 to 1112 °F)						
				L	2 x	Pt100,	O, class A, -50-200°C (-58 to 392 °F)										
				M			00, class A, -200-600°C (-328 to 1112 °F)										
					Enc	losure			try								
					A	1	selecte										
					В		E+H b										
					C	1 ′	E+H blue Al + cover; NPT ¾" tic PP white; NPT ½"										
					D	1											
					E	1	ic PP v	,		VAIDT							
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					Y	Special version – consult E+H sales					sales rebresettiative for more obnoris						
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						A C											
						D				MT181 MT181	FM IS						
						E					CSA IS						
						P	~	анниа Г ТМТ		v11101	OOM 10						
						R	1		ι 102 Γ182 F	M IS							
						T				CSA IS							
						U					NB, GP						
						V	i				NB, FM/CSA IS						
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							1	Not s	electe	d							
								Addi	tional	optio	n 1						
								Α	Not s	selecte	i						
								В	Sens	or calib	oration certificate						
									Vers	ion							
									K	Stand							
]		P		ned (Ra 32 μ-inch)						
										Addi	tional option 2						
										1	Not selected						
										2	PROFIBUS PA plug M12						
										3	Foundation Fieldbus plug 7/8"						
	_			_						4	Plastic cable gland						
TH11-											Enter desired product structure						

TH13 RTD General Purpose

Threaded thermowell, economical RTD assembly with weatherproof heads

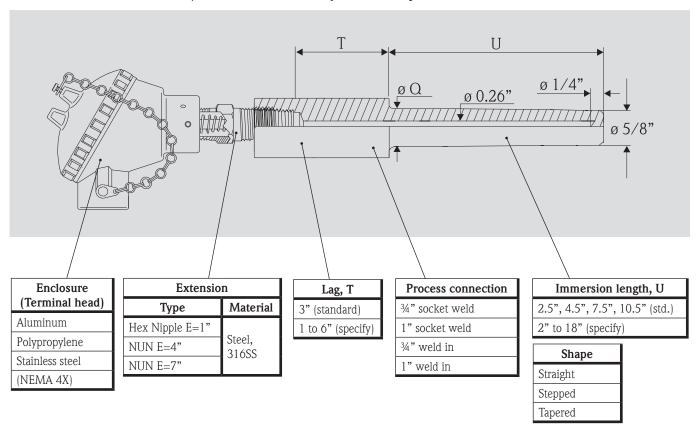


Product Structure, General RTD Assembly, TH13

TH13	Get	neral l	RTD	Ass	emh	lv w	ith T	hern	nowel	II, US Style, TH13							
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	3	71/2"															
	4	101/2	,														
	5	13½															
	6	16½															
	7	22½															
	8	l .		cifv i	ncrei	ment	0.5") (2"	to 18"	"							
	9									E+H sales representative							
										nstruction							
		A1		NPT													
		A2		NPT	,												
		A3	1"]	NPT,	316	SS											
			The	ermo	owel	ll sha	ipe										
			2	Ste	pped	, Stan	ndard	Duty	,								
			3		apered, Heavy Duty hermowell Lag (T)												
				The													
				Α	None												
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					6					ple Steel, E=7" ple 316 SS, E=7"							
					0	_		Type		pie 510 55, E=7							
						E				ss B, 4 wire, -50-200°C (-58 to 392 °F)							
						F			,	ss B, 4 wire, -200-600°C (-328 to 1112 °F)							
						G			,	ss A, 4 wire, -50-200°C (-58 to 392 °F)							
						Н			,	ss A, 4 wire, -200-600°C (-328 to 1112 °F)							
						J				ss B, 3 wire, -50-200°C (-58 to 392 °F)							
						K	2 2	Pt10	0, clas	ss B, 3 wire, -200-600°C (-328 to 1112 °F)							
						L	2 2	r Pt10	0, clas	ss A, 3 wire, -50-200°C (-58 to 392 °F)							
						M				ss A, 3 wire, -200-600°C (-328 to 1112 °F)							
										able entry							
							A	1	Not selected								
							В	1		blue Al + cover; NPT ½"							
							C			blue Al + cover; NPT ¾"							
							I			rrsion – consult E+H sales representative for more options 1 connection							
								A		rammable RTD TMT180							
								C	_	rammable TMT181							
								D	_	rammable TMT181 FM IS							
								E		rammable TMT181 CSA IS							
								P		T TMT182							
								R	HAR	T TMT182 FM IS							
								T	HAR	T TMT182 CSA IS							
								U		ead Transmitter DINB, GP							
								V		ead Transmitter DINB, FM/CSA IS							
								2		g leads							
1								3		ninal block							
								4		bus PA Head Transmitter DINB, GP							
								5		bus PA Head Transmitter DINB, FM/CSA IS							
										itional option							
										Not selected PROFIBUS PA plug M12							
										Foundation Fieldbus plug 7/8"							
										Plastic cable gland							
										Test; Calibration							
										A Not selected							
									E								
1										C Material traceability certificate							
										Version							
										K Standard							
										L With Certificate of Compliance							
TH13-										Enter desired product structure							

TH13 RTD General Purpose

Weld-in / socket weld thermowell, economical RTD assembly with weatherproof heads

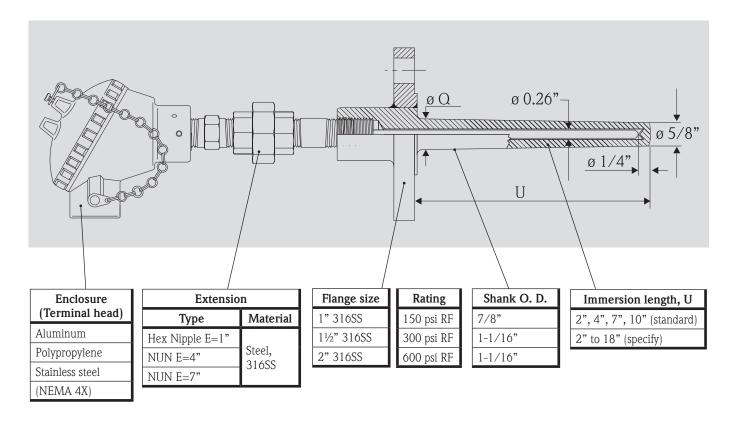


Product Structure, General RTD Assembly, TH13

TH13	Gei	neral	RTD	Ass	emb	ly wi	ith T	herm	owe	il, US Style, TH13								
	TW	Imm																
	1	21/2"																
	2	41/2"																
	3	71/2"																
	4	101/2	"															
	5	131/2	"															
	6	161/2																
	7	221/2																
	8) (2" t										
	9									E+H sales representative								
									f Co	nstruction								
		B1				¾", 3												
		B2				1", 3		S										
		C1				316 5												
		C2			1", 316 SS er sizes and materials, consult your E+H sales representative													
		YY	-					teriais	, COI	suit your E+H sales representative								
			2			ll sha		Duty										
			3		tepped, Standard Duty apered, Heavy Duty													
			3															
				A														
				E														
				X	spe	cify												
				**		tensi	on (I	E)										
					1				6 SS	E=1"								
					2					ople 316 SS, E=4"								
					3			ole Ste										
		İ			4	Nip	ple+l	Union	+Ni	ople Steel, E=4"								
					5	Nip	ple+1	Union	+Ni	ople Steel, E=7"								
					6	Nip	ple+1	Union	+Ni	pple 316 SS, E=7"								
						_												
						Е	Sensor Type E 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F)											
						F				ass B, 4 wire, -200-600°C (-328 to 1112 °F)								
						G	1		,	ass A, 4 wire, -50-200°C (-58 to 392 °F)								
						Н	1		,	ass A, 4 wire, -200-600°C (-328 to 1112 °F)								
						J				ass B, 3 wire, -50-200°C (-58 to 392 °F)								
						K				ass B, 3 wire, -200-600°C (-328 to 1112 °F)								
						L	1			ss A, 3 wire, -50-200°C (-58 to 392 °F)								
						M				sss A, 3 wire, -200-600°C (-328 to 1112 °F)								
							A	Not										
							В			blue Al + cover; NPT ½"								
							C			blue Al + cover; NPT 3/4"								
							Y	/		ersion - consult E+H sales representative for more options								
							1			al connection								
								_		grammable RTD TMT180								
										grammable TMT181								
										grammable TMT181 FM IS								
								Е	Prog	grammable TMT181 CSA IS								
										TTTMT182								
										TT TMT182 FM IS								
										RT TMT182 CSA IS								
										Head Transmitter DINB, GP								
										Head Transmitter DINB, FM/CSA IS								
										ng leads								
										ninal block								
										ibus PA Head Transmitter DINB, GP ibus PA Head Transmitter DINB, FM/CSA IS								
								I - F		litional option								
								1 F		Not selected								
								1 1		PROFIBUS PA plug M12								
										Foundation Fieldbus plug 7/8"								
										Plastic cable gland								
										Test; Calibration								
									ľ	A Not selected								
										B Sensor calibration certificate								
										C Material traceability certificate								
										Version								
					K Standard													
								\sqcup		L With Certificate of Compliance								
TH13-										Enter desired product structure								

TH14 RTD General purpose

flanged thermowell, economical RTD assembly with weatherproof heads

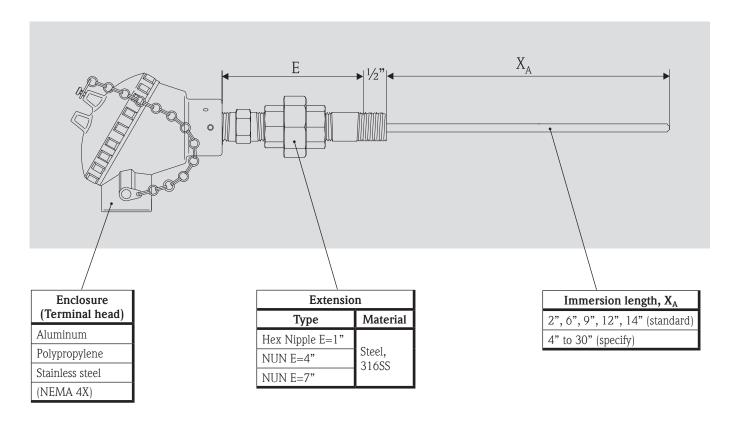


Product Structure, general flanged RTD assembly, TH14

TW Immersion length (U)	TH14	Ge	nera	1 flan	iged	RTI	D ass	seml	bly v	with t	her	nowell, US Style, TH14						
1 2" 4" 3 7" 4 10" 5 13" 5 13" 5 13" 5 13" 5 13" 5 13" 5 13" 5 13" 5 13" 5 13" 5 14" 5 13" 5 15" 5									-, '									
2 4" 4 10" 5 13" 6 10" 7 22" 8 2". (Specify increment 0.5") 8 1 - 1", 31 0.5 S 9 1 - 1", 31 0.5 S C 2", 31 0.5 S V For large stars/different construction materials - consult your E+H sales representative 8		-				8	- ('	-										
1			4"															
107			7"															
Second Process			10"															
8 'Specify Increment 0.5") Flange sizes, TW Material of Construction A 1", 316 SS B 1-1-\('1', 316 SS C 2", 316 SS Y For larger sizes, different construction materials - consult your E+H sales representative Rating Plange Type 1 150 pst, 87 2 300 pst, 87 3 tripler ratings available on request- consult your E+H sales representative		5	13"															
Range size; TW Material of Construction																		
Range size; TW Material of Construction																		
A 17, 316 SS B 1-1/47, 316 SS C 27, 316 SS C 27, 316 SS C 27, 316 SS For larger sizes/different construction materials - consult your E+H sales representative Rating; Flange Type T 150 psi; RF 2 300 psi; RF 2 300 psi; RF 3 600 psi; RF 3 600 psi; RF 3 600 psi; RF 3 600 psi; RF 3 600 psi; RF 3 600 psi; RF 3 600 psi; RF 3 600 psi; RF 7 7 7 7 7 7 7 7 7		8		" (Spe	ecify	incre	emer	nt 0.5	5")	_								
B 1-14", 310 SS C 2", 310 SS							Ma	teria	ıl of	Cons	truc	ion						
Yes For targer sizes/different construction materials - consult your E+H sales representative Rating; Flange Type 1 150 psi; RF 2 300 psi; RF 3 600 psi; RF 7 150 psi; RF 150 psi; RF							r											
For larger staces different construction materials – consult your E+H sales representative							5											
Rating: Flange Type							pc/A	liffor	ent o	Onetr	ıctio	n materials - consult your F+H sales representative						
1 50 psi; RF 2 300 psi; RF 3 600 psi; RF 4 7 7 7 7 7 7 7 7 7			1							OIIOLI	acut.	I materials Consult your Litti suice representative						
2 300 psi, RF 3 600 psi, BF 1 1 1 1 1 1 1 1 1				-				JPC										
Y				2														
Shape of TW, Welding option				3	600	0 psi; RF												
Straight, Standard TW Lag length (T)				Y	hig	her r	ating	gs av	ailab	le on	requ	est- consult your E+H sales representative						
Twite Twit							Straight; Standard Tapered; Standard											
TW Lag length (T)					-													
A None B 3" Specify					2													
B 3"									ıgtn	(1)								
X Specify Extension length (E) 1 Hex nipple 316 SS, E=1" 2 Nipple -Union-Nipple 316 SS, E=4" 3 Hex nipple 51ed, E=1" 4 Nipple -Union-Nipple Steel, E=4" 5 Nipple -Union-Nipple 51ed, E=4" 5 Nipple -Union-Nipple 316 SS, E=7" 6 Nipple-Union-Nipple 316 SS, E=7" 5 Sensor Type E 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F) F x y Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F) H x y Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F) H x y Pt100, class B, 3 wire, -50-200°C (-58 to 392 °F) K 2 x Pt100, class B, 3 wire, -50-200°C (-58 to 392 °F) K 2 x Pt100, class B, 3 wire, -50-200°C (-58 to 392 °F) K 2 x Pt100, class B, 3 wire, -50-200°C (-58 to 392 °F) M 2 x Pt100, class B, 3 wire, 50-200°C (-58 to 392 °F																		
Extension length (E) 1 Hex nipple 316 SS, E=1" 2 Nipple -Union-Nipple 316 SS, E=4" 3 Hex nipple Steel, E=1" 4 Nipple -Union-Nipple Steel, E=7" 5 Nipple-Union-Nipple Steel, E=7" 6 Nipple-Union-Nipple 316 SS, E=7" Sensor Type E 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F) F 1 x Pt100, class B, 4 wire, -200-600°C (-328 to 1112 °F) G 1 x Pt100, class B, 4 wire, -200-600°C (-328 to 1112 °F) J 2 x Pt100, class B, 4 wire, -200-600°C (-328 to 1112 °F) J 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F) J 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F) J 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F) L 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F) M 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F) M 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F) Enclosure; Cable entry A Not selected B Alu, E+H blue; NPT '8" A Not selected B Alu, E+H blue; NPT '8" A Not selected B Alu, E+H blue; NPT '8" C Alu, E+H blue; NPT '8" A Not selected B Programmable TMT181 CS IS P HART TMT182 CSA IS P HART TMT182 CSA IS P HART TMT182 CSA IS P HART TMT182 CSA IS P HART TMT182 CSA IS P HART TMT182 CSA IS P HART TMT182 CSA IS P FRed Transmitter DINB, CP F Fred Transmitter DINB, CP F Fred Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P Profibus PA Head Transmitter DINB, PM-CSA IS P PROFIBUS PA PROFIBUS PA PROFIBUS PA PROFIBUS PA PROFIBUS PA PROFIBUS PA PROFIBUS PA PROFIBUS PA PROF							1 -											
Hex nipple 310 SS, E=1"										lengt	h (E							
Hex nipple Steel, E=1"							$\overline{}$											
Hex nipple Steel, E=1"								Nip	pple-	-Unio	n+N	pple 316 SS, E=4"						
S																		
Sensor Type E 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F)																		
Sensor Type E 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F) F 1 x Pt100, class B, 4 wire, -200-600°C (-328 to 1112 °F) G 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F) H 1 x Pt100, class A, 4 wire, -50-200°C (-58 to 392 °F) K 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F) L 2 x Pt100, class B, 3 wire, -50-200°C (-58 to 392 °F) K 2 x Pt100, class A, 3 wire, -200-600°C (-328 to 1112 °F) Enclosure; Cable entry A Not selected B Alu, E+H blue ; NPT '4" C Alu, E+H blue ; NPT '4" 1 Alu, E+H blue ; NPT '4"							1 -	Nip	pple-	-Unio	n+N	pple Steel, E=7"						
E							0	Nıp	ople-	-Unio	n+N	pple 316 SS, E=7"						
F							Sensor Type											
G								E 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F)										
H																		
R																		
L 2 x Pt100, class A, 3 wire, -50-200°C (-58 to 392 °F) M 2 x Pt100, class A, 3 wire, -200-600°C (-328 to 1112 °F) Enclosure; Cable entry A Not selected B Alu, E+H blue; NPT ½" C Alu, E+H blue; NPT ¾" 1 Alu, E+H blue + flip cover, 1/2" NPT Y Special version - consult E+H sales representative for more options Electrical connection A Programmable TMT180 C Programmable TMT181 D Programmable TMT181 D Programmable TMT181 CSA IS F HART TMT182 R HART TMT182 R HART TMT182 CSA IS U FF Head Transmitter DINB, GP V FF Head Transmitter DINB, GP V FF Head Transmitter DINB, FM/CSA IS 2 Flying leads 3 Terminal block 4 Profibus PA Head Transmitter DINB, FM/CSA IS 2 Flying leads 3 Terminal block 4 Profibus PA Head Transmitter DINB, FM/CSA IS Additional option 1 Not selected 2 PROFIBUS PA plug M12 3 Foundation Fieldbus plug 7/8" 4 Plastic cable gland 9 Special version Test; Calibration								J	2 x	Pt10	0, cl	nss B, 3 wire, -50-200°C (-58 to 392 °F)						
M 2 x Pt100, class A, 3 wire, -200-600°C (-328 to 1112 °F) Enclosure; Cable entry A Not selected B Alu, E+H blue; NPT ½" C Alu, E+H blue; NPT ½" 1 Alu, E+H blue + flip cover, 1/2" NPT Y Special version - consult E+H sales representative for more options Electrical connection A Programmable RTD TMT180 C Programmable TMT181 FM IS D Programmable TMT181 FM IS E Programmable TMT181 CSA IS P HART TMT182 R HART TMT182 R HART TMT182 R HART TMT182 FM IS T HART TMT182 FM IS T HART TMT182 C FF Head Transmitter DINB, GP V FF Head Transmitter DINB, FM/CSA IS 2 Flying leads 3 Terminal block 4 Profibus PA Head Transmitter DINB, GP 5 Profibus PA Head Transmitter DINB, FM/CSA IS Additional option 1 Not selected 2 PROFIBUS PA plug M12 3 Foundation Fieldbus plug 7/8" 4 Plastic cable gland 9 Special version Test; Calibration								K										
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B Alu, E+H blue; NPT ½" C Alu, E+H blue; NPT ½" 1 Alu, E+H blue; hip cover, 1/2" NPT Special version - consult E+H sales representative for more options Electrical connection A Programmable RTD TMT180 C Programmable TMT181 D Programmable TMT181 D Programmable TMT181 FM IS E Programmable TMT181 CSA IS P HART TMT182 R HART TMT182 R HART TMT182 CSA IS U FF Head Transmitter DINB, GP V FF Head Transmitter DINB, FM/CSA IS 2 Flying leads 3 Terminal block 4 Profibus PA Head Transmitter DINB, GP Frofibus PA Head Transmitter DINB, FM/CSA IS Additional option 1 Not selected 2 PROFIBUS PA plug M12 3 Foundation Fieldbus plug 7/8" 4 Plastic cable gland 9 Special version Test; Calibration									-									
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9 Special version Test; Calibration											- 1							
Test; Calibration																		
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B Sensor calibration certificate												B Sensor calibration certificate						
C Material traceability certificate																		
Version																		
K Standard																		
L With Certificate of Compliance	my y 4			_				-		_	\dashv							
TH14- Enter desired product structure	1П14-			<u> </u>						1		Enter desired product structure						

TH15 RTD General Purpose

spring loaded element, economical RTD assembly with weatherproof heads for existing thermowells



 $\boldsymbol{X}_{\!A} = \text{drilled length of existing thermowell.}$

Product Structure, General RTD Assembly, spring-loaded insert TH15

TH15-	Ge	neral	RTI) As	sem1	blv v	vitho	ut 1	hern	owell, spring-loaded insert, US Style, TH15							
11113-		mers						ut I		on on spring readed mostly on organ, title							
	1	4"	.VII I	ungl	ıı (A	AJ											
	1	6"															
	2	1															
	3	9"															
	4	12"															
	5	14"															
	8	'	" (Spe	ecify	incre	emer	nt 0.5	")									
		She	ath (1											
		Α	1/4",	316	SS												
			Ext	ensi	on (I	E)											
			1	Hex	k nipj	ple 3	316 SS	S, E=	=1"								
			2	Nip	ple+	Unic	n+Ni	ipple	316	SS, E=4"							
			3	Hex	k nipj	nipple Steel, E=1" le+Union+Nipple Steel, E=4" le+Union+Nipple Steel, E=7" le+Union+Nipple 316 SS, E=7" or Type 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F)											
			4	Nip	ple+												
1	İ		5	Nip	ple+												
	1		6	-	-												
	1			Ser	sor												
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				F			,		,	re, -200-600°C (-328 to 1112 °F)							
				G			,		,	ire, -50-200°C (-58 to 392 °F)							
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				J					,	re, -50-200°C (-58 to 392 °F)							
				K						re, -200-600°C (-328 to 1112 °F)							
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									,	re, -200-600°C (-328 to 1112 °F)							
				IVI					e ent								
						_				LY							
					A		t sele			NDT 1/2							
					В	1	Alu, E+H blue Al + cover; NPT ½" Alu, E+H blue Al + cover; NPT ¾"										
					С		,			'							
					D	1			,	IPT ½"							
					Е	1			,	IPT ¾"							
					F				- , ,	T ½"							
					G				- /	display; NPT ½"							
					1					p cover, 1/2" NPT							
					Y					onsult E+H sales representative for more options							
						-	_		onne								
						A	1 '	_	mmable RTD TMT180								
						C	1 '	ogrammable TMT181									
						D	,	_		hable TMT181 FM IS							
						Е	1 '	-		TMT181 CSA IS							
						P			MT1								
						R				2 FM IS							
						T	1			2 CSA IS							
						U				Head Transmitter DINB, GP							
						V				mitter DINB, FM/CSA IS							
						2	Flyi										
						3	Terr	nina	ıl bloc								
						4	Prof	ibus	PA H	ead Transmitter DINB, GP							
						5	Prof	ibus	PA H	ead Transmitter DINB, FM/CSA IS							
							Doo	cum	entat	on required							
							1	No	selec	ted							
							2	wit	h Cer	ificate of Conformance							
								Tes	t; Ca	ibration							
								Α	Not	selected							
								В	Sens	or calibration certificate							
								С	Mat	erial traceability certificate							
									Ver								
										Standard							
										Additional option							
										1 Not selected							
										2 PROFIBUS PA plug M12							
										Foundation Fieldbus plug 7/8"							
										4 Plastic cable gland							
TH15-	\vdash	Α	\vdash		\vdash	\vdash	\vdash		K	Enter desired product structure							
							ш			F							

TH1x RTD assembly with advanced TMT162 transmitters for critical control applications

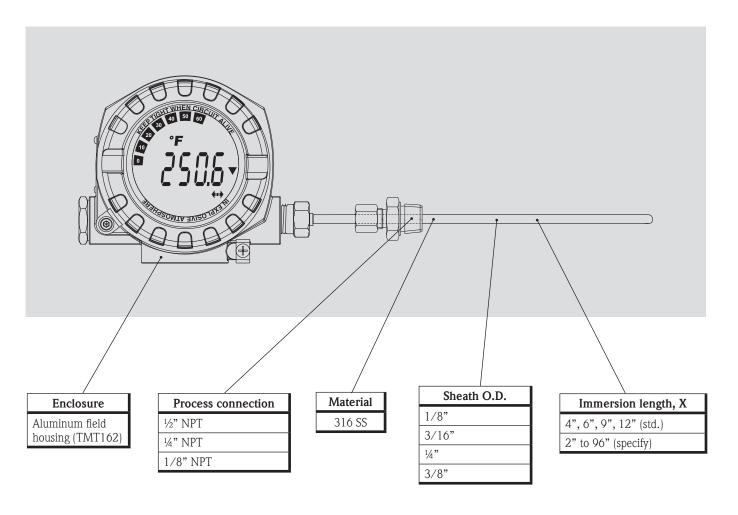
- The TMT162 gives temperature measurement instruments unique technological advantages.
- The assembly offers improved safety and ease of installation through dual compartment transmitter housing design.
- The completely potted electronics allow seamless operation in extreme temperatures and high precipitation & condensation areas.
- The best in class accuracy and performance with zero-corrosion* gold plated terminals, ultra low copper content, dual epoxy coating and specially coated threads offer a robust instrument that stands up to the harshest environments.
- This transmitter is also available in cast 316L stainless steel for offshore applications.
- The accuracy can be optimized through loop calibration and sensor-transmitter-matching.
- Customers with high pressure applications such as boilers and vessels will appreciate the pressure calculations available for the CRN registered designs.



^{*} Gold plating ensures virtually no corrosion.

TH11 RTD General Purpose

welded insert, RTD assembly with advanced TMT162 transmitters for critical control applications

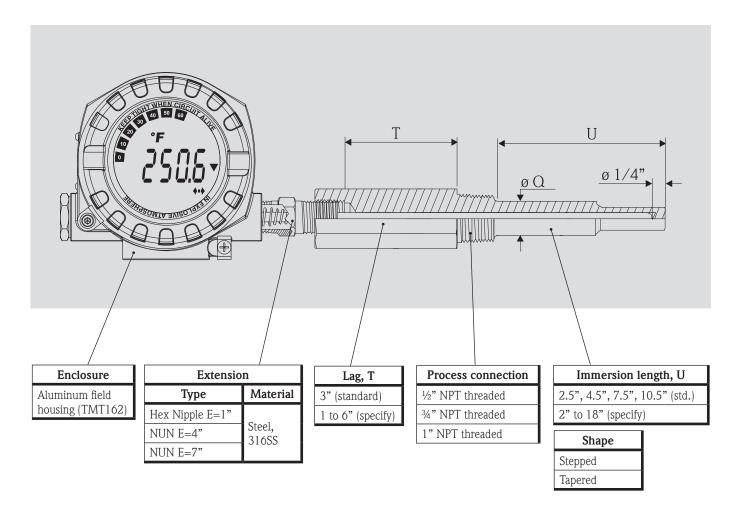


Product Structure, General Purpose RTD assembly with advanced TMT162, TH11

TH11-	Ge	nera	l Pu	Purpose RTD with field housing, TH11													
	Pro	cess	Co	nne	ctio	n											
	Α	Not	sele	ected	i												
	В	1/2"	NPT	, 31	6 SS												
	С	Con	np. f	ittin	g 1/	8" N	NPT 3	316 S	S, or	e time							
	l									adjustable							
	l		-		-			6 SS,		·							
	l		-		_			,		ijustable							
	1		_		_			2 to		yaran o							
					Dime			2 10									
		- 1		"X" Dimension													
		- 1			X* Dimension X* Dimension												
					"X" Dimension												
						Dimension city increment 0.5")											
		°															
		ł	_	_				Mate	ıaı								
					; 310			/1 / 27	214	cc							
			Г	-				/16";	310	33							
				_	nsor			1 T		20000 (50 +- 202 05)							
							,		,	0-200°C (-58 to 392 °F)							
				F						00-600°C (-328 to 1112 °F)							
					1		,		-	0-200°C (-58 to 392 °F)							
							,		,	00-600°C (-328 to 1112 °F)							
				J						0-200°C (-58 to 392 °F)							
										00-600°C (-328 to 1112 °F)							
										D-200°C (-58 to 392 °F)							
				M					_	00-600°C (-328 to 1112 °F)							
					_	_		Cab									
					J	1				2 x Input + NPT ½" + HART							
					1				-	NPT ½" + HART + 2 x Input + display							
					L	1				2 x Input + FF + NPT ½"							
					M	-			_	NPT ½" + FF + 2 x Input + display							
							_			ction							
						I	1		2, dual compartment								
						J	1			I IS, dual compartment							
						K	-		_	A IS, dual compartment							
								_	mentation required								
							1		sele								
										nal option 1							
								A		selected							
								В		sor calibration certificate							
										sion							
									K	Standard D. H. L. (D. CO. J. L. L.)							
									P	Polished (Ra 32 µ-inch)							
										Additional option 2							
										1 Not selected							
										2 PROFIBUS PA plug M12							
						3 Foundation Fieldbus plug 7/8"											
TOTAL 1		-								4 Plastic cable gland							
TH11-										Enter desired product structure							

TH13 RTD General Purpose

Threaded thermowell, RTD assembly with advanced TMT162 transmitter for critical control applications

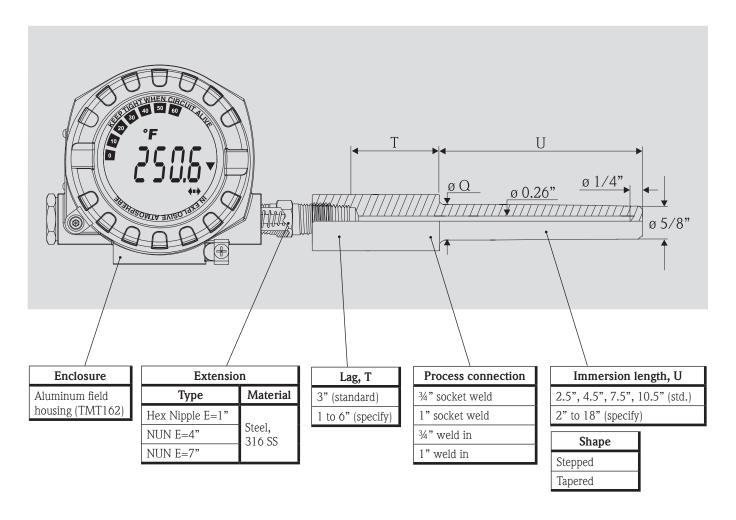


Product Structure, General Purpose RTD assembly with advanced TMT162, TH13

TH13 General RTD As	sembly with Thermowell, US Style, TH13											
TW Immersion												
1 21/2"	2½"											
2 4½"												
3 71/2"												
4 10½"												
5 13½"												
6 16½"												
7 22½"												
	increment 0.5") (2" to 18")											
0 0	hs available - consult your E+H sales representative											
	nnection; Material of Construction											
	2" NPT, 316 SS 4" NPT, 316 SS											
	NPT, 316 SS NPT, 316 SS											
	nernowell shape											
	epped, Standard Duty											
	Tapered, Heavy Duty											
	Thermowell Lag (T)											
A	None											
E	3"											
X	specify											
	Extension (E)											
	1 Hex nipple 316 SS, E=1"											
	Nipple+Union+Nipple 316 SS, E=4"											
	3 Hex nipple Steel, E=1"											
	4 Nipple+Union+Nipple Steel, E=4" 5 Nipple+Union+Nipple Steel, E=7"											
	6 Nipple+Union+Nipple 316 SS, E=7"											
	Sensor Type											
	E 1 x Pt100, class B, 4 wire, -50-200°C (-58 to 392 °F)											
	F 1 x Pt100, class B, 4 wire, -200-600°C (-328 to 1112 °F)											
	G 1 x Pt100, class A, 4 wire, -50-200°C (-58 to 392 °F)											
	H 1 x Pt100, class A, 4 wire, -200-600°C (-328 to 1112 °F)											
	J 2 x Pt100, class B, 3 wire, -50-200°C (-58 to 392 °F)											
	K 2 x Pt100, class B, 3 wire, -200-600°C (-328 to 1112 °F)											
	L 2 x Pt100, class A, 3 wire, -50-200°C (-58 to 392 °F)											
	M 2 x Pt100, class A, 3 wire, -200-600°C (-328 to 1112 °F)											
	Enclosure; Cable entry J AL field housing; 2 x Input + NPT ½" + HART											
	J AL field housing; 2 x Input + NPT ½" + HART K AL field housing; NPT ½" + HART + 2 x Input + display											
	L AL field housing; 18 F1 72 + FIART + 2 x input + display L AL field housing; 2 x Input + FF + NPT ½"											
	M AL field housing; NPT ½" + FF + 2 x Input + display											
	Electrical connection											
	For single compartment– consult your E+H sales representative											
	I TMT162, dual compartment											
	J TMT162, FM IS, dual compartment											
	K TMT162, CSA IS, dual compartment											
	Additional option											
	Not selected											
	2 PROFIBUS PA plug M12 3 Foundation Fieldbus plug 7/8"											
	Test; Calibration											
	A Not selected											
	B Sensor calibration certificate											
	C Material traceability certificate											
	Version											
	K Standard											
	L With Certificate of Compliance											
TH13-	Enter desired product structure											

TH13 RTD General Purpose

Weld-in / socket weld thermowell RTD assembly with advanced TMT162 transmitter for critical control applications

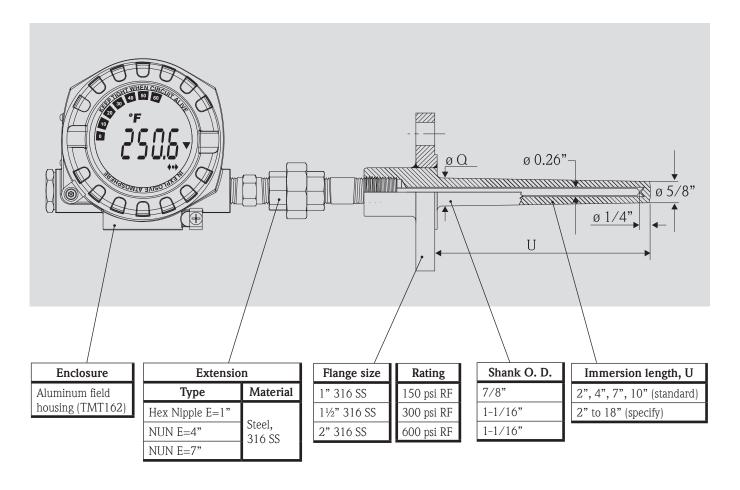


Product Structure, General Purpose RTD assembly with advanced TMT162, TH13

TH13	Ge	neral RTD Assembly with Thermowell, US Style, TH13														
	TW	Imm	ersi	on le	ngth	(U)										
	1	21/2"														
	2	41/2"														
	3	71/2"														
	4	101/2	"													
	5	131/2	"													
	6	161/2	"													
	7	221/2														
	8		" (Specify increment 0.5") (2" to 18")													
	9									E+H sales representative						
	ľ								,	onstruction						
		B1							01 00	nisti ucuon						
		B2		Socket weld ¾", 316 SS												
		C1		Socket weld 1", 316 SS Weld-in ¾", 316 SS												
		C2														
		CZ		Weld-in 1", 316 SS Thermowell shape												
	-		-	Thermowell shape												
				2 Stepped, Standard Duty 3 Tapared Heavy Duty												
			3	Tapered, Heavy Duty There would be (T)												
				Thermowell Lag (T)												
				A	Nor	ne										
				Е	3"											
				X	spe											
							on (I									
					1	1				S, E=1"						
					2					pple 316 SS, E=4"						
					3		1.1		eel, E							
					4					pple Steel, E=4"						
					5		-		-	pple Steel, E=7"						
					6					pple 316 SS, E=7"						
						-	isor '									
						Е	1		,	ass B, 4 wire, -50-200°C (-58 to 392 °F)						
						F				ass B, 4 wire, -200-600°C (-328 to 1112 °F)						
						G				ass A, 4 wire, -50-200°C (-58 to 392 °F)						
						Н	1			ass A, 4 wire, -200-600°C (-328 to 1112 °F)						
						J	2 x	Pt10	00, cla	ass B, 3 wire, -50-200°C (-58 to 392 °F)						
						K	2 x	Pt10	00, cla	ass B, 3 wire, -200-600°C (-328 to 1112 °F)						
				L 2 x Pt100, class A, 3 wire, -50-200°C (-58 to 392 °F)												
				M 2 x Pt100, class A, 3 wire, -200-600°C (-328 to 1112 °F)												
							Enc			Cable entry						
							J	AL t	field l	housing; 2 x Input + NPT ½" + HART						
							K	AL	field l	housing; NPT ½" + HART + 2 x Input + display						
							L	AL 1	field l	housing; 2 x Input + FF + NPT ½"						
							M	AL t	field l	housing; NPT ½" + FF + 2 x Input + display						
								Ele		al connection						
									For	single compartment- consult your E+H sales representative						
								I	TM	T162, dual compartment						
								J	TM	T162, FM IS, dual compartment						
								K	TM	T162, CSA IS, dual compartment						
									Add	ditional option						
									1	Not selected						
	İ		İ	İ		İ			2	PROFIBUS PA plug M12						
										Foundation Fieldbus plug 7/8"						
										Plastic cable gland						
										Test; Calibration						
										A Not selected						
										B Sensor calibration certificate						
									1 1	C Material traceability certificate						
										Version						
										K Standard						
										L With Certificate of Compliance						
TH13-					 		1		\vdash	Enter desired product structure						

TH14 RTD General purpose

flanged thermowell RTD assembly with advanced TMT162 transmitter for critical control applications

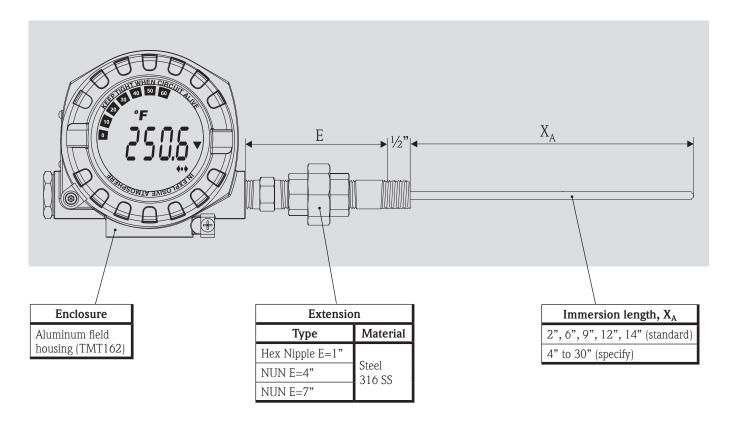


Product Structure, General Purpose RTD flanged assembly with advanced TMT162, TH14

TH14	Ge	nera	1 flar	nged	RTI	D as	semi	hlv v	with th	ermo	well, US Style, TH14					
11114	TW	/ Imi	mers	ion	leng	th (I	U)	J1y .	************	CIIIIO	wen, 00 00/10, 11114					
	1	2"					,									
	2	4"														
	3	7"									j					
	4	10"														
	5	13"														
	6	16"														
	7	22"														
	8								max. 1							
		-	nge s 1",			Ma	teria	ı of	Const	ructio	n					
		A B	1-1/2			ς										
		C	2",			3										
		Y				zes/d	liffere	ent c	onstru	rtion n	naterials - consult your E+H sales representative					
		-	-				Гуре				, , , , , , , , , , , , , , , , , , , ,					
			1		0 psi		/1									
			2	30	0 psi	, RF										
			3	1 /												
			Y	0 0 1 1 1												
				Shape of TW; Welding option												
				1 Straight; Standard 2 Tapered; Standard												
				2			i; Sta g len									
					A	No		igui	(1)							
					B	3"										
					X		ecify									
					**				length	(E)						
						1			ople 31		E=1"					
						2	Nip	ople-	+Union	+Nipp	le 316 SS, E=4"					
						3	He	x nip	ople Ste	el, E=	1"					
						4					le Steel, E=4"					
						5					le Steel, E=7"					
						6				+Nipp	le 316 SS, E=7"					
							E		Type	01000	B, 4 wire, -50-200°C (-58 to 392 °F)					
							F				B, 4 wire, -200-600°C (-38 to 1112 °F)					
							G				A, 4 wire, -50-200°C (-58 to 392 °F)					
							Н				A, 4 wire, -200-600°C (-328 to 1112 °F)					
							J				B, 3 wire, -50-200°C (-58 to 392 °F)					
							K				B, 3 wire, -200-600°C (-328 to 1112 °F)					
				İ			L				A, 3 wire, -50-200°C (-58 to 392 °F)					
							M	2 2	r Pt100	, class	A, 3 wire, -200-600°C (-328 to 1112 °F)					
								En			ole entry					
								J			using; 2 x Input + NPT ½" + HART					
								K			using; NPT ½" + HART + 2 x Input + display					
							-	L			using; 2 x Input + FF + NPT ½"					
								IVI			using; NPT ½" + FF + 2 x Input + display					
											gle compartment- consult your E+H sales representative					
											62, dual compartment					
											62, FM IS, dual compartment					
											62, CSA IS, dual compartment					
										Additi	onal option					
											ot selected					
											OFIBUS PA plug M12					
											undation Fieldbus plug 7/8"					
											astic cable gland					
											ecial version					
										A	st; Calibration Not selected					
										B	Sensor calibration certificate					
										C	Material traceability certificate					
										١	Version					
											K Standard					
											L With Certificate of Compliance					
TH14-											Enter desired product structure					

TH15 RTD General Purpose

spring loaded element with advanced TMT162 transmitter for critical control applications (for existing thermowells)



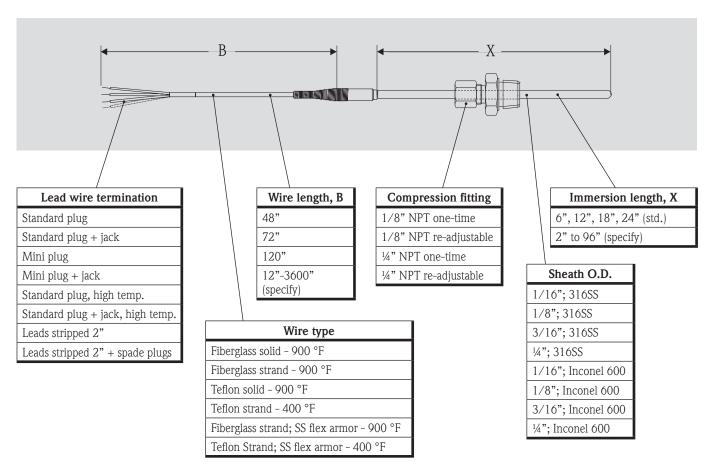
 $\boldsymbol{X}_{\!A} = \text{drilled length of existing thermowell.}$

Product Structure, General RTD assembly with advanced TMT162, spring-loaded insert, TH15

TH15-	Gei	nera	RTI	RTD assembly without thermowell, spring-loaded insert, US Style, TH15													
	Imr	ners	ion 1	on length (X _A)													
	1	4"															
	2	6"															
	3	9"															
	4	12"															
		ı															
	5	14"			fy increment 0.5")												
	8	_															
					iameter 114 CC												
		Α	1/4",	, 316 SS tension (E) Hex nipple 316 SS, E=1"													
			Ext														
			1														
	İ		2	Nip	Nipple+Union+Nipple 316 SS, E=4" Hex nipple Steel, E=1"												
			3														
			4		ple+Union+Nipple Steel, E=4"												
			5	1 -	-												
									le Steel, E=7"								
			6	_				ippie	le 316 SS, E=7"								
				-	isor												
				Е					B, 4 wire, -50-200°C (-58 to 392 °F)								
				F	1 x	Pt10	00, cl	ass E	B, 4 wire, -200-600°C (-328 to 1112 °F)								
				G	1 x	Pt10	00, cl	ass A	A, 4 wire, -50-200°C (-58 to 392 °F)								
				Н	1 x	Pt10	00, cl	ass A	A, 4 wire, -200-600°C (-328 to 1112 °F)								
				J	2 x	Pt10	00, cl	ass E	B, 3 wire, -50-200°C (-58 to 392 °F)								
				K	1				B, 3 wire, -200-600°C (-328 to 1112 °F)								
				L	1		,		A, 3 wire, -50-200°C (-58 to 392 °F)								
									A, 3 wire, -200-600°C (-328 to 1112 °F)								
				111	_				ole entry								
					J	_			ousing; 2 x Input + NPT ½" + HART								
					K				ousing; NPT ½" + HART + 2 x Input + display								
					L				ousing, 10 1 72 + 11AC1 + 2 X input + display								
					1												
					M	_			ousing; NPT ½" + FF + 2 x Input + display								
					ŀ	EIG			connection								
						For single compartment- consult your E+H sales representative											
						I	1		62, dual compartment								
						J TMT162, FM IS, dual compartment											
					ļ	K TMT162, CSA IS, dual compartment											
						Documentation required											
						1 Not selected											
					2 with Certificate of Conformance												
					Test; Calibration												
								Α	Not selected								
								В	Sensor calibration certificate								
								С	Material traceability certificate								
									Version								
									K Standard								
									Additional option								
									1 Not selected								
									2 PROFIBUS PA plug M12								
									3 Foundation Fieldbus plug 7/8"								
					_		Ш		4 Plastic cable gland								
TH15-		Α							K Enter desired product structure								

TH52 General Purpose, MgO insulated thermocouple with fiberglass braided or armored leads with optional male plug

The TH52 offers **a thermocouple element with extension cable** for process application that required fast response time and extension cable.



Product Structure, General thermocouple assembly with cable, TH52

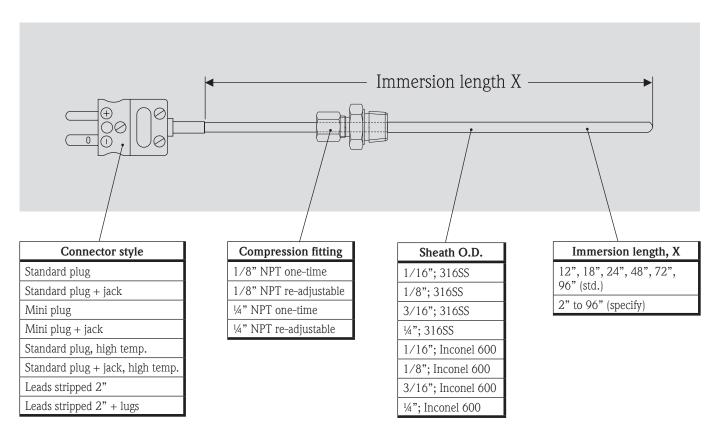
TH52-						ple .	Asso	embl	y wit	h ca	able, T	H52	
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	D								S, re a		table		
	Е								ne tin				
	F								e adju				
	Y									cons	sult yo	r E+H sale	es representative
		-		sion	leng	th (2	X), 2	2 to 9	<i>1</i> 0″				
		1	6"										
		2	12"										
		3	18"										
		4	24"					+ 0	C")				
		8						ent 0.			*0.11 a la 1 a		TOTAL TARGET AND
		9						later		is av	aliable	consuit y	our E+H sales rep
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					o; s "; 31								
					6"; 31								
					316)3						
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					6"; Ii								
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					2 x l								
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					2 x l								
					1 x l								
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				S	2 x '	T; 2							
									mbina	atior	ns, and	special acc	curacy available on request
					June								
				- 1	1		ound						
					2			nded					
						A	48'	ngth					
						В	72						
						C	120						
						X	1 '		ecify i	ncre	ement	2")	
						Y	1		versior		ATTICITE	2)	
			l			-		re Ty					
							1		erglass	soli	id		
							2		erglass				
							3		lon sol				
			İ				4	Tef	lon str	and			
							5					flex armor	r
							6					armor	
								Lea			rmina	ion	
								Α			plug		
												female jac	ck
								С	Mini				
												ale jack	
								Е	High	tem	ıperatı	re standaro	d plug
												e standard	d plug + female jack
								H	Strip	ped .	2"		4
											selecte	n require	d
											; Calil		
									_		Not se		
										- 1			n certificate
									1	-	Version		2 000 MINOREO
												andard	
												dditional	option
											1	Not sele	
TH52-			1						1		K 1	Enter d	desired product structure

TH56 General Purpose, quick disconnect MgO insulated thermocouple with male plug

The TH56 offers a thermocouple probe with quick disconnect plugs for process application such as heat treatment ovens and furnaces. We use heavy duty thermocouple and extension grade wires, individually tested and inspected to deliver the highest quality product. The options found in the order code represent common industrial requirements. Standard plus withstand temperatures up to $200\,^{\circ}$ C and for higher temperatures the heavy duty plugs that withstand $400\,^{\circ}$ C are recommended.

Custom built and other terminations and option are available on request.

This series also offers the advanced Type N thermocouple that has superior drift resistance to any other TC type available.



Product Structure, General thermocouple assembly with direct plug, TH56

TH56-	Gei	neral	Th	erm	OC01	uple A	SSE	embly v	vith	direct plug, TH56
		cess								
	Α	Not	sele	cted	l					
	С	Con	np. f	ittin	g 1/	8" NPT	Г3	16 SS, c	ne t	me
	D							16 SS, r		
	Е							SS, one		
	F							SS, re a		
	Y									nsult your E+H sales representative
	1							2 to 96'		mont four Bill bales representative
			12"		1011	gar (21)	,, -	10 /0		
			18"							
			24"							
			48"							
		4								
			72"							
		6	96"					. 0 5		
								nt 0.5")		
									gths	available- consult your E+H sales rep
						meter;		aterial		
						316 SS				
						16 SS				
						316 SS				
					; 316					
						Inconel				
			J	1/8	3"; In	nconel (600)		
			K	3/1	6";	Inconel	60)0		
			L	1/4";	; Inco	onel 60	0			
				Sen	isor	Type;	Cla	ass		
				Α	1 x	J; 2				
				С	1 x	J; 1				
				Е	1 x	K; 2				
				G	1 x	K; 1				
				J	1 x	E; 2				
		l l	İ	L		E; 1				
		l l	İ	N		N; 2				
İ				P		N; 1				
				R		T; 2				
				T		T; 1				
		l l		Y			rsio	n, com	oinat	ions, and special accuracy available on request
		l i	İ			iction s				
		l l	İ		1	Grour				
			ı		2	Ungro				
		l l	İ					tor styl	e	
								ndard pl		
										female jack
								ni plug		· · · · · · ·
									ferr	ale jack
										e standard plug
										e standard plug + female jack
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TH5x General Purpose, economical TC assembly with weatherproof heads

The TH5x is a simple to configure, complete thermocouple assembly, for all temperature monitoring needs.

Key features include:

- Ultra low copper heads with dual epoxy powder coats ensures high resistance to corrosive environments like salt water
- Patented Endress+Hauser design heads for easy wiring.
- Highly reliable and individually tested sensor.
- Use of high quality certified materials such as MgO cable, pipes and bar stock.
- Robust thermocouple wire for applications requiring a wide temperature range.

This style of TH5x assemblies offer the advantage of high quality measurement instrument with a low total cost of ownership, making them the perfect choice for all your monitoring applications.

The assemblies are available with Endress+Hauser's robust TMT series of In-head DIN B size temperature transmitters with 4-20 mA, HART, Profibus PA and FOUNDATIONTM Fieldbus outputs.

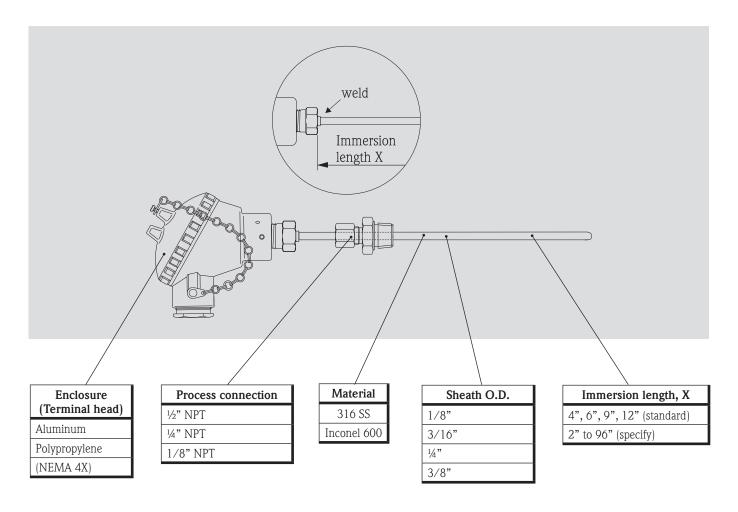
We offer the Type N thermocouple as a standard. Type N was designed for aerospace applications and finds excellent used in cyclic temperature applications such as mining and primary industries. It has the best stability among all thermocouple types available on the market.

Customers with high pressure applications such as boilers and vessels will appreciate the pressure calculations available for the CRN registered designs.



TH51 TC General Purpose

welded insert, economical TC assembly with weatherproof heads for direct measurement

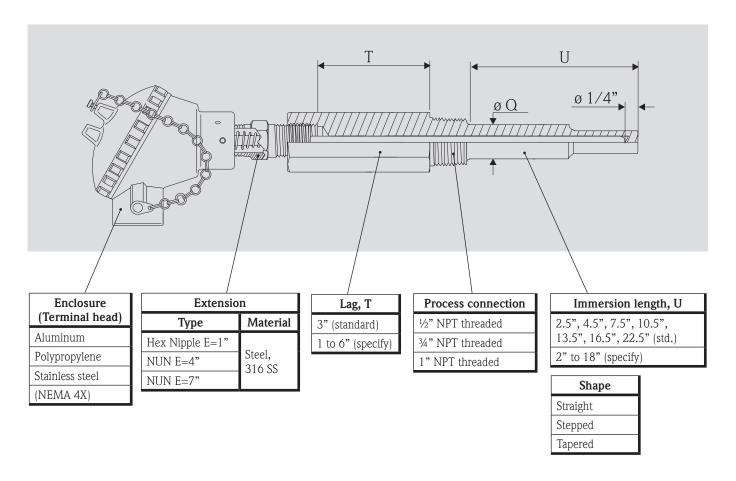


Product Structure, General Thermocouple assembly with connection head, TH51

General Thermocouple Assembly with connection head, TH51 Process connection	TH51-	Ge	nera	1 The	ermo	0011	ple /	Asset	mhlv	v wit	h co	nnection head. TH51
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S 2 x T; std Y For Special version / (TC combinations and special accuracy available, consult E+H sales representative) Junction Style 1 Grounded Enclosure; Cable entry A Not selected B Alu, E+H blue Al + cover; NPT ½" Y Special version - Consult E+H sales representative for more options Electrical connection C Programmable TMT181 FM IS P Programmable TMT181 CSA IS P HART TMT182 R HART TMT182 R HART TMT182 FM IS T HART TMT182 CSA IS Y Special version 2 Flying leads 3 Terminal block Documentation required 1 Not selected 9 Special version Test; Calibration A Not selected B Sensor calibration certificate Y Special version K Standard Y Special version K Standard Y Special version A Mot selected 2 PROFIBUS PA plug M12 3 Foundation Fieldbus plug 7/8" 4 Plastic cable gland 9 Special version												
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	TH51-											Enter desired product structure

TH53 TC General Purpose

threaded thermowell, economical TC assembly with weatherproof heads

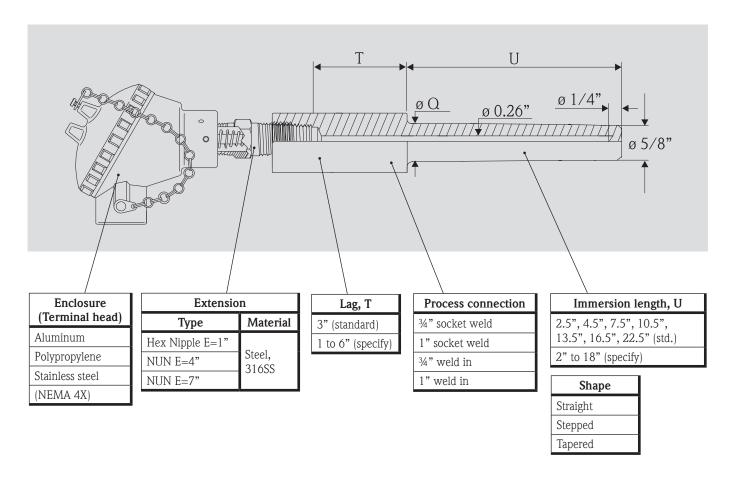


Product Structure, general thermocouple assembly, TH53

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TH53 TC General Purpose

weld in / socket weld thermowell, economical TC assembly with weatherproof heads

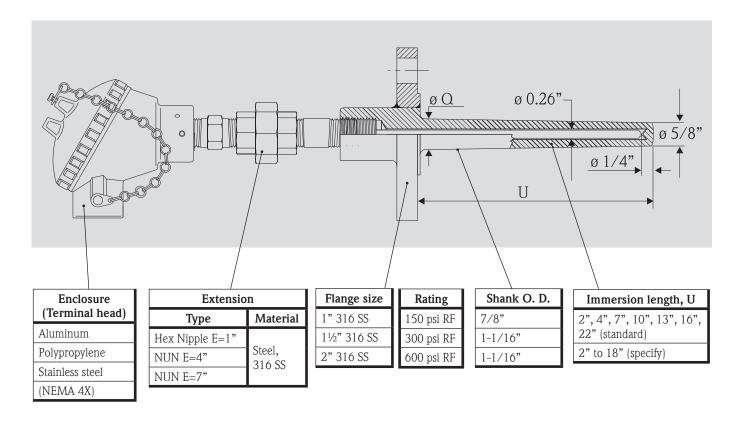


Product Structure, general thermocouple assembly, TH53

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TH54 TC General Purpose

flanged thermowell, economical TC assembly with weatherproof heads

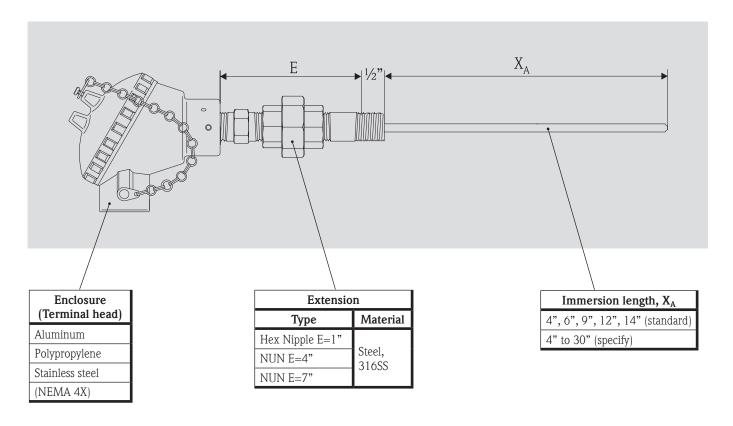


Product Structure, general flanged thermcouple assembly, TH54

TH54	Ge	nera	l flan	ged	the	rmo	cour	ole a	ssembl	y wit	h thern	rmowell, US Style, TH54
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			3	600) psi;	; RF						
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										3		ndation Fieldbus plug 7/8"
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												Sensor calibration certificate
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TH54-						1	\vdash			\top	¹	Enter desired product structure

TH55 TC General Purpose

spring loaded insert, economical TC assembly with weatherproof heads for existing thermowells



 $X_A = drilled length of existing thermowell.$

Product Structure, general thermocouple assembly, spring-loaded TH55

TH55-	Gei	neral	thei	rmo	coup	ole as	semb	ly wi	hout	thermowell, spring-loaded, US Style, TH55						
		ners	nersion length (A)													
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	2	6"														
	3	9"														
	4	12"														
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	8	٠ ا	" (Spe	ecify	incre	emen	t 0.5")									
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										NPT ¾"						
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						1 1				C display; NPT ½"						
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										3 Foundation Fieldbus plug 7/8"						
										4 Plastic cable gland						
TH55-									K	Enter desired product structure						

TH5x TC assembly with advanced TMT162 transmitters for critical control and safety applications

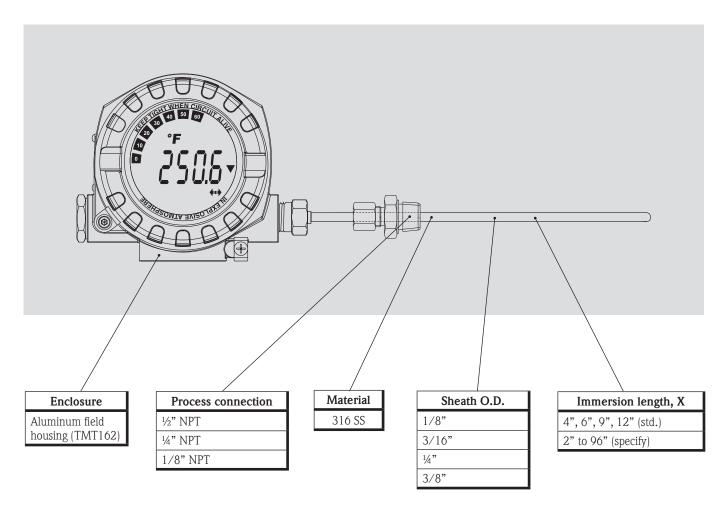
- The TMT162 gives temperature measurement instrument unique technological advantages.
- The assembly offers improved safety and ease of installation through dual compartment transmitter housing design.
- The completely potted electronics allow seamless operation in extreme temperatures and high precipitation & condensation areas.
- The best in class accuracy and performance with zero-corrosion* gold plated terminals, ultra low copper content, dual epoxy coating and coated threads offers a robust instrument that stands up to harshest environments.
- This transmitter is also available in cast 316L stainless steel for highly corrosive environments.
- Customers with high pressure applications such as boilers and vessels will appreciate the pressure calculations available for the CRN registered designs.



^{*} Gold plating ensures virtually no corrosion.

TH51 TC General Purpose

welded insert, TC assembly with advanced TMT162 transmitter for critical control applications (for direct measurement)

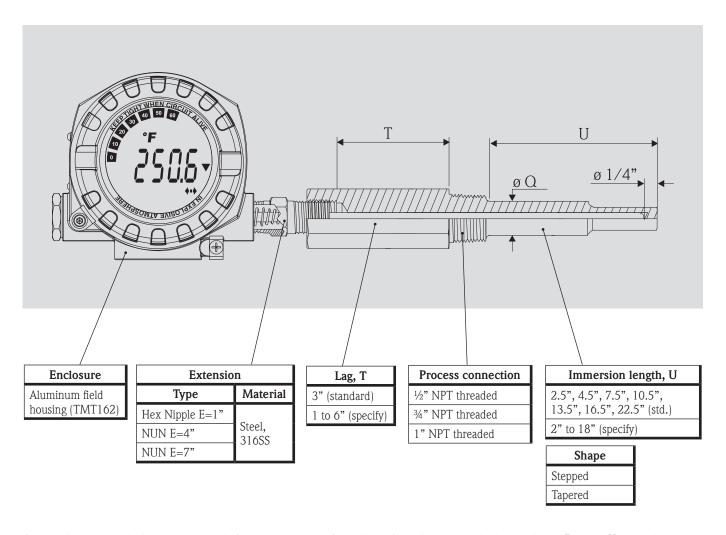


Product Structure, General Purpose TC assembly with advanced TMT162, TH51

TH51-	Ge	nera	1 the	rmo	cour	ole a	ssem	ıbly wi	vith field housing, TH51
		cess	con	nect					
	Α		t sele						
	В		NPT,						
	С								one time
	D								re adjustable
	E							SS, one	
	F								adjustable
	-	-		ion l	leng	th (X	(), 2	to 96"	,
	-	1	4" 6"						
		2	9"						
	ŀ	3	12"						
	1	8			ocify	incr	omon	it 0.5")	
		0						terial	
						16 SS		iteriai	
	l	l	C	3/1	, , , , , , , , , , , , , , , , , , ,	316	35		
					; 316		50		
			F			16 SS	3		
	İ	İ	Ī				el 600)	
			K				nel 60		
			L			onel (
	İ	İ	M	3/8	3"; In	ncone	el 600)	
				Sen	ısor	Туре	e; Cla	ass (st	standard accuracy)
						J; st			
						J; st			
						K; s			
		-		F		K; s			
				J		E; st			
						E; st			
	1	ŀ		N O		: N; s : N; s			
	ŀ	l		R		. IN; S : T; st			
				S		T; st			
	İ	İ		Y				ersion/	/ (TC combinations and special accuracy available, consult E+H sales representative)
	ĺ	ĺ					n Sty		
					1	Gro	unde	ed	
					2		groun		
						-			able entry
						J			housing; 2 x Input + NPT ½" + HART
						K			housing; NPT ½" + HART + 2 x Input + display
	-	-				L			housing; 2 x Input + FF + NPT ½"
						M			housing; NPT ½" + FF + 2 x Input + display
							Ele	for cine	1 connection ngle compartment, consult E+H Sales representative
							I	TMT1	162, dual compartment
									162, FM IS, dual compartment
									162, CSA IS, dual compartment
									imentation required
							[Not selected
									Special version
								Te	Test; Calibration
								A	
								В	
									Version K Standard
									K Standard Y Special version
									Additional option
									1 Not selected
									2 PROFIBUS PA plug M12
									3 Foundation Fieldbus plug 7/8"
									4 Plastic cable gland
									9 Special version
TH51-	L			L		L			Enter desired product structure
			_						

TH53 TC General Purpose

threaded thermowell, TC assembly with advanced TMT162 transmitter for critical control applications

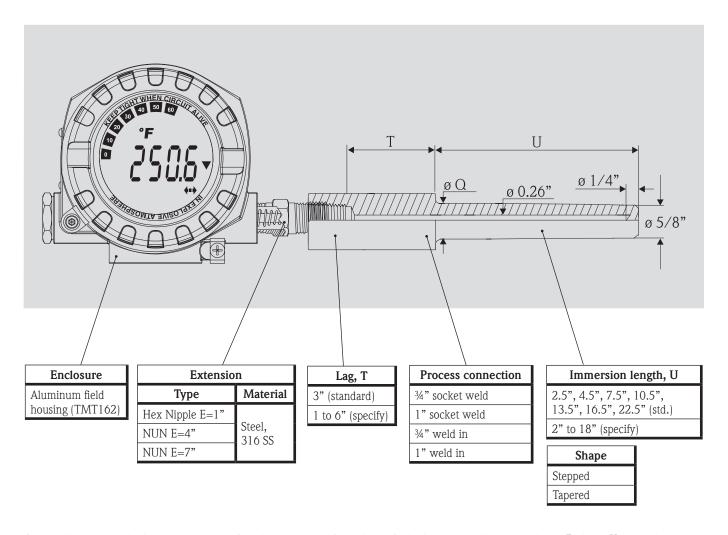


Product Structure, General Purpose TC assembly with advanced TMT162, TH53

TH53	Co	noral	ther	mac	ounle	0 200	amh	lv wit	h thermowell, US Style, TH53
11155		/ Imm					emb	iy wit	i thermowen, 63 style, 11135
		21/2"		11116	ugu	(0)			
	1	41/2"							
	2								
	3	71/2"							
	4	101/2							
	5	131/2							
	6	161/2							
	7	221/2							
	8	"	(Spe	cify i	ncrer	ment	0.5")		
	Y								to 108" are available on request
									Construction
		A1	1/2"	NPT	316	SS			
		A2	3/4"	NPT	, 316	SS			
		A3			316				
		YY					and m	nateria	ls available, consult you E+H sales representative
		1	The	rme	well	1 shaj	ne	Iu to I Iu	as available, combail you 2 111 bales representative
			2					Duty	
			3			, Heav			
			'			well			
				A	Nor		Lag	(1)	
					3"	iie			
				E		, (. 0.5%
				Х					nent 0.5")
		ļ				tensio			
					1				S SS, E=1"
					2				+Nipple 316 SS, E=4"
					3				el, E=1"
					4				+Nipple Steel, E=4"
					5				+Nipple Steel, E=7"
					6				+Nipple 316 SS, E=7"
						Sen			Class; Material
						Α	1 x	J; 2; I1	nsert 316SS
						В	2 x	J; 2; I1	nsert 316SS
						Е	1 x	K; 2, 1	Insert Inconel 600
						F	2 x	K; 2, 1	Insert Inconel 600
						J	1 x	E; 2, I	Ínsert Inconel 600
						K	2 x	E; 2, I	Insert Inconel 600
İ			İ		İ	N	1 x	N; 2,	Insert Inconel 600
						0	2 x	N; 2,	Insert Inconel 600
						R			nsert 316SS
						S			nsert 316SS
								ction	
								Grou	
									ounded
							2		osure; Cable entry
								J A	Nu field housing; 2 x Input + NPT ½" + HART
									Alu field housing; 2 x input + 14 F 1 72 + 1 FART Alu field housing; NPT ½" + HART + 2 x Input + display
									Alu field housing; 18 F 1 72 + FLAKT + 2 x mput + display Alu field housing; 2 x Input + FF + NPT ½"
								IVI F	Alu field housing, NPT ½" + FF + 2 x Input + display Electrical connection
								I	
								J	11111102) 111110) ddar comparanone
								ŀ	
									Additional option
									1 Not selected
									2 PROFIBUS PA plug M12
									3 Foundation Fieldbus plug 7/8"
									4 Plastic cable gland
									Test; Calibration
									A Not selected
									B Sensor calibration certificate
									C Material traceability certificate
									Version
									K Standard
									L With Certificate of Compliance
TH53-									Enter desired product structure
									-

TH53 TC General Purpose

weld-in / socket thermowell, TC assembly with advanced TMT162 transmitter for critical control applications

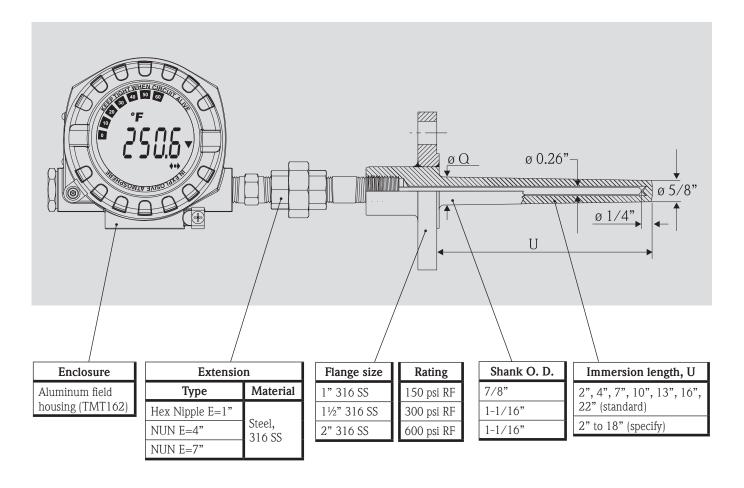


Product Structure, General Purpose TC assembly with advanced TMT162, TH53

TH53	Co	noral	thor	maa	oun1	0.000	omh	127 327	vith thermowell, US Style, TH53
11133		Imm Imm					emb	1y W	viui mermowen, oo otyte, 11199
			61310	JII IE	ilgu	1 (0)			
	1	21/2"							
	2	41/2"							
	3	71/2"							
	4	101/2							
	5	131/2							
	6	161/2							
	7	221/2							
	8					ment (
	Y								p to 108" are available on request
									of Construction
		B1				¾", 3			
		B2				1", 31		3	
						316 S			
		C2				316 S			
		YY	Ma	ny ot	ther s	sizes a	and n	nater	rials available, consult you E+H sales representative
			The			ll shaj			
			2			, Stan			ty
			3	Tap	ered	, Heav	vy D1	uty	
				The		owell	Lag	(T)	
				Α	No	ne			
				E	3"				
				X		." (spe	ecify	incre	ement 0.5")
					Ext	tensio			
					1				316 SS, E=1"
					2				on+Nipple 316 SS, E=4"
					3				Steel, E=1"
					4				on+Nipple Steel, E=4"
					5				on+Nipple Steel, E=7"
					6				on+Nipple 316 SS, E=7"
									e; Class; Material
						A		-, ,	R; Insert 316SS
						В			t; Insert 316SS
									2, Insert Inconel 600
						F			2, Insert Inconel 600
						J			2, Insert Inconel 600
						K			2, Insert Inconel 600
						N			2, Insert Inconel 600
						O R			2, Insert Inconel 600
						S			2, Insert 316SS
						3			2, Insert 316SS on style
							_		ounded
							1 2		
							2		ngrounded Iclosure; Cable entry
								I	Alu field housing; 2 x Input + NPT ½" + HART
								K	Alu field housing; NPT ½" + HART + 2 x Input + display
								L	Alu field housing; 2 x Input + FF + NPT ½"
									Alu field housing; 2 x input + FF + NF1 ½ Alu field housing; NPT ½" + FF + 2 x Input + display
								141	Electrical connection
									I TMT162, dual compartment
									J TMT162, FM IS, dual compartment
									K TMT162, CSA IS, dual compartment
									Additional option
									1 Not selected
									2 PROFIBUS PA plug M12
									3 Foundation Fieldbus plug 7/8"
									4 Plastic cable gland
									Test; Calibration
									A Not selected
									B Sensor calibration certificate
									C Material traceability certificate
									Version
									K Standard
									L With Certificate of Compliance
TH53-						丄			Enter desired product structure

TH54 TC General Purpose

flanged thermowell, TC assembly with advanced TMT162 transmitter for critical control applications

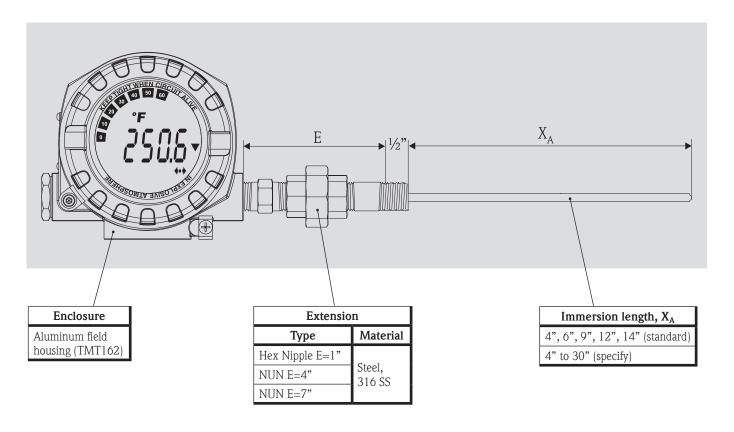


Product Structure, general flanged thermcouple assembly, TH54

TH54	Ge	nerai	1 flan	ged	the	rmod	COUL	ole as	semi	ably with thermowell, US Style, TH54
1110 .		/ Imr						,10 dc		
	1	2"								
	2	4"								
	3	7"								
	4	10"								
	5	13"								
	6	16"								
	7	22"						- ** \		
	8	Elec	' (Spe	CITY	incre	emen	10.5)")		
		A	nge s			Iviai	eria	1		
		В			6 SS					
		С	2",							
		Ϋ́				es/d	iffere	ent co	nstri	uction materials – consult your E+H sales representative
		1			Flan				7110 (1 (accontinued constant your 2:11 dated representative
			1) psi,		71			
			2) psi,					
			3	600) psi;	; RF				
			Y							request- consult your E+H sales representative
										ding
				1				ndard		
				2				ndaro		
					-	No		igth (1)	
					A X			orom (ent 0.	5")
					Λ			ion (.5)
						1				116 SS, E=1"
						2				on+Nipple 316 SS, E=4"
						3				teel, Ê=1"
						4				on+Nipple Steel, E=4"
						5				on+Nipple Steel, E=7"
						6	Nip	ple+	Unior	on+Nipple 316 SS, E=7"
								nsor	Type	3 - 2 To and 21400
							A			ass 2, Insert 316SS ass 2, Insert 316SS
										ass 2, Insert Inconel 600
							F			ass 2, Insert Inconel 600
							Ţ			ass 2, Insert Inconel 600
										ass 2, Insert Inconel 600
										lass 2, Insert Inconel 600
										lass 2, Insert Inconel 600
							R			ass 2, Insert 316SS
							S			ass 2, Insert 316SS
							ļ			n style
								1 2		unded
										grounded
										Alu field housing; 2 x Input + NPT 1/2" + HART
							Ì			Alu field housing; NPT ½" + HART + 2 x Input + display
							Ì			Alu field housing; 2 x Input + FF + NPT ½"
	İ						İ	ll		Alu field housing; NPT ½" + FF + 2 x Input + display
										Electrical connection
										I TMT162, dual compartment
										J TMT162, FM IS, dual compartment
										K TMT162, CSA IS, dual compartment
										Additional option
										1 Not selected 2 PROFIBUS PA plug M12
										3 Foundation Fieldbus plug 7/8"
										4 Plastic cable gland
										Additional option 2
										A Not selected
										B Sensor calibration certificate
										C Material traceability certificate
										Version
										K Standard
myy s	_			_	_	_		\sqcup	\perp	L With Certificate of Compliance
TH54-										Enter desired product structure

TH55 TC General Purpose

spring loaded insert, TC assembly with advanced TMT162 transmitter for critical control applications (for existing thermowells)



 $X_A = drilled length of existing thermowell.$

Product Structure, general thermocouple assembly, spring-loaded TH55

TH55-	Gei	nerai	l the	rmo	coup	le as	ssem	bly	with	out t	hermowell, spring-loaded, US Style, TH55						
			ion 1					,			, , , , , , , , , , , , , , , , , , , ,						
	1	4"	1011 1	-116t	-1 (11	AJ											
	1	6"															
	2																
	3	9"															
	4	12"	'														
	5	14"	'														
	8	٠ ا	" (Spe	ecify	incre	emen	t 0.5	")									
		-	eath o														
		A															
		В															
	ŀ	D															
	ļ																
			1			pple 316 SS, E=1"											
			2	Nip	ple+	e+Union+Nipple 316 SS, E=4"											
			3	Hex	k nip	ple S	teel,	E=1	,,								
			4	Nip	ple+	Unio	n+N	ipple	Stee	1, E=	4"						
			5	Nipple+Union+Nipple Steel, E=4" Nipple+Union+Nipple Steel, E=7"													
			6							SS, I							
			١	_		Туре		-bhic	010	55, 1							
						J; cla											
				В		J; cla											
						K; cla											
				F	2x	K; cla	ass 2										
				J	1x	E; cla	ass 2										
				K	2x	E; cla	ass 2										
				N		N; cla											
						N; cl											
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				S		T; cla											
	ļ					ction											
					1		ounde										
					2	Ung	groui	nded									
						End	closu	ıre;	Cabl	e en	try						
						J	Alu	field	l hou	sing;	2 x Input + NPT ½" + HART						
			İ		1	K	Alu	field	l hou	sing;	NPT ½" + HART + 2 x Input + display						
					1	L					2 x Input + FF + NPT ½"						
						M					NPT ½" + FF + 2 x Input + display						
						***					ction						
							I	1			al compartment						
							1										
							J	1		,	I IS, dual compartment						
							K				A IS, dual compartment						
									_		ion required						
								1		seled							
								2	wit	n Cer	tificate of Conformance						
									Ado	ditio	nal option 1						
									Α		selected						
									В	1	sor calibration certificate						
										-	sion						
										_	Standard						
										1/2							
											Additional option 2						
											1 Not selected						
											2 PROFIBUS PA plug M12						
											3 Foundation Fieldbus plug 7/8"						
	L_	L	<u>L</u> _	L	L	L	L	L	L	┖	4 Plastic cable gland						
TH55-										K	Enter desired product structure						
11133				L						1 **	and acoused product of detaile						

Explosion proof assemblies

Your safety is of paramount importance to us at Endress+Hauser.



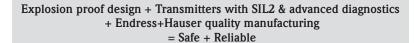
Approved enclosure (terminal head), electrical connection and transmitter (when required)

Flame proof lamination union

+

At least 5 threads must engage between nipple and thermowell

Explosion proof design





As costs continue to rise and liabilities extend into the future, plant safety and reliability demands focus and expert attention. The Explosion proof temperature assemblies are manufactured as per stringent requirements of FM & CSA, referenced to NEC 500 (USA) & CEC sec 18 (Canada) codes, respectively. They are assembled under highest quality standards.

Endress+Hauser can provide you with correctly designed, manufactured and documented measurement points.

Your advantage? A safer and more reliable plant. Lower risk and higher productivity!

Hazardous area classifications in North America (FM/CSA)

Class

I	Flammable gases or vapors are present in the air in quantities sufficient to produce explosive or ignitable mixtures.
II	Combustible or conductive dusts are present.
III	Ignitable fibers or flyings are present, but not likely to be in suspension in sufficient quantities to produce ignitable mixtures. (Group classifications are not applied to this class.)

Zone

0	Ignitable mixture present for long periods
1	Ignitable mixture present intermittently
2	Ignitable mixture not normally present

Division

1	The substance referred to by class is present during normal conditions.
2	The substance referred to by class is present only in abnormal conditions, such as a container failure or system breakdown.

Group

Α	Acetylene							
В	Hydrogen (or gases of equivalent hazard)							
С	Ethylene (or gases of equivalent hazard)							
D	Gasoline (or gases of equivalent hazard)							
Е	Metal Dust							
F	Coal Dust							
G	Grain Dust							

Temperature

_		
	°F	°C
T1	842	450
T2	572	300
Т3	392	200
T4	275	135
T5	212	100
T6	185	85

T1x Explosion Proof, thermowell, RTD assembly with heavy duty connection heads

Demanding monitoring and controlling temperature measurement applications require the heavy-duty T1x assembly. This product is especially manufactured for the chemical, oil & gas, petrochemical and refinery applications.

Material selection

Especially designed heavy duty heads with ultra low copper ensures high corrosion resistance in saline and harsh environments. Additionally the ergonomic design eases installation and wiring on site. The use of 316 SS as a standard, high purity ceramics and carefully tested sensors and cables further enhances the durability of the product.

Design

Correct design of components and parts help avoid accidents and contain damage in the event of an explosion.

Details

The special molybdenum based coat on threads ensures that threads don't lock up in harsh environments.

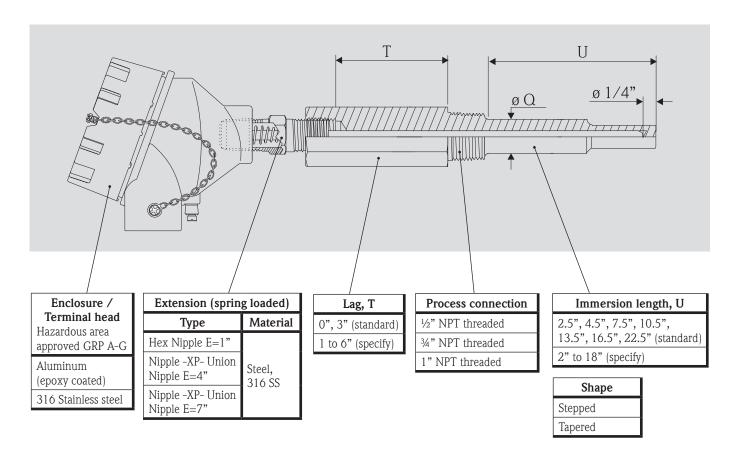
Signal immunity and measurement performance

The assemblies are available with Endress+Hauser's robust TMT series of In-head DIN B size temperature transmitters with 4-20 mA, HART, Profibus PA and FOUNDATIONTM Fieldbus outputs. These offer 2 kV of galvanic isolation and a highly accurate measurement.



T13 Explosion proof RTD assembly

Threaded thermowell, with heavy duty connection heads

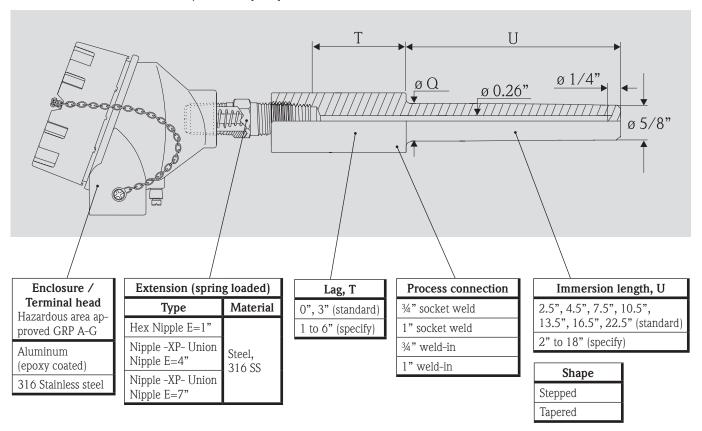


Product Structure, Explosion proof RTD assembly, T13

T12	DIT	D :		1 2	THE	т. —	VP	11.0	C4-1							
T13-	_	D as prov		oly, 1	ıW-	Гуре	XP	U.S.	Style							
	D		XP D	ID C	lace	1 11 11	II Div	r 1±	2							
	E		XP N			, ,										
	F		A XP													
	G								1+2							
	J	FM	/CSA	XP	DIP	Class	, I,II,l	III D	iv. 1+2							
	K						lass I	,II,II	I Div. 1	+2						
		-	ermo		1 Sh	ape:										
		2														
		3	_	pered ocess Connection:												
					read ½" NPT; 316 SS											
					read 34" NPT; 316 SS											
			А3				NPT; 316 SS on length (U); 2-18" available for quick order; longer lengths available on request									
				1	2.5											
				2	7.5											
				4	10.											
				5	13.											
				6	16.	.5"										
				7	22.											
				8					or. 0.5")							
				9				ths available - consult your E+H sales representative								
					-			ell Lag, T: (1-6") ected								
					E	3"	JCICC	icu								
					Х		" (0.5	5" in	cremer	nts)						
						Ext	ensi									
						1			ple ste							
						3	1	-	ple SS3							
						4		-	ole+Union+Nipple steel E=4" ole+Union+Nipple SS316 E=4"							
						5	1 1	-		-	ople steel E=7"					
						6	Nip	ple+	Union	ion+Nipple SS316 E=7"						
							-		Type:							
							E				B; 4 wire, -50 to 200 °C					
							F G				B; 4 wire, -200 to 600 °C A; 4 wire, -50 to 200 °C					
							1				A; 4 wire, -200 to 600 °C					
							J				B; 3 wire, -50 to 200 °C					
							K				B; 3 wire, -200 to 600 °C					
							L				A; 3 wire, -50 to 200 °C					
							M				A; 3 wire, -200 to 600 °C					
								_			able entry: blue + cover, ½" NPT, Grp.A-G					
								В			blue + cover, ³ 4" NPT, Grp.A-G					
								С	Alu,	grey	+ cover, ½" NPT, Grp.B-G					
								D			+ cover, ³ 4" NPT, Grp.B-G					
								E			cover, ½" NPT, Grp.B-G					
								F			cover, ¾" NPT, Grp.B-G					
											grammable RTD TMT180					
											grammable TMT181					
									1 1		T TMT182					
									1 1		ead DIN B FF					
											lead Profibus PA					
											cial version, to be specified ng leads					
											ninal block					
									1 · 1		sion:					
										K	Standard, North American region					
											Additional Option 1:					
											A not selected					
											B Sensor calibration certificate C Material Tracebility Cerificate (MTR)					
											Additional Option 2:					
											1 not selected					
	L				L	L	L				9 Additional options required- consult factory					
T13-										K	Enter desired product structure					

T13 Explosion proof RTD assembly

Weld-in / socket weld thermowell, with heavy duty connection heads

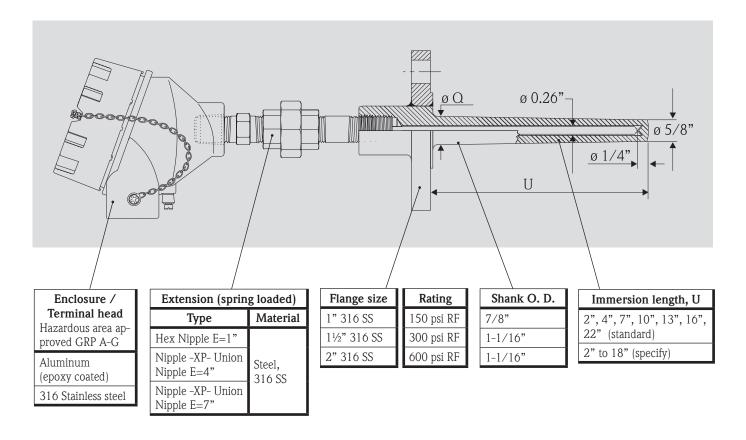


Product Structure, Explosion proof RTD assembly, T13

T13-	рт	D as	semi	nlv '	ΓW′	Tyne	XP	II S	Style								
113-		prov		, i y,		.ype	AI	0.0.	otyre								
	D		M XP DIP Class I,II,III Div. 1+2														
	E						II,III										
	F	1					11,111 III Di										
	G	1				, ,			1+2								
	I								v. 1+2	2.							
	K								Div.								
	1,,		ermo				-000 1	,,	۷۱۷,	. 12							
		2	Step			-F											
		3	Tape														
	İ				Cor	nec	nection:										
			B1	Soc	ket v	veld	34" N	NPS;	316 S	S							
			B2						16 SS	5							
							NPS;										
			C2				NPS;			10"							
				-		mersion length (U); 2-18" available for quick order; longer lengths available on request											
				1	2.5												
		2 4.5" 3 7.5"															
				4	10.												
				5	13.												
				6	16.												
				7	22.												
				8			18" i	ncr. (0.5")								
		8" (2-18" incr. 0.5") 9 Longer lengths available – consult your E+H sales representative															
							owell Lag, T: (1-6")										
					Α	not	selec										
					Е	3"											
					X	-			creme	nts)							
							ensi		-14	-1 Г	1.77						
						1 2			ple ste								
						3			nipple SS316 E=1" sle+Union+Nipple steel E=4"			teel F=4"					
						4		-		_	-						
						5				nion+Nipple SS316 E=4" nion+Nipple steel E=7"							
						6			Union+Nipple SS316 E=7"								
									Туре:								
							1	1			,	wire, −50 to 200 °C					
								1				wire, -200 to 600 °C					
										class A; 4 wire, -50 to 200 °C							
							H J			00 class A; 4 wire, -200 to 600 °C 00 class B; 3 wire, -50 to 200 °C							
							1.	1									
							L			00 class B; 3 wire, -200 to 600 °C 00 class A; 3 wire, -50 to 200 °C							
												wire, -200 to 600 °C					
												Entry:					
								Α	Alu,	Е+Н	blue	+ cover, ½" NPT, Grp.A-G					
								В	1 '			+ cover, ¾" NPT, Grp.A-G					
								С				ver, ½" NPT, Grp.B-G					
								D				ver, ¾" NPT, Grp.B-G					
								E F	1			; ½" NPT, Grp.B-G					
								r				, ¾" NPT, Grp.B-G nnection:					
									A			nable RTD TMT180					
									В			nable TMT181					
									C			MT182					
									M			DIN B FF					
									N			Profibus PA					
									Y	Spec	cial ve	ersion, to be specified					
									2		ng lea						
									3			block					
											sion:						
										K		dard, North American region litional Option 1:					
											Add	not selected					
											В	Sensor calibration certificate					
											С	Material Tracebility Cerificate (MTR)					
											_	Additional Option 2:					
												1 not selected					
												9 Additional options required- consult factory					
T13-										K		Enter desired product structure					

T14 Explosion proof RTD assembly

Flanged thermowell, with heavy duty connection heads



Product Structure, Explosion proof RTD assembly, T14

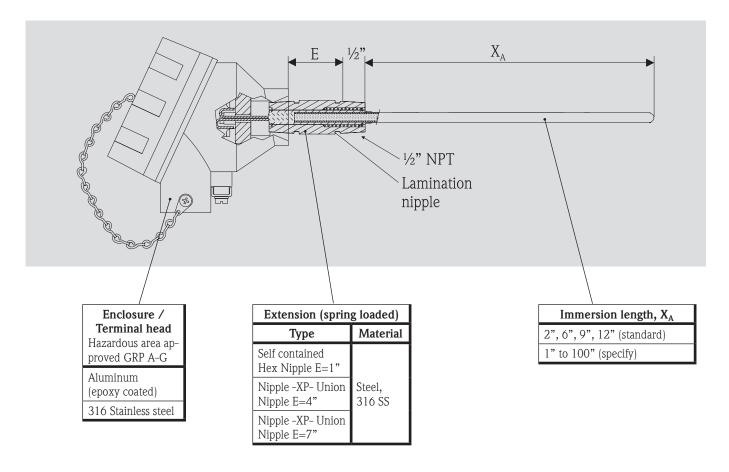
T14-	RT	D as	sem	bly,	flar	nged	TW-	-Type	XP U	J.S.St	yle					
	Ap	pproval:														
	D															
	Е		FM XP NI DIP Class I,II,III Div. 1+2 CSA XP DIP Class I,II,III Div. 1+2													
	F															
	G								v. 1+2							
	Į Į								iv. 1+							
	K								II Div.	1+2						
		The						lding								
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		·							Mate	rial:						
		ı	Α	1";	SS3	16										
			В	1.5	"; SS	316										
			С	2";	SS3	16										
			Y	Lar	ger s	izes	avail	able -	consu	lt yοι	ır E+H sales representative					
							nge t	ype								
				1) psi;										
				2) psi;) psi;										
				0				rc 11n 1	250	O and	other types of faces available on request, please consult your E+H representative					
				9							" available for quick order; longer lengths available on request					
					1	2"	51011	lengt	11 (0)	2-10	available for quick order, longer lengths available on request					
					2	4"										
					3	7"										
					4	10'	,									
					5	13'	,									
					6	16'										
					7	22'										
					8				ncr. 0.		to Table 1					
					9						rult your E+H sales representative					
						A		selec	Lag,	1: (1	-0")					
						X			teu 5" inci	'emei	ntl					
						11		tensio		011101						
							1	Hex	nipple	e stee	1 E=1"					
							2				16 E=1"					
							3				Nipple steel E=4"					
							4				Nipple SS316 E=4"					
							5				Nipple steel E=7" Nipple SS316 E=7"					
							0		sor Ty		Nippie 35310 E=7					
								E			lass B; 4 wire, -50 to 200 °C					
								F			lass B; 4 wire, -200 to 600 °C					
		l				ĺ	İ	G			lass A; 4 wire, -50 to 200 °C					
								Н	1 Pt1	100 c	lass A; 4 wire, -200 to 600 °C					
								J			lass B; 3 wire, -50 to 200 °C					
								K			lass B; 3 wire, -200 to 600 °C					
								L			lass A; 3 wire, -50 to 200 °C					
1								M			lass A; 3 wire, -200 to 600 °C e; Cable Entry:					
											e; Cable Entry: E+H blue + cover, ½" NPT, Grp. A-G					
									В	Alu.	E+H blue + cover, 3/2 Nr I, Orp. A-G					
											grey + cover, ½" NPT, Grp.B-G					
									D	Alu,	grey + cover, ¾" NPT, Grp.B-G					
											6 + cover, ½" NPT, Grp.B-G					
											6 + cover, ¾" NPT, Grp.B-G					
1									1 5		trical Connection:					
										A	programmable RTD TMT180					
1										B C	programmable TMT181 HART TMT182					
										M	In Head DIN B FF					
										N	In Head Profibus PA					
1										Y	Special version, to be specified					
										2	Flying leads					
										3	Terminal block					
1											Version:					
											K Standard, North American region					
											Additional Option 1:					
											A not selected B Sensor calibration certificate					
1											C Material Tracebility Cerificate (MTR)					
T14-		\dashv									Enter desired product structure					
						_										

T15 Explosion proof RTD assembly

spring loaded sensor, with heavy duty connection heads and lamination nipple

The unique design of this assembly allows you to retain approvals even if the thermowell exists on site and was not purchased according to the requirements of the electrical code.

What's more it allows you to assemble the connection head or transmitter on site without infringing the approval.



 X_A = drilled length of existing thermowell.

Product Structure, Explosion proof RTD assembly, spring-loaded insert T15

T15-	RTI) ass	emb	ıly -	repl	lacem	nent	t asse	embly for Explosion proof areas for exisiting thermowells						
	App	rova	ıl:												
	D	FM	XP I	DIP	Class	s I,II,I	II D	iv. 1+	-2						
	Е	FM	XP I	NI D	IP C	lass I,	II,II,	II Div	1+2						
	F	1				ss I,II,	, ,								
	G	1				, ,			v. 1+2						
	I	1					, ,)iv. 1+2						
	K	1							II Div. 1+2						
	IX.					gth ()									
		1	4"	31011	Ten	gui (z	·AJ	(1-10	,						
		2	6"												
		3	9"												
		4	12"												
		8			crom	nent 0	15"))							
		0				meter)							
					; SS3		•								
						S316									
			C		tensi										
				5		n. Nip	2010	CC21	4						
				6					on+Nipple SS316, E=4"						
									on+Nipple SS316, E=4						
				/		nsor 7			011+Nipple 55510, E=7						
					E				P. Aprilla, 50 to 200 80						
					F				B; 4 wire, -50 to 200 °C B; 4 wire, -200 to 600 °C						
					G				A; 4 wire, -50 to 200 °C						
					Н				, ,						
									A; 4 wire, -200 to 600 °C						
					J K				B; 3 wire, -50 to 200 °C B; 3 wire, -200 to 600 °C						
					L				3 wire, -50 to 200 °C						
						1			A; 3 wire, -200 to 200 °C						
					101				Cable Entry:						
									H blue + cover, ½" NPT, Grp.A-G						
									H blue + cover, 34" NPT, Grp.A-G						
								,	y + cover, ½" NPT, Grp.B-G						
								, .	y + cover, ³ / ₄ " NPT, Grp.B-G						
								, .	cover, ½" NPT, Grp.B-G						
									cover, 3/2 NPT, Grp.B-G						
						1			al Connection:						
							A		grammable RTD TMT180						
							В	1 -	grammable RTD 1M1160						
								1	TTMT182						
							M	1	lead DIN B FF						
						1 1	N	1	lead Profibus PA						
						1 1	Y	1	cial version, to be specified						
							2	- 1	ng leads						
							3		ninal block						
							3		sion:						
								K	Standard, North American region						
								IV.	Additional Option 1:						
									A not selected						
									B Sensor calibration certificate						
									C Material Tracebility Cerificate (MTR)						
									Additional Option 2:						
									1 not selected						
									9 Additional options required- consult factory						
T15-		\vdash				\vdash		K	Enter desired product structure						
115		ш	ш			ш		112	zanos desisted product structure						

T1x Explosion proof, thermowell RTD assembly with advanced TMT162 transmitters for critical control and safety applications

The TMT162 gives these measurement instrument unique technological advantages.

The assembly offers improved safety and ease of installation through dual compartment transmitter housing design. The robust design makes it ideal for the demanding application in the petroleum upstream, downstream processes and heavy industries such as underground mining, hazardous chemicals and fossil fuel based power plants.

The completely potted electronics allow seamless operation in extreme temperatures and high precipitation & condensation areas.

The key features are:

- Dual inputs, for automatic back up.
- Advanced diagnostic features.
- Best in class accuracy.
- Zero-corrosion* gold plated terminals.
- 2 kV galvanic signal isolation.
- Ultra low copper content and powder coating for corrosion resistance.
- Molybdenum based antiseize coating on threads.

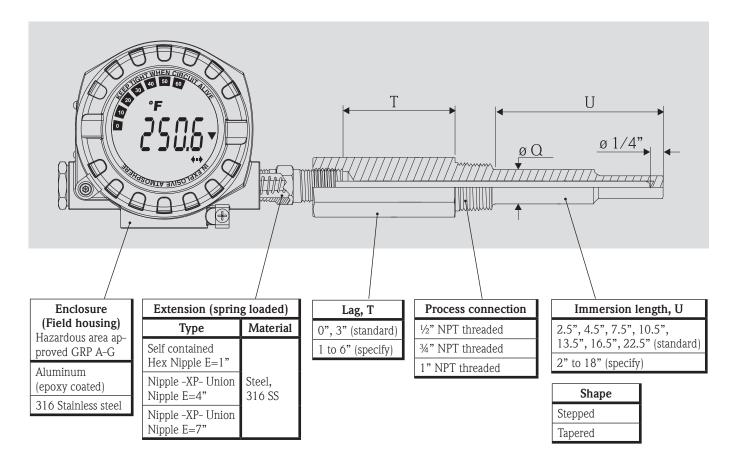
All in all a heavy duty instrument built to last and perform! This transmitter is also available in cast 316L stainless steel for offshore applications.



^{*} Gold plating ensures virtually no corrosion.

T13 Explosion proof RTD assembly

Threaded thermowell, with advanced TMT162 transmitter for critical control and safety applications

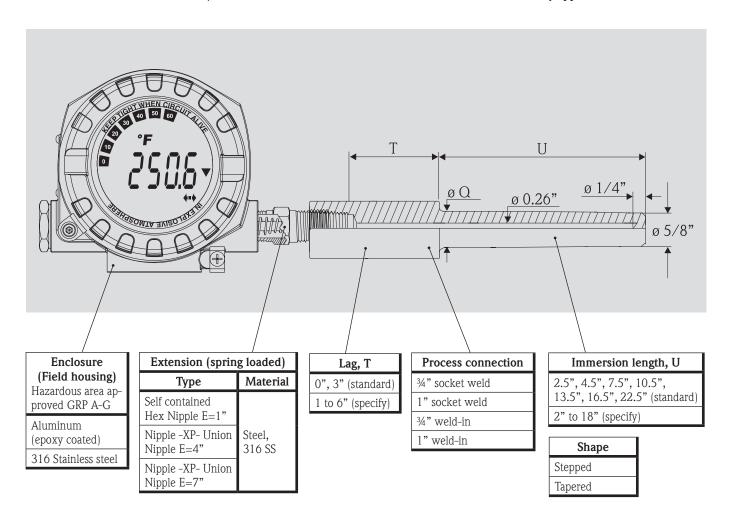


Product Structure, Explosion proof RTD assembly, T13

T13-	RT	D ass	semb	oly, T	ΓW-	Type	XP I	U.S.	Style									
			assembly, TW-Type XP U.S. Style oval:															
	D		M XP DIP Class I,II,III Div. 1+2															
	E	1			I DIP Class I,II,III Div. 1+2													
	F	1				33 1,1 3 I,II,I	,											
	G	1				lass I												
	I					Class				2								
	K	1				OILLOS OIP CI	, ,											
	IX.	-	ermo				1000 1	,11,111	DIV.	112								
			Step		0116	ipc.												
		3	Tape															
		ľ			Cor	nect	tion:											
						½" N			S									
						¾" N	,											
						1" NI												
			110							-18"	avail	able for quick order; longer lengths available on request						
				1	2.5			(- ,, -			4						
				2	4.5													
				3	7.5													
				4	10.													
				5	13.													
				6	16.													
				7	22.													
				8		" (2-	18" i	ncr (5")									
				9						e - co	nsult	your E+H sales representative						
						ermo						, · · · · · · · · · · · · · · · · · · ·						
					A	_	selec		9 (<i>)</i>							
					Е	3"												
					Х	·,	" (0.5	" inc	reme	nt)								
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	İ					1			ole ste	eel E=	=1"							
						2					E=1"							
						3	Nip	ple+	Unior	n+Nip	pple s	eel E=4"						
						4	Nip	ple+	Unior	ı+Nip	pple S	S316 E=4"						
						5	Nip	ple+	Unior	ı+Nip	pple s	eel E=7"						
						6	Nip	ple+	Unior	ı+Nip	pple S	S316 E=7"						
							Sen		Type									
							Е					vire, -50 to 200 °C						
							F					vire, -200 to 600 °C						
												wire, -50 to 200 °C						
												wire, -200 to 600 °C						
							J					vire, -50 to 200 °C						
							K					vire, -200 to 600 °C						
							L					wire, -50 to 200 °C						
							M					wire, -200 to 600 °C						
								-				Entry:						
								G				ng, ½" NPT, Grp. A-G						
								Н				ng, 1x ½" NPT + display, Grp. A-G						
								I				using, ½" NPT, Grp. A-G						
								J				using, Display, ½" NPT, Grp. A-G						
									F			mnection:						
									G			MT162, 1 Input, Dual Compartment MT162, 2 Input, Dual Compartment						
									Н			62, 2 Input, Dual Compartment						
									П I			17142, 1 Input, Single Compartment						
									1		sion:							
										K		dard, North American region						
										,,		itional Option 1:						
											A	not selected						
											В	Sensor calibration certificate						
											C	Material Tracebility Cerificate (MTR)						
												Additional Option 2:						
												1 not selected						
												9 Additional options required- consult factory						
T13-		\Box								K		Enter desired product structure						
		لــــــا					_											

T13 Explosion proof RTD assembly

Weld-in / socket weld thermowell, with advanced TMT162 transmitter for critical control and safety applications

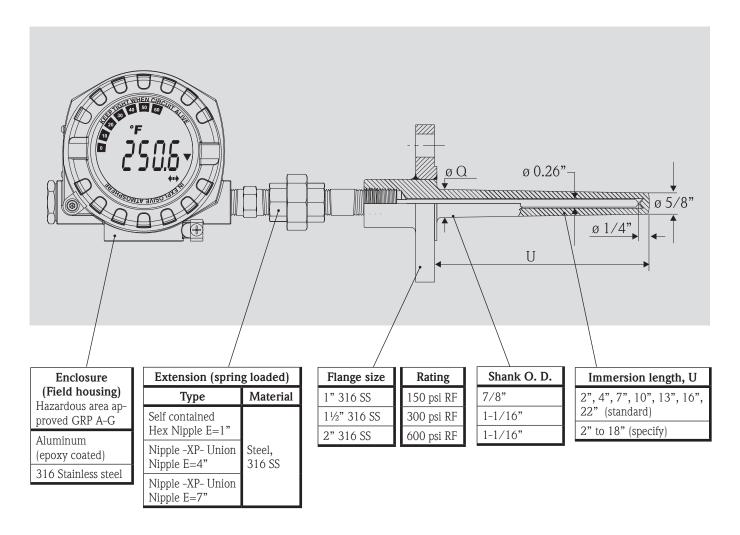


Product Structure, Explosion proof RTD assembly, T13

T12	Date	<u> </u>		1	ru.	Т	VD.	11.0	C+ 1					
T13-	_	D ass		ory, T	I VV-	Type	XP	U.S.	otyle					
	D			IP C	lass	I,II,II	I Div	: 1+2	2,					
	E					ass I,I								
	F					s I,II,I								
	G	CSA	XP 1	NI D	IP C	lass I	,II,III	Div.	1+2					
	J					Class								
	K					OIP CI	lass I,	,II,III	Div.	1+2				
			rmo		1 Sha	ape:								
			Step											
		3	Tape		Car	nnect	ione							
						weld 3		[PÇ+ 1	316 S	ς				
						weld :		,						
						3/4" N		,						
			C2	We	ld-in	1" N	IPS; 3	316 5	SS					
			[Im	mei	rsion	leng	th (l	U); 2-	-18"	avail	able for quick order; longer lengths available on request		
				1	2.5									
				2	4.5									
				3	7.5									
				4 5	10. 13.									
				6	16.									
				7	22.									
				8		" (2-1	18" i	ncr. (0.5")					
				9	Lor	nger le	ength	is ava	ailable	e - co	nsult	your E+H sales representative		
					Th	ermo			;, T: (1-6")			
					A		selec	ted						
					E	3"	. (0. 5	., .						
					Х		ensio		creme	ntj				
						1			ple ste	el E	-1"			
						2			ple SS					
						3	Nip	ple+	Unior	ı+Nij	ople s	teel E=4"		
						4						S316 E=4"		
						5						teel E=7"		
						6					ople S	S316 E=7"		
									Type		B. 1 1	wire, -50 to 200 °C		
							F					vire, -200 to 600 °C		
												wire, -50 to 200 °C		
							Н	1 P	t100	class	A; 4	wire, -200 to 600 °C		
							J					wire, -50 to 200 °C		
							1				,	wire, -200 to 600 °C		
							L				,	wire, -50 to 200 °C		
							IVI					wire, -200 to 600 °C Entry:		
								G				ng, ½" NPT, Grp. A-G		
								Н				ng, 1x ½" NPT + display, Grp. A-G		
								I	316	L Fie	ld Ho	using, ½" NPT, Grp. A-G		
								J				using, Display, ½" NPT, Grp. A-G		
									_			nnection:		
									F			WT162, 1 Input, Dual Compartment		
									G H			MT162, 2 Input, Dual Compartment 62, 2 Input, Dual Compartment		
									I			MT142, 1 Input, Single Compartment		
										_	sion:			
										K		dard, North American region		
												itional Option 1:		
											A	not selected		
											В	Sensor calibration certificate		
											С	Material Tracebility Cerificate (MTR)		
												Additional Option 2: 1 not selected		
												9 Additional options required- consult factory		
T13-		\Box								K		Enter desired product structure		
									-			-		

T14 Explosion proof RTD assembly

Flanged thermowell, with advanced TMT162 transmitter for critical control and safety applications



Product Structure, Explosion proof RTD assembly, T14

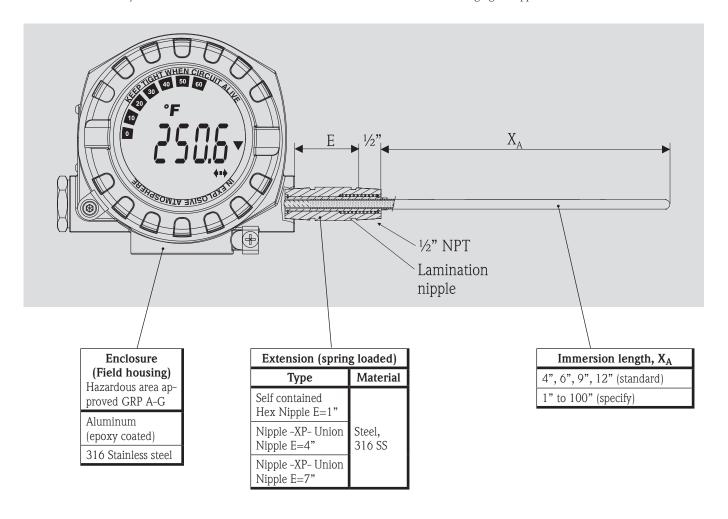
T14-	RT	ΓD a	ssen	ıblv	flar	nged	TW-	-Tvpe	XP U.S.	Style							
	_	opro															
	D			P DIP Class I,II,III Div. 1+2 P NI DIP Class I,II,III Div. 1+2													
	E	FN	I XP	NI I	OIP (Class I	I,II,II	I Div.	1+2								
	F	CS	a XP	DII	Cla	ss I,II	I,IIÍ I	Div. 1+	-2								
	G							III Div.									
	J								v. 1+2								
	K								Div. 1+	2							
								lding:									
		1				ndard											
		3				andaro pene											
		4				l pene											
		-	Fla	noe	Size	· The	erman	on owell	Materia								
			A		SS3		CIIIIC	J ** C11	111410114								
			В	1.5	"; SS	5316											
			С	2";	ŚS3	16											
			Y	Lat	ger s	sizes a			consult y	our E+H sales representative							
				-		Flan		ype									
				1) psi;											
				2) psi;											
				3) psi;			0500	total of the state							
				9						nd other types of faces available on request, please consult your E+H representative							
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					3	7"											
					4	10"	,										
					5	13"											
					6	16"											
		İ			7	22"	•										
					8				cr 0.5")								
					9					nsult your E+H sales representative							
									Lag, T: (1-6")							
						A X		select	ea ' increme	not)							
						Λ		ensio		2011)							
							1	Hex	nipple st	eel E=1"							
							2	Hex	nipple SS	316 E=1"							
							3	Nipp!	le+Unior	n+Nipple steel E=4"							
							4			n+Nipple SS316 E=4"							
							5			+Nipple steel E=7"							
							6			n+Nipple SS316 E=7"							
									or Type								
										class B; 4 wire, -50 to 200 °C							
										class B; 4 wire, -200 to 600 °C class A; 4 wire, -50 to 200 °C							
										class A; 4 wire, -30 to 600 °C							
										class B; 3 wire, -50 to 200 °C							
										class B; 3 wire, -200 to 600 °C							
										class A; 3 wire, -50 to 200 °C							
								M		class A; 3 wire, -200 to 600 °C							
								[ire; Cable Entry:							
										field housing, ½" NPT, Grp. A-G							
										field housing, 1x ½" NPT + display							
										5L Field Housing, ½" NPT, Grp. A-G 5L Field Housing, Display, ½" NPT, Grp. A-G							
										DL Field Housing, Display, ½" NP1, Grp. A-G							
									F	HART TMT162, 1 Input, Dual Compartment							
									G	HART TMT102, 1 Input, Dual Compartment HART TMT162, 2 Input, Dual Compartment							
									Н	FF TMT162, 2 Input, Dual Compartment							
									I	HART TMT142, 1 Input, Single Compartment							
										Version:							
										K Standard, North American region							
										Additional Option 1:							
										A not selected							
										B Sensor calibration certificate							
T1/		+			\vdash	\vdash		\vdash	-	C Material Tracebility Cerificate (MTR) Enter desired product structure							
T14-						ш		ш		Enter desired product structure							

T15 Explosion proof RTD assembly

spring loaded sensor, with advanced TMT162 transmitter and lamination nipple for critical control and safety applications

The unique design of this assembly allows you to retain approvals even if the thermowell exists on site and was not purchased according to the requirements of the electrical code.

What's more it allows you to assemble the connection head or transmitter on site without infringing the approval.



 X_A = drilled length of existing thermowell.

Product Structure, Explosion proof RTD assembly, spring-loaded insert T15

T15-	DTI) 200	omh	1xr	ton	lacor	mont	2000	mbly for Explosion proof areas for exisiting thermowells								
115-		orova		,1y -	1ep	iacel	ment	asst	miny for publication brook great for evisiting merinowells								
	D			DID	Class	e I II	III Di	v 1_)								
	E	1					I,II,III										
	F	1					1,11,111 I,III D										
	G	1				,	,										
	I	1					ass I,II,III Div. 1+2 Class I,II,III Div. 1+2 IP Class I,II,III Div. 1+2										
	K	1															
	V						(X _A) (
		1	4"	SIOI	i ien	gui (.	Λ _A) (1-10	J):								
		2	6"														
		3	9"														
		4	12"	,													
		8				+ (at 0.5") ter:										
		0															
			_				er:										
					'; SS3	S316											
			C		tens												
				5			pple S	2021									
				6					n+Nipple SS316, E=3"								
				7	1				n+Nipple 55316, E=5 n+Nipple SS316, E=6"								
				'					1+Nippie 35310, E=0								
					E		Type		B; 4 wire, -50 to 200 °C								
					F				B; 4 wire, -200 to 600 °C								
					G	1			A; 4 wire, -50 to 200 °C								
					Н				A; 4 wire, -200 to 600 °C								
					J	1			B; 3 wire, -50 to 200 °C								
					K				B; 3 wire, -200 to 600 °C								
					L				A; 3 wire, -50 to 200 °C								
					1				A; 3 wire, -200 to 600 °C								
					1111				able Entry:								
						G			housing, ½" NPT, Grp. A-G								
						H	1		housing, 1x ½" NPT + display, Grp. A-G								
						I			eld housing, 1/2" NPT, Grp. A-G								
						Ī			eld housing, display, ½" NPT, Grp. A-G								
						ľ			Il Connection:								
									T TMT162, 1 Input, Dual Compartment								
									T TMT162, 2 Input, Dual Compartment								
									MT162, 2 Input, Dual Compartment								
									T TMT142, 1 Input, Single Compartment								
							i i		ion:								
							Ιľ	K	Standard, North American region								
									Additional Option 1:								
									A not selected								
									B Sensor calibration certificate								
									C Material Tracebility Cerificate (MTR)								
									Additional Option 2:								
									1 not selected								
									9 Additional options required- consult factory								
T15-							\vdash	K	Enter desired product structure								

T5x Explosion proof, thermowell, TC assembly with heavy duty connection heads

Demanding monitoring and controlling temperature measurement applications require the heavy-duty T5x assembly. This product is especially manufactured for the chemical, oil & gas, petrochemical and refinery applications.

Material selection

Especially designed heavy duty heads with ultra low copper ensures high corrosion resistance in saline and harsh environments additionally the ergonomic design eases installation and wiring on site. The use of 316SS as a standard, high purity ceramics and carefully tested sensors and cables further enhances the durability of the product.

Design

Correct design of components and parts help avoid accidents and contain damage in the event of an explosion.

Details

The special molybdenum based coat on threads ensures that threads don't lock up in harsh environments.

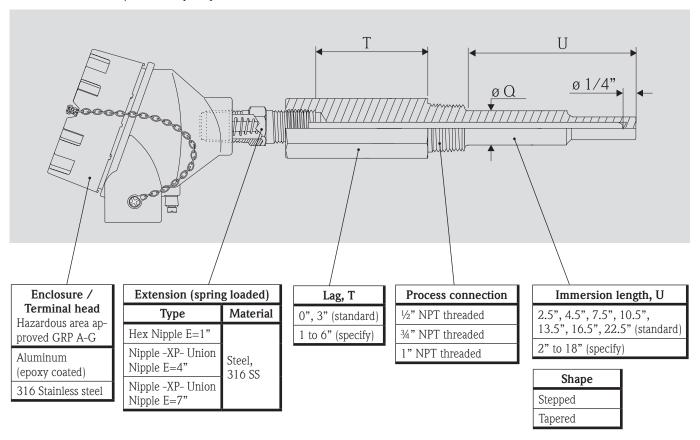
Signal immunity and measurement performance

The assemblies are available with Endress+Hauser's robust TMT series of In-head DIN B size temperature transmitters with 4-20 mA, HART, Profibus PA and FOUNDATIONTM Fieldbus outputs. These offer 2 kV of galvanic isolation and a highly accurate measurement.



T53 Explosion proof TC assembly

Threaded thermowell, with heavy duty connection heads

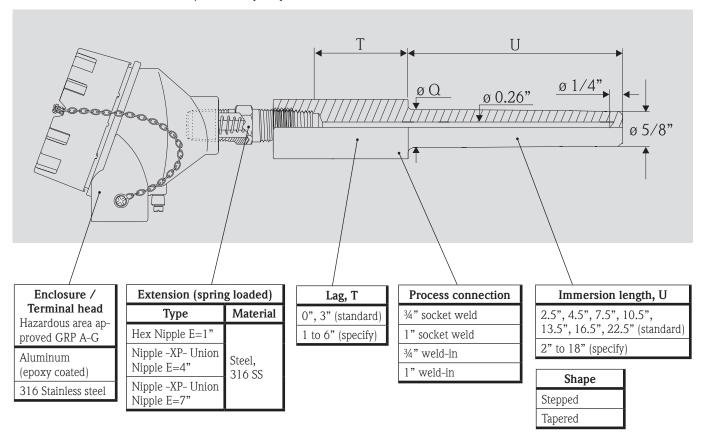


Product Structure, Explosion proof TC assembly, T53

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								C	HART TMT182					
								M	In Head DIN B FF					
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									C Material Tracebility Cerificate (MTR)					

T53 Explosion proof TC assembly

Weld-in / socket weld thermowell, with heavy duty connection heads

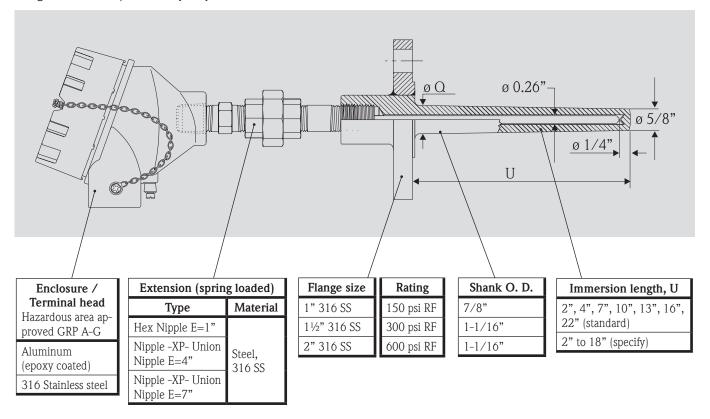


Product Structure, Explosion proof TC assembly, T53

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										B Sensor calibration certificate							
										C Material Tracebility Cerificate (MTR)							
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T54 Explosion proof TC assembly

Flanged thermowell, with heavy duty connection heads



Product Structure, Explosion proof TC assembly, T54

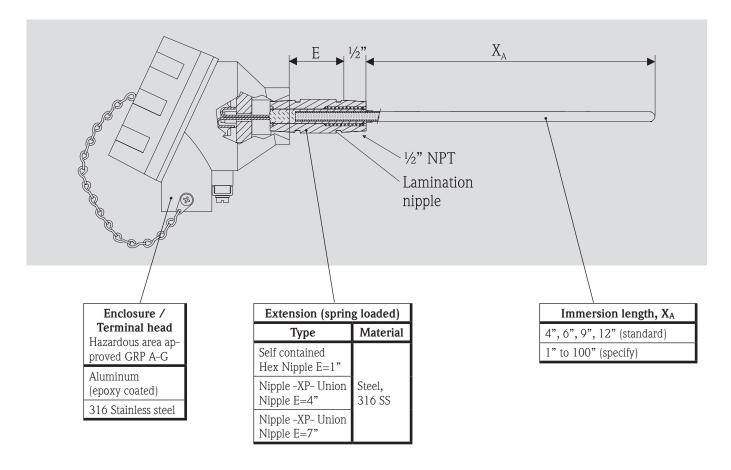
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			3) psi;				
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								D Alı	, grey + cover, 34" NPT, Grp.B-G
								E SS	816 + cover, ½" NPT, Grp.B-G
									316 + cover, ¾" NPT, Grp.B-G
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								C	HART TMT182
								M	In Head DIN B FF
								N N	In Head Profibus PA
								Y	Special version, to be specified
								2	Flying leads
								3	Terminal block
									Version:
									K Standard, North American region
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									R Sensor calibration certificate
									B Sensor calibration certificate C Material Tracebility Cerificate (MTR)

T55 Explosion proof TC assembly

spring loaded sensor, with heavy duty connection heads and lamination nipple

The unique design of this assembly allows you to retain approvals even if the thermowell exists on site and was not purchased according to the requirements of the electrical code.

What's more it allows you to assemble the connection head or transmitter on site without infringing the approval.



 X_A = drilled length of existing thermowell.

Product Structure, Explosion proof TC assembly, spring-loaded insert T55

Approval: D											
E FM XP NI DIP Class I,II,III Div. 1+2 CSA XP DIP Class I,II,III Div. 1+2 G CSA XP NI DIP Class I,II,III Div. 1+2 FM/CSA XP DIP Class I,II,III Div. 1+2 FM/CSA XP NI DIP Class I,II,III Div. 1+2 Immersion length (X _A) (1-100"): 1 4" 2 6" 3 9" 4 12" 8" (increment 0.5") Sheath diameter: A ¼"; SS316 C 3/8"; SS316 Extension: 5 Lam. Nipple SS316 6 Lam. Nipple SS316, E=3" 7 Lam. Nipple+Union+Nipple SS316, E=6"											
F CSA XP DIP Class I,II,III Div. 1+2 G CSA XP NI DIP Class I,II,III Div. 1+2 FM/CSA XP DIP Class I,II,III Div. 1+2 FM/CSA XP NI DIP Class I,II,III Div. 1+2 Immersion length (X _A) (1-100"): 1											
CSA XP NI DIP Class I,II,III Div. 1+2											
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K FM/CSA XP NI DIP Class I,II,III Div. 1+2 Immersion length (X _A) (1-100"): 1											
Immersion length (X _A) (1-100"): 1											
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2 6" 3 9" 4 12" 8 " (increment 0.5")											
3 9" 4 12" 8 " (increment 0.5")											
4 12" 8 " (increment 0.5")											
8" (increment 0.5") Sheath diameter: A ¼"; SS316 C 3/8"; SS316 Extension: 5 Lam. Nipple SS316											
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Sensor Type:											
A 1 Type J class 2 (Insert SS316)											
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E 1 Type K class 2 (Insert Inconel 600)											
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Enclosure; Cable Entry:											
A Alu, E+H blue + cover, ½" NPT, Grp.A-G											
B Alu, E+H blue + cover, 3/4" NPT, Grp.A-G											
C Alu, grey + cover, ½" NPT, Grp.B-G											
D Alu, grey + cover, ¾" NPT, Grp.B-G											
E SS316 + cover, ½" NPT, Grp.B-G											
F SS316 + cover, ¾" NPT, Grp.B-G											
Electrical Connection:											
A programmable RTD TMT180											
B programmable TMT181											
C HART TMT182											
M In Head DIN B FF											
N In Head Profibus PA Y Special version, to be specified											
Y Special version, to be specified 2 Flying leads											
2 Frying leads 3 Terminal block											
Version:											
K Standard, North American region											
Additional Option 1:											
A not selected											
B Sensor calibration certificate											
C Material Tracebility Certificate (MTR)											
Additional Option 2:											
1 not selected											
9 Additional options required- consult factory											
T55- K Enter desired product structure											

T5x Explosion proof, thermowell TC assembly with advanced TMT162 transmitters for critical control and safety applications

The TMT162 gives these measurement instruments unique technological advantages.

The assembly offers improved safety and ease of installation through dual compartment transmitter housing design. The robust design makes it ideal for the demanding application in the petroleum upstream, downstream processes and heavy industries such as underground mining, hazardous chemicals and fossil fuel based power plants.

The completely potted electronics allow seamless operation in extreme temperatures and high precipitation & condensation areas.

The key features are:

- Dual inputs, for automatic back up.
- Advanced diagnostic features.
- Best in class accuracy.
- Zero-corrosion* gold plated terminals.
- 2 kV galvanic signal isolation.
- Ultra low copper content and powder coating for corrosion resistance.
- Molybdenum based antiseize coating on threads.

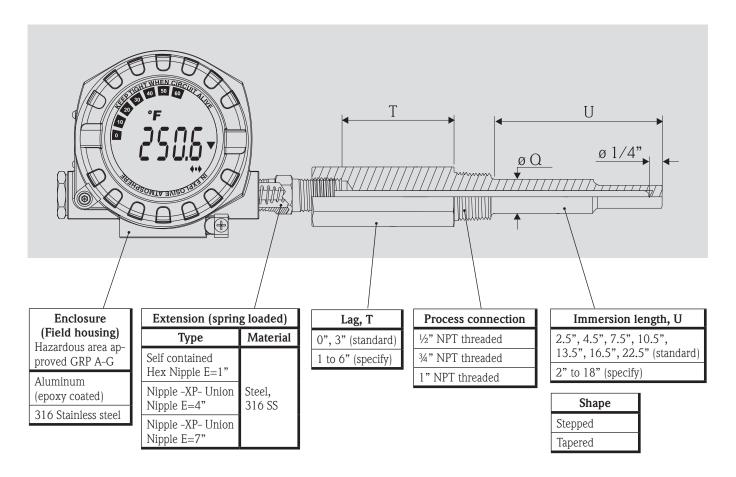
All in all a heavy duty instrument built to last and perform! This transmitter is also available in cast 316L stainless steel for offshore applications.



^{*} Gold plating ensures virtually no corrosion.

T53 Explosion proof TC assembly

Threaded thermowell, with advanced TMT162 transmitter for critical control and safety applications

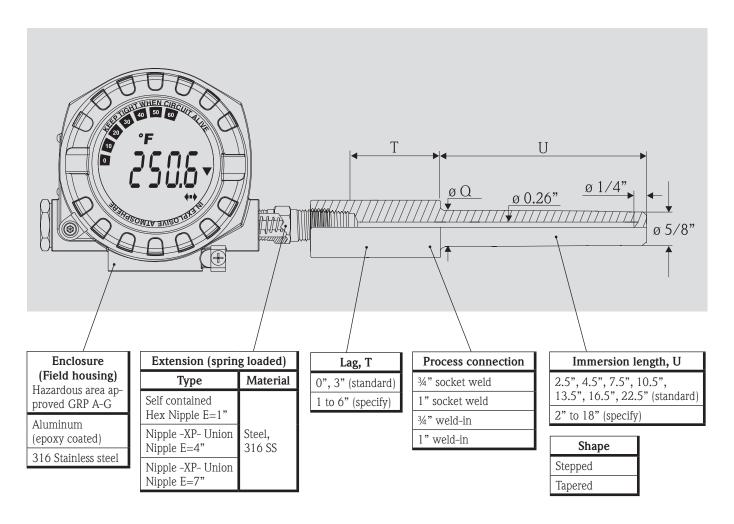


Product Structure, Explosion proof TC assembly, T53

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										field housing, 1x ½" NPT + display, Grp. A-G					
								I		L field housing, ½" NPT, Grp. A-G					
								J		L field housing, display, ½" NPT, Grp. A-G					
									F	ctrical Connection: HART TMT162, 1 Input, Dual Compartment					
									G	HART TMT162, 1 Input, Dual Compartment HART TMT162, 2 Input, Dual Compartment					
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									I	HART TMT142, 1 Input, Single Compartment					
									1	Version:					
										K Standard, North American region					
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										B Sensor calibration certificate					
										C Material Tracebility Cerificate (MTR)					
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										9 Additional options required- consult factory					
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T53 Explosion proof TC assembly

Weld-in / socket weld thermowell, with advanced TMT162 transmitter for critical control and safety applications

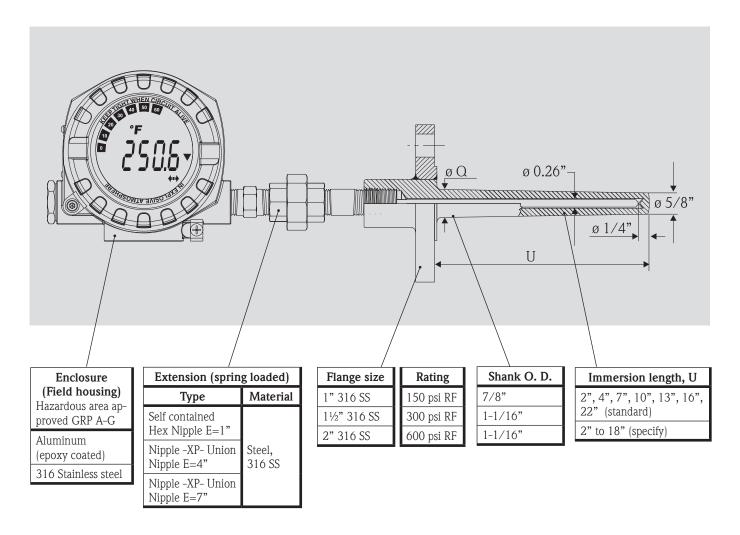


Product Structure, Explosion proof TC assembly, T53

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	F															
	G			(P NI DIP Class I,II,III Div. 1+2												
	J		CSA XP DIP Class I,II,III Div. 1+2													
	K		FM/CSA XP NI DIP Class I,II,III Div. 1+2													
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								Н		u field housing, 1x ½" NPT + display, Grp. A-G						
								I		6L field housing, ½" NPT, Grp. A-G						
								J		6L field housing, display, ½" NPT, Grp. A-G						
1										ectrical Connection:						
									F	HART TMT162, 1 Input, Dual Compartment						
									G	HART TMT162, 2 Input, Dual Compartment						
									Н	FF TMT162, 2 Input, Dual Compartment						
									Ι	HART TMT142, 1 Input, Single Compartment						
										Version:						
										K Standard, North American region						
										Additional Option 1:						
										A not selected						
										B Sensor calibration certificate						
T53-	-	\vdash	_	_			_	-	$\vdash \vdash \vdash$	C Material Tracebility Cerificate (MTR) K Enter desired product structure						
133-									ш	K Enter desired product structure						

T54 Explosion proof TC assembly

Flanged thermowell, with advanced TMT162 transmitter for critical control and safety applications



Product Structure, Explosion proof TC assembly, T54

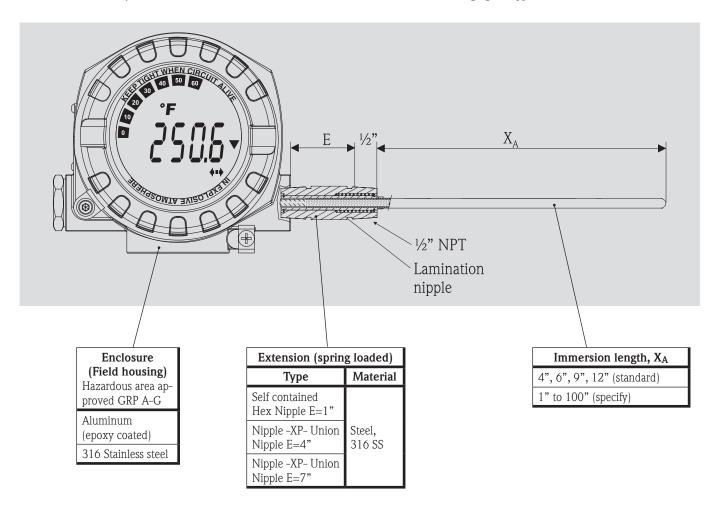
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	Е			(P NI DIP Class I,II,III Div. 1+2									
	F							Div. 1+					
	G	CSA	A XP	NI	DIP	Class	Í,II,l	III Div.	. 1+2				
	J								iv. 1+2				
	K								I Div. 1+2				
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			В	1.5	"; SS	316							
		C 2"; SS316 Y Larger sizes available - consult your E+H sales representative											
		Y Larger sizes available - consult your E+H sales representative Rating, Flange type											
			Rating, Flange type										
				3) psi;							
				9				s up to	2500 an	d other types of faces available on request, please consult your E+H representative			
					Im		ion l	length	ı (U) 2-18	3" available for quick order; longer lengths available on request			
					1	2"							
					2	4" 7"							
					3	10"	,						
					5	13"							
					6	16"							
					7	22"							
					8				cr. 0.5")				
					9	For	long	er leng	gths - Con	sult your E+H sales representative			
						A		selecte	Lag, T: (1	-6")			
						X			eu " incremer	nt)			
						E	3"	(0.0)	11101011101				
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							2		nipple SS3	116 E=1" ⊦Nipple steel E=4"			
							4			Nipple SS316 E=4"			
							5			+Nipple 35376 E=4			
							6			+Nipple SS316 E=7"			
								Sens	or Type:				
										class 2 (Insert SS316)			
										class 2 (Insert SS316)			
										class 2 (Insert Inconel 600) class 2 (Insert Inconel 600)			
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								R	1 Type T	class 2 (Insert SS316)			
										class 2 (Insert SS316)			
									G Alu	re; Cable Entry: field housing, ½" NPT, Grp. A-G			
										field housing, 1x ½" NPT + display			
										L field housing, ½" NPT, Grp. A-G			
									I 316	L field housing, display, ½" NPT, Grp. A-G			
										trical Connection:			
									F	HART TMT162, 1 Input, Dual Compartment			
									G	HART TMT162, 2 Input, Dual Compartment FF TMT162, 2 Input, Dual Compartment			
									H	HART TMT162, 2 Input, Dual Compartment HART TMT142, 1 Input, Single Compartment			
									1	Version:			
										K Standard, North American region			
										Additional Option 1:			
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										B Sensor calibration certificate C Material Transhilling Conflicts (MTD)			
T54-	+	\vdash	-		\vdash	\vdash		\vdash		C Material Tracebility Cerificate (MTR) Enter desired product structure			
134-								لــــــــــــــــــــــــــــــــــــــ		Enter desired product structure			

T55 Explosion proof TC assembly

spring loaded sensor, with advanced TMT162 transmitter and lamination nipple for critical control and safety applications

The unique design of this assembly allows you to retain approvals even if the thermowell exists on site and was not purchased according to the requirements of the electrical code.

What's more it allows you to assemble the connection head or transmitter on site without infringing the approval.



 X_A = drilled length of existing thermowell.

Product Structure, Explosion proof TC assembly, spring-loaded insert T55

T55-	TC	assembly - replacement assembly for Explosion proof areas for exisiting thermowells													
	1.1		roval:												
	D		FM XP DIP Class I,II,III Div. 1+2 FM XP NI DIP Class I,II,III Div. 1+2												
	Е						, ,								
	F		CSA XP DIP Class I,II,III Div. 1+2												
	G		CSA XP NI DIP Class I,II,III Div. 1+2												
	J		FM/CSA XP DIP Class I,II,III Div. 1+2												
	K		FM/CSA XP NI DIP Class I,II,III Div. 1+2												
		-	Immersion length (X _A) (1-100"):												
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		2		6"											
		3	9"												
		4	12"												
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				7					on+Nipple SS316, E=7"						
				l ′		nsor)II+NIPPIE 33310, E=7						
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					В				2 (Insert SS316)						
					E				is 2 (Insert Inconel 600)						
					F										
					J	71									
					K				s 2 (Insert Inconel 600)						
					N	1 T	ype l	N class	ss 2 (Insert Inconel 600)						
					0	2 T	ype l	N class	ss 2 (Insert Inconel 600)						
					R	11									
					S	7									
						Enclosure; Cable Entry:									
						G Alu field housing, ½" NPT, Grp. A-G									
						H Alu field housing, 1x ½" NPT + display, Grp. A-G									
						I	1		ield housing, ½" NPT, Grp. A-G						
						J	-		ield housing, display, ½" NPT, Grp. A-G						
							-		al Connection:						
				F HART TMT162, 1 Input, Dual Compartment											
					G HART TMT162, 2 Input, Dual Compartment										
							1		FMT162, 2 Input, Dual Compartment						
					I HART TMT142, 1 Input, Single Compartment										
					Version:										
				K Standard, North American region											
					A not selected										
									B Sensor calibration certificate						
									C Material Tracebility Cerificate (MTR)						
									Additional Option 2:						
									1 not selected						
									9 Additional options required- consult factory						
T55-		Н					t	K	Enter desired product structure						

Thermowells

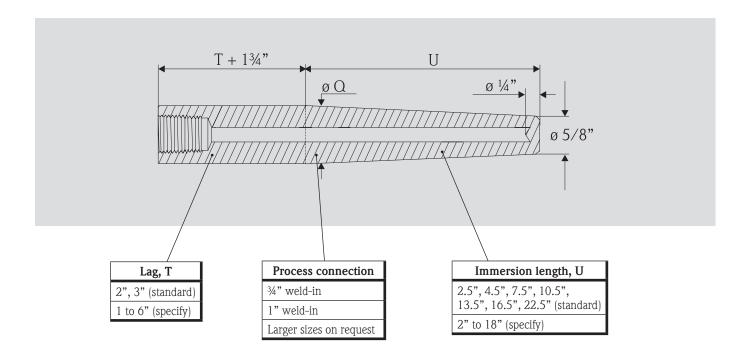
Thermowells are used to protect temperature measuring instruments in process systems. In processes where pressure, velocity, or viscous, abrasive, and corrosive materials are present individually or in combination, the measurement probe can be quickly damaged. Additionally, a thermowell enables removal of the temperature instrument for replacement, repair, or testing without affecting the process system. Thermowells are designed with pressure vessel standards and the ASME PTC19.3 calculation methods.

In Canada manufacturers are required to obtain a Canadian Registration Number (CRN). This requires methodical design and pressure rating calculations based on geometry and dimensions. The manufacturing must be exactly as the registered and approved designs. Endress+Hauser Inc. has CRN approved designs for its complete range of thermowells.

Important terminology to order a thermowell

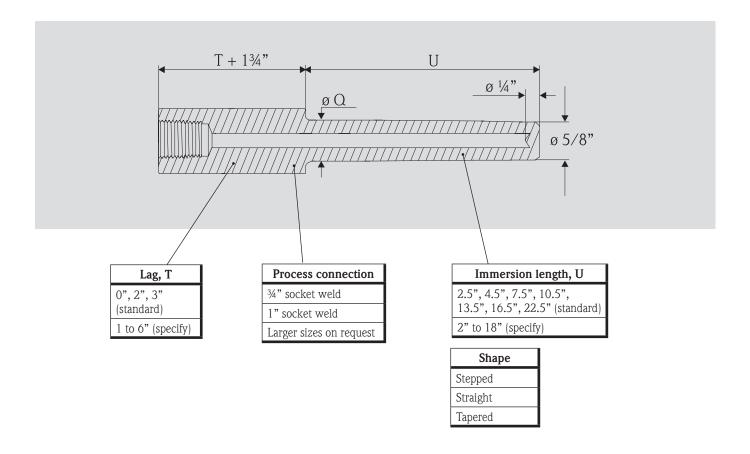
External means to connect thermowell to process system. Wells can be threaded, bolted (to matching flange), clamped, or welded in place.
Internal threads to connect temperature instrument to thermowell.
Length of thermowell immersed into process system. Measured from the base of the process connection to the end tip of the well. E+ H order structures are based on this dimension.
Also called "lag length" or "lagging extension". Extends length between the instrument and process connections to accommodate vessel or piping insulation.
Instrument insertion length into thermowell. Equal to bore length.
Also called "tip diameter". Diameter of thermowell shank at the end tip of the thermowell. This dimension may vary with process connection and/or shank design.
Also called "root diameter". Diameter of thermowell shank below the process connection. This dimension may vary with process connection and/or shank design.
Dimension of internal bore to match the diameter of the instrument inserted into the thermowell.
Also called "reduced tip". The shank O.D. is reduced over the last $2\frac{1}{2}$ " of the "U" dimension from the standard root diameter to $\frac{1}{2}$ " O.D. The stepped shank is available with a 0.260" bore diameter only.
Shank O.D. is the same from the root diameter ("Q" dimension) to the tip diameter ("D" dimension). The straight shank is generally used with a 0.385 " or larger bore diameter, but is also available with a 0.260 " bore.
Shank O.D. is gradually reduced from the root diameter ("Q" dimension) to the tip diameter ("D" dimension). The tapered shank is recommended for heavy duty applications characterized by high vibration, pressure, temperature, and/or velocity

TU51 Weld-in thermowells



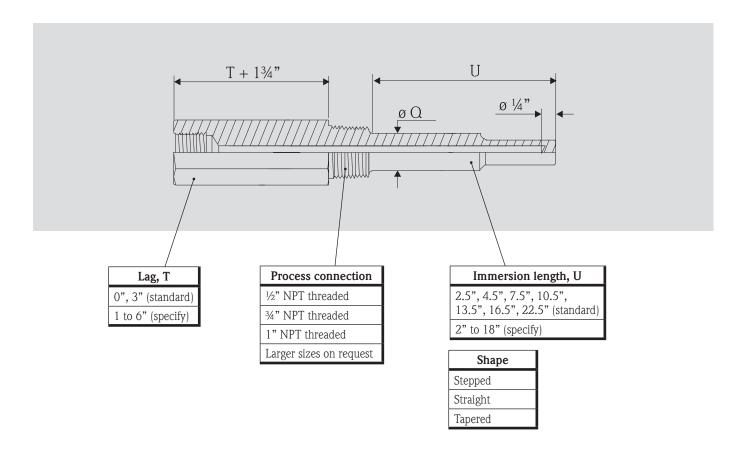
TU51 we	ld in	therm	iowe	211								
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	Y	Speci	al ve	rsio	n, to	be sp	oecifi	ed				
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	1	AB	3/4"	wel	d-in,	316	SS					
	1	AC	1" v	welc	l-in,	316	SS					
		YY	othe	er m	ateri	al av	ailab	le or	ı req	uest		
			Imr	ner	sion	leng	gth (U) 2	-18	' av	ailal	ole for quick order; longer lengths available on request
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			2	4.5	5"							
			3	7.5	5"							
			4	10	.5"							
			5	13	.5"							
			6	16	.5"							
			7	22	.5"							
			8		." (2	-18"	incr.	0.5	")			
			9	lor	nger !	lengt	hs av	ailal	ole o	n re	ques	t, consult your E+H representative
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TU52 Socket weld thermowells



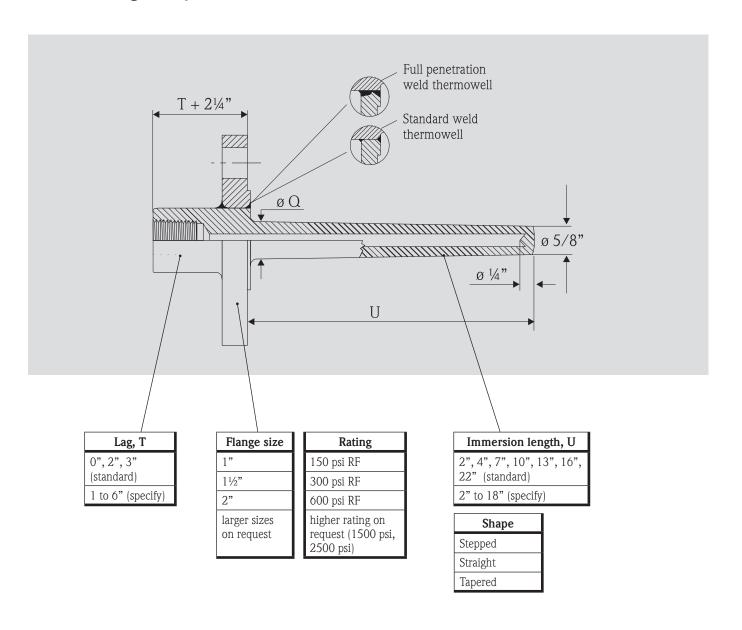
Instrument connection:	TU52 soc	ket v	weld t	hern	now	rell							
Y Process connection, material: AB Socket weld 34" NPS, 316 SS AC Socket weld 1" NPS, 316 SS Other material available on request Immersion length (U) 2 to 18" available for quick order; longer lengths available on request 1 2.5"		Ins	trume	nt c	onn	ectio	on:						
Process connection, material: AB			1/2"										
AB		Y	_										
AC YY Immersion length (U) 2 to 18" available for quick order; longer lengths available on request Immersion length (U) 2 to 18" available for quick order; longer lengths available on request 1													
VY Other material available on request Immersion length (U) 2 to 18" available for quick order; longer lengths available on request 1 2.5"													
Immersion length (U) 2 to 18" available for quick order; longer lengths available on request 1								,					
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3													
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16.5" 7 22.5" 8 " (2 to 18", incr 0.5") 9													
7 22.5" 8" (2 to 18", incr 0.5") 9 longer lengths available on request, consult your E+H representative Thermowell Lag, T: (1-6" available on request) 1 not selected 3 2" 4 3" 8" (1 to 6", incr. 0.25") Shape: A Stepped B Straight C Tapered Bore Diameter B: 1 0.260" 9 Special version, to be specified Accessory: A not selected B Cap, SS304				-									
8" (2 to 18", incr 0.5") 9 longer lengths available on request, consult your E+H representative Thermowell Lag, T: (1-6" available on request) 1 not selected 3 2" 4 3" 8" (1 to 6", incr. 0.25") Shape: A Stepped B Straight C Tapered Bore Diameter B: 1 0.260" 9 Special version, to be specified Accessory: A not selected B Cap, SS304													
9 longer lengths available on request, consult your E+H representative Thermowell Lag, T: (1-6" available on request) 1 not selected 3 2" 4 3" 8" (1 to 6", incr. 0.25") Shape: A Stepped B Straight C Tapered Bore Diameter B: 1 0.260" 9 Special version, to be specified Accessory: A not selected B Cap, SS304				!	1		to 1	8" iı	ncr () 5")			
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4 3"									<u> </u>	. (-			
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Shape: A Stepped B Straight C Tapered Bore Diameter B: 1 0.260" 9 Special version, to be specified Accessory: A not selected B Cap, SS304		İ		İ	4	3"							
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B Stress Calculation PTC 19.3 C Oxygen service													
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K Standard													
Y Special version, to be specified													
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TU53 Threaded style thermowells



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		AB	1			,	316					
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											K	Standard
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TU54 Flanged style thermowells



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C	2"										
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	Mat	erial	:								
	AA	316	SS								
	AB	304	SS								
	YY	othe	er ma	iteri	al av	ailab	le on	reque	est		
			ng, l								
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		2			; RF						
		3			; RF						
		Y		-	-	105 11	n to	2500	and	oth	ther types of faces available on request, please consult your E+H representative
		•									available for quick order; longer lengths available on request
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				3	3"						
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Material availability guide

Material	Composition	Max temperature	Application
304SS	18% Chromium	900 °C	Offers excellent resistance to many corrosive agents encountered in domestic and industrial use.
310SS	25% Chromium	1148 °C	Good resistance to oxidation at temperatures up to 1148 °C. Good resistance to thermal fatigue and cyclic heating.
316SS	17% Chromium 12% Nickel 2-3% Molybdenum	898 °C	Good resistance to a much larger range of chemicals than 304SS. Withstands sulphurous acid compounds.
321SS	Similar to 304SS but Steel stabilized by Titanium addition	871 °C	Not sensitive to inter-granular corrosion when heated within the carbide precipitation range of 482 $^{\circ}$ C to 815 $^{\circ}$ C. Similar in corrosion resistance to 304SS.
347SS	Similar to 304SS but contains Tantalum and is Steel stabilized by Colombium addition	871 °C	Excellent equivalent to 304SS for 426 $^{\circ}$ C to 815 $^{\circ}$ C range. Superior to 321SS where service is both corrosive and at an elevated temperature.
304LSS/ 316LSS	Similar to 304SS and 316SS but with reduced carbon (low carbon)	871 °C	Low carbon versions of 304SS and 316SS (maximum of 0.03% carbon). Because of low carbon content the effects of carbide precipitation are reduced.
Inconel 600	76% Nickel	1212 °C	Excellent material for severely corrosive environments. Resistant to oxidation at temperatures up to 1175 °C.– excellent for cement plants.
Inconel 601	60.5% Nickel 23.0% Chromium 1.5% Aluminum	1148 °C	Similar to Inconel 600 however higher chromium content gives superior resistance to oxidizing, carburizing and sulphur containing environments.
Incoloy 800	32.5% Nickel 46% Iron 21% Chromium	1093 °C	Resistant to oxidation and carburization at elevated temperatures. It resists stress – corrosion cracking, sulphur attack, internal oxidation, scaling and corrosion in a wide variety of industrial atmospheres. Sulphurous applications
Monel 400	66% Nickel 31% Copper	537 °C	Highly resistant to corrosion by chlorinated solvents, glass etching agents, Sulphuric and many other acids, and practically all alkalies generally free from stress-corrosion cracking Good resistant to salt water corrosion. Salination plants.
Hastelloy B	61% Nickel 28% Molybdenum	1204 °C	Good corrosion resistance to hydrochloric, sulphuric, phosphoric, and acetic acids. Excellent corrosion resistance to hydrogen-chloride gas.
Hastelloy C	54% Nickel 16% Molybdenum 15.5% Chromium 4% Tungsten	1204 °C	Good corrosion resistance to many chemical environments, including ferric and cupric chlorides, contaminated mineral acids, wet chlorine gas. Oxidation resistance to 990 $^{\circ}$ C.
Hastelloy X	47% Nickel 9% Molybdenum 22% Chromium 0.5% Tungsten	1204 °C	Good high temperature strength and resistance to oxidation to 1204 $^{\circ}\text{C}$. Also good for reducing conditions.
F11 chrom moly	0.5% Molybdenum 1.25% Chromium	575 °C	High strength steels used in pressure vessels and industrial boilers. Resisitant to cleaning agents, chloroform, food products and carbon disulphide. The chrom moly is generally matched to the pipe grade for optimized welds.
F22	1.0% Molybdenum 2.25% Chromium	600 °C	High strength steels used in pressure vessels and industrial boilers. Resisitant to cleaning agents, chloroform, food products and carbon disulphide, F22 has a higher tensile strengthan F11. The chrom moly is generally matched to the pipe grade for optimized welds.
F91	1.0% Molybdenum 9.0% Chromium	600 °C	High strength steels used in pressure vessels and industrial boilers. Resisitant to cleaning agents, chloroform, food products and carbon disulphide. F91 has one of the highest available tensile strengths for chrom moly steels. The chrom moly is generally matched to the pipe grade for optimized welds.
HR160	29% Cobalt 28% Chromium max. 2% Iron 2.75% Silicon	1204 °C	A high temperature alloy with outstanding resistance to high temperature corrosion, it has excellent resistance to sulphidation, and chloride attack in both reducing and oxidizing atmospheres. Its resistance to attack by the products of combustion of low-grade fuels make it VERY useful in municipal, industrial, hazardous and nuclear waste incinerators.
Titanium	Ti metal	450 °C	Excellent resistance to oxidizing acids such as nitric or chromic, it is also resistant to inorganic chloride solutions, chlorinated organic compounds and moist chlorine gas. Its good resistance to seawater and salt spray, allows it to be used in off-shore installations
Duplex stainless steel 2205	4.5% Nickel	315 °C	These grades combine high strength with excellent corrosion resistance, especially to chloride stress corrosion cracking, however a tendency to brittleness limits their use to approx 300 to 315 °C maximum, sub-Zero use is also restricted because of brittleness due to the ferrite content. Offshore piplines are the main applications.

Sanitary process instruments

Endress+Hauser is one of the world's leading suppliers of solutions for sanitary process measurements. The designs meet the most stringent requirements of the Food & Beverage, Dairy and the Biopharmaceutical Industries for safety, accuracy and reliability.

Complete compliance

Our experience of over 50 years in process measurement helps us to meet or exceed the performance, reliability, cleanability, sterilization, documentation, validation and environmental requirements.

Well designed products

Our sensor offering has options such as PMO, 3-A and ASME BPE compliance.

We also have solutions for replacing MIGs in cooking retort applications. Our housings are made with specially approved materials and designed with glass free construction and smooth surfaces for sanitary environments.

Special solutions

We even provide special solutions like flush mount sensors, non-intrusive sensors; bio-reactor multi-points and FDA approved Teflon coating.

Traceability

Our advanced web asset management solution or W@M offers complete traceability - including any and every calibration or service event carried out by our trained and authorized team, throughout the Life Cycle of the product.

The range of products and services will convince you that we are the experts you can trust for your stringent sanitary requirements.



General specifications

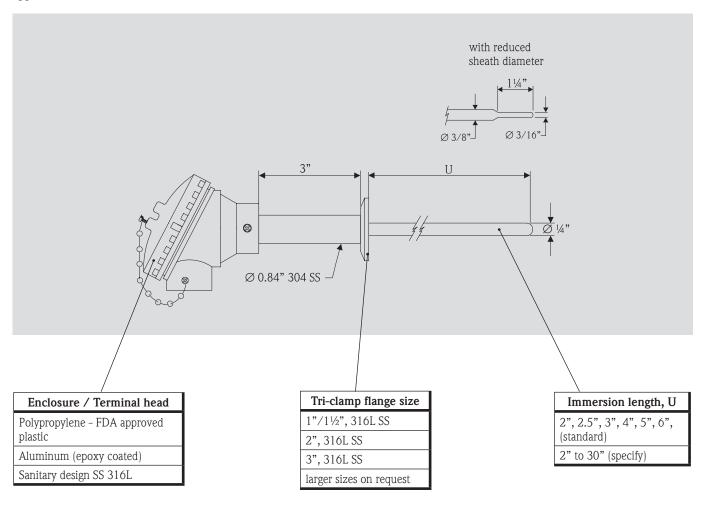
Sensor Styles: As per ASTM 14.03, E230	RTD: Single or dual element (3 wire only) Pt 100, class A or class B -50 to +260 °C (-58 to 500 °F), low temp -50 to +200 °C (-58 to 390 °F), in continuous operation -200 to +600 °C (-328 to 1110 °F), high temp
Process connection:	Tri-clamp, weld-in (see TH13), UNEF micro threads (see TH15) $$
Thermowell style:	Straight or stepped bar stock
Materials:	Standard is 316SS

Options include:

- PMO speed of response test
- Sealed electronic enclosures/ connection heads
- Certificate of compliance (EN 3.1)
- Silicon free assemblies
- PMI (Positive Material Testing) testing
- Surface finishing to 3-A and ASME BPE (animal fat free)
- Ultrasonic, hydrostatic testing
- NIST traceable calibration
- Oxygen service cleaning
- Callendar/Van Dusen sensor transmitter matching for RTD's

TH17 sanitary RTD assembly for sanitary process

Economical Tri-clamp, RTD assembly with standard, FDA approved plastic and sanitary 316L SS connection heads for monitoring applications

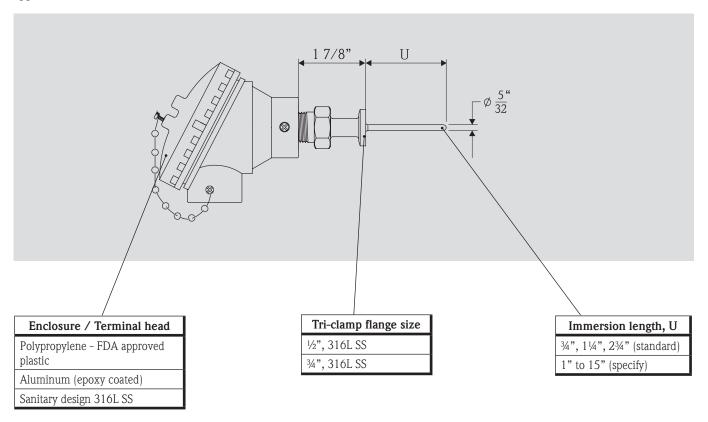


Product Structure, sanitary RTD assembly, TH17

TH17-	San	itary	RTI) ass	emb	oly, T	TH1'	7		
									Cons	ruction (32 μ-inch surface finish)
	В								16L S	
	C				-			16L :		-
	D							316		
	E							16L		
	1 .	-						to 3		
		1	2"	1011	relig	ou (oj Z	10 3	0	
		2	3"							
		3	3 4"							
		4	5"							
	1	5	6"							
	1	6	2.5	,,						
		8			: 6	in on		nt 0.5	="1	
		°	Tul	(Spe	echy,	IIICI	eme	ntor	Mate	rial of Construction (32 μ-inch surface finish)
			C		OD;				IVIAL	mai of Construction (32 μ-inch surface linish)
	1		F						16" (DD; 316L SS
	1		G							T version
	1		Н							DD; 316L SS, PMO HTST version
			п			_		:u 3/	10 (7D, 510L 35, FIVIO H131 VEISIOII
	1			C	1sor			laca A	4, 3 v	ino
				1						
	1			G					A, 4 v	
	1			L					A, 3 v	
									e en	ry
					A		t sele		- A1	NIPT 1/7
					В					- cover; NPT ½"
	1				C					- cover; NPT ¾"
	1				D				,	IPT ½"
					Е					IPT 3/4"
					F					NPT 1/2"
					G					C display; NPT ½" (only with TMT18x transmitter)
					1					ip cover, NPT ½"
	1					_			nne	
						A				e RTD TMT180
						С				TMT181
						D	1	_		TMT181 FM IS
						E	1	_		2 TMT181 CSA IS
						P	1		MT1	
						R	1			22 FM IS
						T	1			22 CSA IS
	1					U	1			smitter DINB, GP
						V				smitter DINB, FM/CSA IS
						2	1 '	ing le		
						3			l bloc	
						4				ead Transmitter DINB, GP
	1					5				ead Transmitter DINB, FM/CSA IS
	1						$\overline{}$			on required
							1	1	selec	
							2	1		Certificate of Conformance (includes MTR)
							3			Traceability cert.
	1									al option 1
	1							A		selected
								В		or calibration certificate
	1									sion
									K	Standard, min. 32 Ra surface finish
	1								P	Pharameutical, min. 15 Ra surface finish
	1									Additional option 2
										1 Not selected
										2 PROFIBUS PA plug M12
										3 Foundation Fieldbus plug 7/8"
	\vdash			_	Ш					4 Plastic cable gland
TH17-										Enter desired product structure

TH18 sanitary RTD assembly for sanitary process

Economical Tri-clamp, RTD assembly with standard, FDA approved plastic and sanitary 316L SS connection heads for monitoring applications

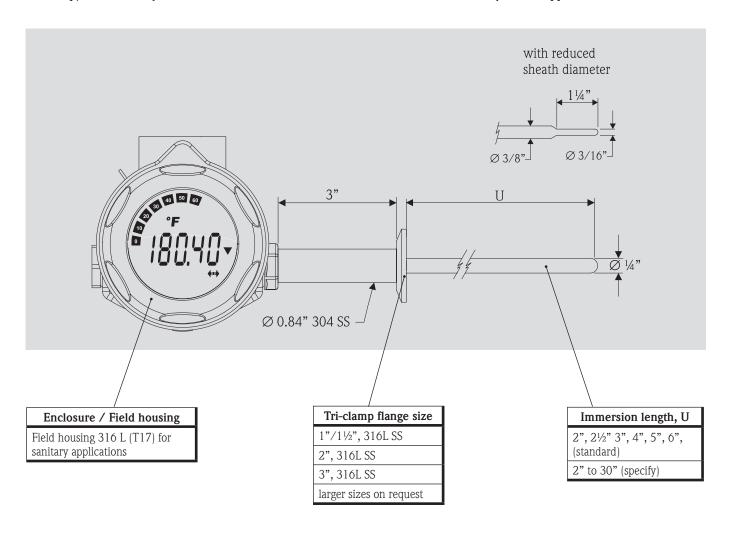


Product Structure, sanitary RTD assembly, TH18

TH18-	San	Sanitary RTD assembly, TH18										
	Pro	cess	Con	nect	tion;	Ma	terial	of C	onstruc	tion (20 µ-inch Ra surface finish)		
	Α								316L SS			
	Y	Spe	cial v	rersic	n							
						eth (U) 1	to 15	5"			
		2	3/4"			J (-, -					
		4	11/4	,,								
		6	23/4									
		8			-:c			. ^ ^!	- ** \			
		8					emen			60 + 1 (00 + 1 P		
			-						Material	of Construction (20 μ-inch Ra surface finish)		
			1				316 S	5				
						Тур						
				1	1		,		, 3 wire			
				G					, 4 wire			
					En				entry			
					Α	Not	t sele	cted				
					В	Alu	, E+F	I blue	e Al + co	ver; NPT ½"		
					С	Alu	, E+F	H blue	e Al + co	ver; NPT ¾"		
İ					D	Plas	stic P	P whi	ite; NPT	1/2"		
					Е				ite; NPT			
					F				OJ); NPT			
				l	G					isplay; NPT ½"		
	1			ŀ	1			*	- /	over, NPT ½"		
					1				nnection			
						A	_			D TMT180		
						1	١ ،	_				
				ŀ		C	1	_	nable TA			
						D	1 '	_		MT181 FM IS		
				ļ		Е				MT181 CSA IS		
						P	1		ИТ182			
						R	1		ИТ182 F			
						T	HAI	RT TA	ИТ182 C	SA IS		
						U	FF I	lead '	Transmit	tter DINB, GP		
						V	FF I	Head '	Transmit	ter DINB, FM/CSA IS		
						2	Flyi	ng lea	ads			
	1			İ	İ	3			block			
						4	Prof	ibus l	PA Head	Transmitter DINB, GP		
						5				Transmitter DINB, FM/CSA IS		
						١				required		
							1	Stan		· · · · · · · · · · · · · · · · · · ·		
	1			ŀ			2			compliance		
							1 1		ial versio	•		
							9		itional o			
									Not sele			
				ŀ				A				
									Version			
										ndard		
										terial traceability certificate		
	1									ditional option		
									1	Not selected		
									2	PROFIBUS PA plug M12		
	1							İ	3	Foundation Fieldbus plug 7/8"		
									4	Plastic cable gland		
TH18-			1					Α		Enter desired product structure		

TH17 sanitary RTD assembly for sanitary process

Tri-clamp, RTD assembly with advanced TMT162 transmitter for critical control and safety related applications

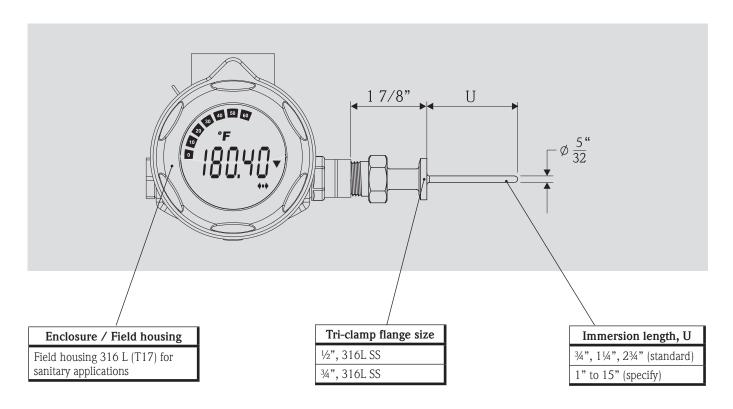


Product Structure, sanitary RTD assembly, TH17

TU17	Carr	ita	חדים)	ors t	1v- 7	TU 1 7	7		
TH17-		itary								
	_									ruction (32 μ-inch surface finish)
	В								16L S	
	С						,	16L S		
	D							316I		
	Е							16L S		
		_		ion l	Leng	gth (U) 2	to 3	0"	
		1	2"							
		2	3"							
		3	4"							
		4	5"							
		5	6"							
		6	2.5	"						
		8		" (spe	ecify,	incr	emer	nt 0.5	5")	
			Tul	oe O	utsic	ie D	iame	eter,	Mate	rial of Construction (32 μ-inch surface finish)
			С	1/4"	OD;	316	L SS			
			F	3/8	3" Ol	D, re	duce	d 3/	16" O	D; 316L SS
			G	1/4"	OD;	316	L SS	PMC) HTS	T version
			Н	3/8	3" Ol	D, re	duce	d 3/	16" O	D; 316L SS, PMO HTST version
				Ser	ısor	Тур	e			
				С	1 x	Pt10	00, cl	lass A	, 3 w	ire
				G	1 x	Pt10	00, cl	lass A	, 4 w	ire
	İ								, 3 w	
	İ			İ	End	closi	ıre;	Cabl	e ent	ry
				İ	Н	316	L (T	17) fi	eld ho	ousing; NPT ½" + HART + 1 x Input
					I	316	L (T	17) fi	eld ho	ousing; NPT ½" + HART + 1 x Input + display
				İ	J	316	SL (T	17) fi	eld ho	ousing; NPT ½" + HART + 2 x Input
	İ			İ	K	316	SL (T	17) fi	eld ho	ousing; NPT ½" + HART + 2 x Input + display
	İ			İ	L	316	SL (T	17) fi	eld ho	ousing; 2 x Input + FF + NPT ½"
					М	316	L (T	17) fi	eld ho	pusing; NPT ½" + FF + 2 x Input + display
									nnec	
						Ι	TM	T162	, dua	l compartment
				İ		J	TM	T162	, FM	IS, dual compartment
				İ		K				IS, dual compartment
				İ			Doc	cume	entati	on required
							1	Not	select	red .
							2	with	3.1	Certificate of Conformance (includes MTR)
				İ			3			Fraceability cert.
İ				İ			li			al option 1
				İ			İ	Α		selected
								В		or calibration certificate
									Vers	ion
				İ					K	Standard, min. 32 Ra surface finish
									Р	Pharameutical, min. 15 Ra surface finish
										Additional option 2
									H -	1 Not selected
										2 PROFIBUS PA plug M12
										3 Foundation Fieldbus plug 7/8"
										4 Plastic cable gland
TH17-				\vdash			\vdash			Enter desired product structure
					$\overline{}$				1 1	Sa product ou detail

TH18 sanitary RTD assembly for sanitary process

Tri-clamp, RTD assembly with advanced TMT162 transmitter for critical control and safety related applications

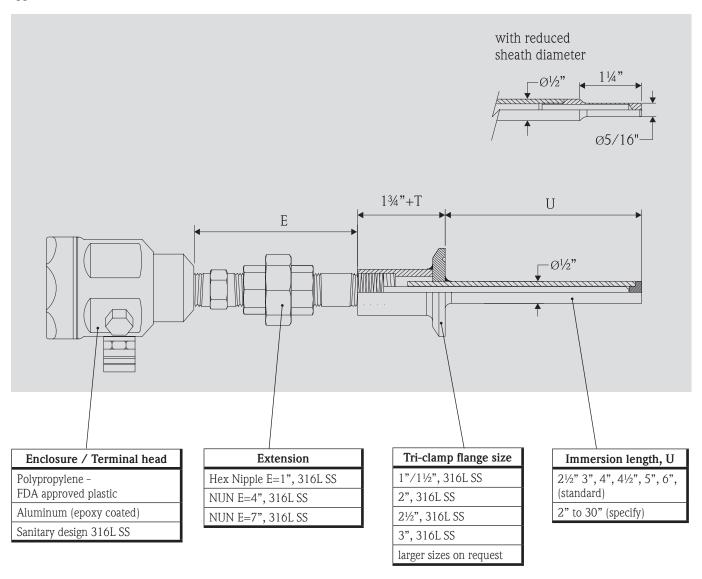


Product Structure, sanitary RTD assembly, TH18

TH18-	San	itary	RTI	RTD assembly, TH18														
	Pro	cess	Con	nect	ion;	Ma	teria	l of (Cons	truction (20 μ-inch Ra surface finish)								
	Α	1/2"	+ 3/4'	' Tri-	clam	ір со	nnec	tion;	316I	SS								
	Y	Spe	cial v	ersio	n													
		Imı		ion l	Leng	gth (U) 1	to 1	5"									
		2	3/4"															
		4	11/4	"														
		6	23/4	"														
		8	"	(spe	cify,	incre	emer	nt 0.2	5")									
			Tut	e O	Coutside Diameter, Material of Construction (20 μ-inch Ra surface finish)													
			1	5/3	5/32" OD; 316 SS													
				Ser	Sensor Type													
				С														
				G	1 x	Pt10	00, c	lass A	4, 4 v	rire								
					En	clos	ure;	Cabl	e en	try								
					J					ousing; 2 x Input + NPT ½" + HART								
					K	316	5L (T	`17) f	ield h	ousing; NPT ½" + HART + 2 x Input + display								
					L					ousing; 2 x Input + FF + NPT ½"								
					М	316	5L (T	`17) f	ield h	ousing; NPT ½" + FF + 2 x Input + display								
						Ele		cal co										
						I				al compartment								
						J				IS, dual compartment								
						K				A IS, dual compartment								
							Do			ion required								
							1		ndard									
							2			e of compliance								
							9			ersion								
								_		al option 1								
								Α	_	selected								
									_	sion								
									K	Standard								
									L	Material traceability certificate								
										Additional option								
										1 Not selected								
										2 PROFIBUS PA plug M12								
										3 Foundation Fieldbus plug 7/8"								
TILL O			_							4 Plastic cable gland								
TH18-			1					Α	Ш	Enter desired product structure								

TH27 sanitary RTD assembly for sanitary process

Tri-clamp thermowell, RTD assembly with standard, FDA approved plastic and sanitary 316 SS connection heads for monitoring applications

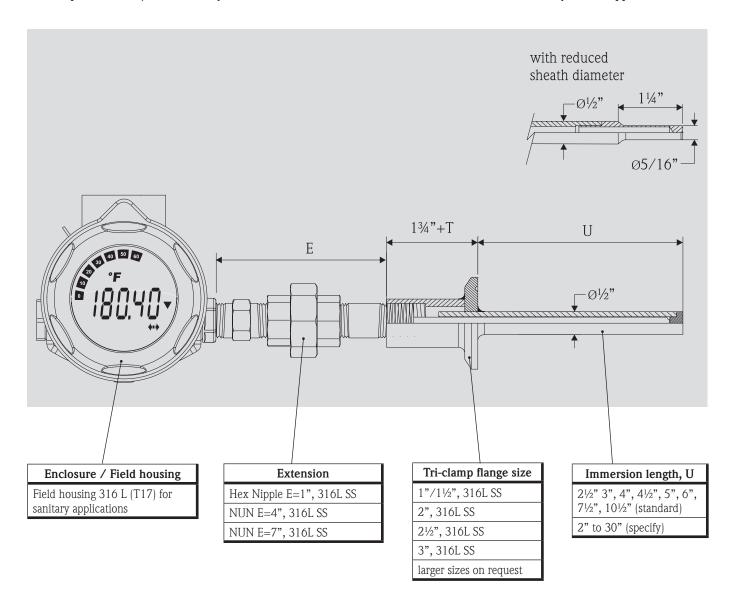


Product Structure, sanitary RTD assembly, TH27

TH27-	Hv	geni	c RT	D A	ssem	ıblv.	US S	tyle.	TH2	27									
										struction (32 μ-inch Ra surface finish)									
	В					; 316			1100	(L vm omvaoo)									
		2"	Tri-cl	amn	: 316	5L SS													
						16L S													
						SL SS													
	Y		cial v			,L 33													
	1					mers	ion 1	enot	h II										
		A	3"					81											
		В	4"																
		C	5"																
		D	6"																
İ		1	21/2	,															
		2	41/2																
		3	71/2																
İ		4	101/	2"															
İ		8	'	'(Sp	ecify	incre	emen	t 0.5	")										
										(32 μ-inch Ra surface finish)									
			1	1/2"	strai	ght; 3	316L	SS											
			2		reduced 5/16"; 316L SS ermowell Lag (T)														
				Th			1 Lag	(T)											
				Α	Not	ne													
				Е	3"														
				X					ement	t 0.5")									
							on (E												
					1					SS, E=1"									
					2					ipple 316L SS, E=4"									
					6					ipple 316L SS, E=7"									
							isor '												
						G				ass A, 4 wire, -50 260°C									
						Н				ass A, 4 wire, -200 600°C									
						L				ass A, 3 wire, -50 260°C									
						IVI				ass A, 3 wire, -200 600°C									
							A		t selec										
							В			H blue Al + cover; NPT ½"									
							C			H blue Al + cover, NYT 72 H blue Al + cover; NPT ¾"									
							D			P white; NPT ½"									
							E			P white; NPT ¾"									
							F			TA20J); NPT ½"									
							G			TA20J) LC display; NPT ½"									
							1			H blue + flip cover; NPT ½"									
						İ				ral connection									
						İ		Α		grammable RTD TMT180									
								С		grammable TMT181									
								D	Prog	grammable TMT181 FM IS									
								Е	Prog	grammable TMT181 CSA IS									
								P	HAR	RT TMT182									
								R	HAR	RT TMT182 FM IS									
								T	HAR	RT TMT182 CSA IS									
								U	FF D	DIN B									
								V	FF D	DIN B, FM/CSA IS									
								2		ing leads									
								3		minal block									
								F	1	OFIBUS PA DIN B									
								G		OFIBUS PA DIN B, FM/CSA IS									
	1									ditional option 1									
										Not selected									
										PROFIBUS PA plug M12 Foundation Fieldbur plug 7 / 9"									
	1									Foundation Fieldbus plug 7/8"									
										Plastic cable gland Additional option 2									
										A Not selected									
									1 1	B Sensor calibration certificate									
										C Material traceability certificate									
										D 3.1 Certificate of Conformance (includes MTR)									
	1									E Sensor calibration certificate + 3.1 Cer. Of compliance (includes MTR)									
										Version									
										K Standard 32 Ra									
	1									P Pharmaceutical 16Ra									
TH27-				\vdash		1		t	\vdash	Enter desired product structure									
	1																		

TH27 sanitary RTD assembly for sanitary process

Tri-clamp thermowell, RTD assembly with advanced TMT162 transmitter for critical control and safety related applications



Product Structure, sanitary RTD assembly, TH27

TH27-	Hy	geni	c RT	D As	ssen	ıbly,	US S	Style.	e, TH27
	Pro	cess	Cor	nec	tion	; Ma	teria	1 of (f Construction (32 μ-inch Ra surface finish)
	В	1+1	1/2"	Tri-cl	lamp	; 316	L SS		
	C	2"	Tri-cl	amp:	; 316	L SS			
	D	21/2	" Tri-	-clam	ip; 3	16L S	SS		
	Е	3" 1	Tri-cl	amp:	; 316	SL SS			
	Y	Spe	cial v	rersio	on				
		The	ermo	wel	1 im	mers	sion 1	lengi	gth U
		Α	3"						
		В	4"						
		С	5"						
		D	6"						
		1	21/2'						
		2	41/2'						
		3	71/2'	,					
		4	101/						
		8	'	" (Sp	ecify	incre	emen	t 0.5	5")
									terial (32 μ-inch Ra surface finish)
			1			ght; 3			144.00
			2						B16L SS
					No	owel	I Lag	<u> </u>)
				A E	3"	ne			
				X		" (Sn	ocify	incre	rement 0.5")
				71		ensi			tement v.5
					1				B16L SS, E=1"
					2				on+Nipple 316L SS, E=4"
	İ				6				on+Nipple 316L SS, E=7"
							sor 7		
						G			00, class A, 4 wire, -50 260°C
						Н			00, class A, 4 wire, -200 600°C
						L			00, class A, 3 wire, -50 260°C
						M			00, class A, 3 wire, -200 600°C
							H		sure; Cable entry
							I		6L (T17) field housing; 1 x Input + NPT ½" + HART 6L (T17) field housing; NPT ½" + HART + 1 x Input + display
							J K		6L (T17) field housing, 2 x Input + NPT ½" + HART
							L		6L (T17) field housing, NPT ½" + HART + 2 x Input + display
							M		6L (T17) field housing; 2 x Input + FF + NPT ½" 6L (T17) field housing; NPT ½" + FF + 2 x Input + display
							IVI		ectrical connection
								I	TMT162, dual compartment
								Ī	TMT162, FM IS, dual compartment
								K	
									Additional option 1
									1 Not selected
	İ								2 PROFIBUS PA plug M12
									3 Foundation Fieldbus plug 7/8"
									4 Plastic cable gland
									Additional option 2
									A Not selected
									B Sensor calibration certificate
									C Material traceability certificate
									D 3.1 Certificate of Conformance (includes MTR)
									E Sensor calibration certificate + 3.1 Cer. Of compliance (includes MTR)
									Version
									K Standard, min. 32 Ra surface finish P Pharmaceutical, min. 16Ra surface finish
TH27-					-	\vdash	-		P Pharmaceutical, min. 16Ra surface finish Enter desired product structure
1112/-									Enter desired product structure

Compact transmitters with integrated sensor probe

TSM470Y and TMR3x

Easytemp compact temperature transmitters combine a four-wire Pt100 class A RTD with the analog output of a transmitter offering an economical and technical alternative to unreliable direct wiring to the control room. The compact, potted design, combined with modern laser welding and a truly fast response sensor ensures a Very accurate – fast and reliable measurement.

In addition this design offers the following advantages:

 Complete stainless steel body makes the design highly resistant to corrosive environments and a perfect fit for clean room, paint booth, industrial robotics and sanitary applications.

- Ergonomic design and easy standard plug termination, means no wiring required and no corrosion of terminals.
- No ingress of moisture during heavy wash downs or highly humid environments such as food and beverage plants.
- High vibration resistance in monitoring of engine temperatures and bearing temperatures on heavy industrial equipment.
- Completely sealed design protects against any dust ingress in dusty environments such as grain silos.
- Highly stable measurement with very low drift and very long stability.
- Matched RTD and transmitter offer high measurement accuracy and fits control and monitoring application.

■ Ready to use 4-20 mA signal fits perfectly for OEM & skid applications.

The TMR3x feature the innovative fast response technology from Endress+Hauser. This design has the sensor mounted right near the tip offering additional advantage of the fastest possible response time with the truest measurement for small insertion depths. This offers unbeatable advantages in time response critical processes and small diameter pipes.

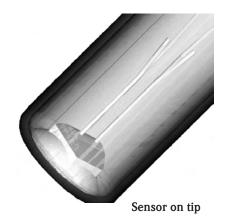
This system is also available in a modular design with detachable sensor- transmitter. Consult your Endress+Hauser partner about a solution for you application based on this unique design.



Fast True Response (FTR) technology or Sensor on tip (SOT)

The measurement element and its thermal coupling to the medium to be measured are primarily responsible for the accuracy, speed of response and trueness of a contact based measurement.

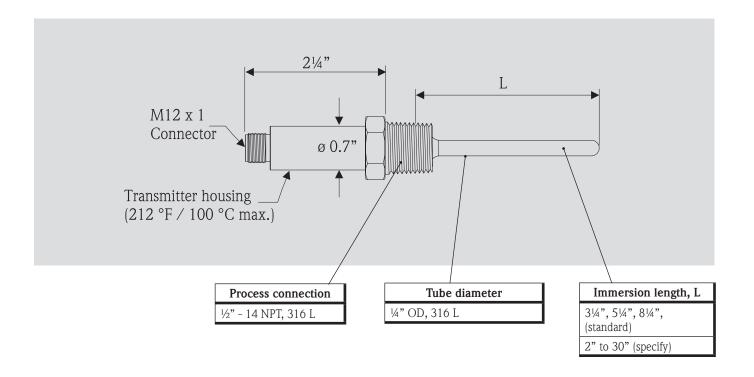
Endress+Hauser has designed an innovative industrial temperature probe with the measurement element soldered directly onto the tip of the measurement insert. This optimized positioning of the sensor significantly improves the measurement quality of the RTD element.



This direct contact between sensor and measured medium means that the thermal transition is optimized and extremely fast response times of $t90 \le 2$ s are reached. Additionally true measurement even with small insertion lengths can be achieved as thermal dispersion losses are minimized.

TSM470G compact RTD transmitter

TSM470G, Industrial compact transmitter with integrated sensor, threaded process connection or with compression fittings

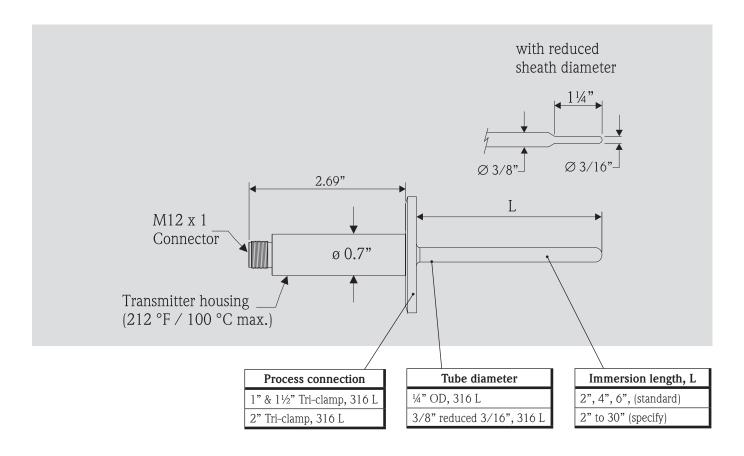


Product Structure, compact RTD transmitter 4-wire Pt100, class A, TSM470G

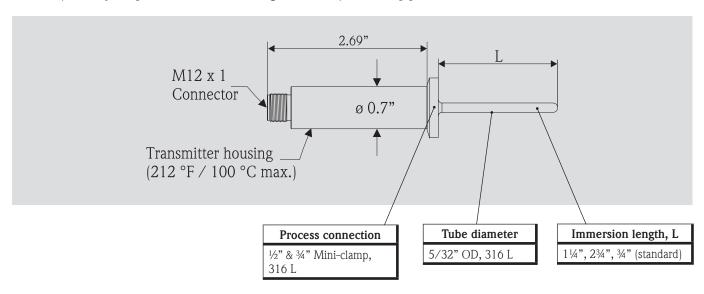
TSM470G	Co	Compact RTD Transmitter 4-wire Pt100, class A, TSM470G									
	Ce	rtific	ification								
	Α	Not	n-ha	zardo	ous are	a					
		Pro	Process Connection; Material								
		Α	A 1/2" - 14 NPT, 316L								
		Y	Special version								
			Tu	ıbe OD diameter							
			1	Dia	meter	¼" C	D, 3	16L			
			9		cial ve						
					mersio	n le	ngth				
				Α	3¼"						
				В	5¼"						
				С	8¼"						
				X	!		,	crement 0.5")			
				Y	Speci						
						_		range			
					AA	,	,	o 100 °F			
					AB	`	-	o 200 °F			
					AC			o 300 °F			
					AD	,	,	0 to 140 °F			
					AE	`	_) to 200 °F			
					BB	`	-	0 to 60 °C			
					BC	,	,	0 to 60 °C			
					BD	,	,	0 to 150 °C			
					BE	`	_	0 to 70 °C			
					BG	`	-	0 to 20 °C			
					BH	,	,	0 to 60 °C			
					BI	,	-	0 to 40 °C			
					BK	`	_	0 50 °C			
					BL	,	,	0 100 °C			
					BM	`	-	o 150 °C			
					XX			zed range			
						-	sion	1 1			
						1		selected			
						9		a cable M12x1, L=5 meters (16.4 ft)			
						9	Mo	cial version			
							-				
TSM470G-	Α.						K	Standard Enter desired product etrusture			
131V147UG-	Α	$oxed{L}$	$ldsymbol{le}}}}}}}}$				K	Enter desired product structure			

TSM470F/TSM470P sanitary compact RTD transmitter

TSM470F, Sanitary compact transmitter with integrated sensor, Tri-clamp process connection



TSM470P, Sanitary compact transmitter with integrated sensor, Mini-clamp process connection



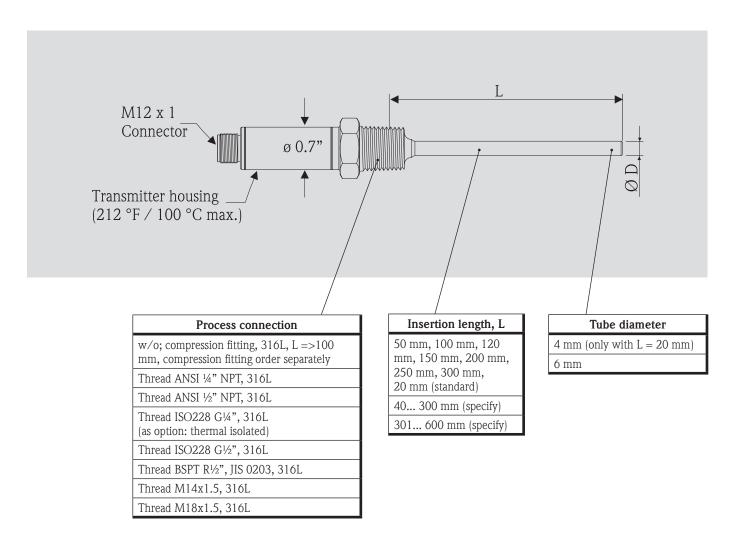
Product Structure, sanitary compact RTD transmitter, 4-wire Pt100, class A

TSM470F	Tri	clan	ip c	omp	act tra	ansn	itte	r 4-wire Pt100, class A, 3-A, 32 Ra
	Ce	rtific	rtification					
	Α	No	n-ha	zard	ous ar	ea		
		Pro	Process Connection; Material					
		В	!			-		nnection, 316L
		С	ı	2" Triclamp connection, 316L				
		Y	Spe	Special version				
			Tu	Tube OD diameter				
			1					
				2 Diameter 3/8" OD reduced 3/16" OD, 316L				
			9	9 Special version				
				Immersion length, L				
				A	2"			
				В	4"			
				С	6"			
				Х	ı			increment 0.5")
				Y	Speci			
								n range
					AA		_	to 100 °F
					AB		0	to 200 °F
							_	to 300 °F
					AD		_	40 to 140 °F
					AE		0	40 to 200 °F
					BB		_	40 to 60 °C
					BC		_	30 to 60 °C
					BD		0	30 to 150 °C
					BE		_	30 to 70 °C
					BG		_	20 to 20 °C
					BH		0	20 to 60 °C
					BI		_	10 to 40 °C
					BK		_	to 50 °C
					BL		_	to 100 °C
					BM		_	to 150 °C
					XX			ized range
						_	rsio1	
						1		t selected
						3		h cable M12x1, L=5 meters (16.4 ft)
						9		cial version
							_	Cton doud
TCMATOR	Α.		_			$\vdash \vdash$	K	Standard Enter desired and destate attractions
TSM470F-	Α						K	Enter desired product structure

TSM470P	Mi	Miniclamp compact transmitter 4-wire Pt100, class A, 20 Ra						ter 4-wire Pt100, class A, 20 Ra		
	Ce	rtific	atio	n						
	Α	No	n-ha	zard	ous are	ea				
		_	ocess Connection; Material							
		В	l	2" & ¾" Triclamp connection, 316L						
		Y		ecial version						
			_	_	pe OD diameter					
			1	l	32" OE	,				
			9		Special version					
				-	Immersion length					
				A B	A 1¼"					
				С	2¾" ¾"					
						a1 xxa				
				I	Y Special version					
					Configuration range AA range 0 to 100 °F					
					AA range 0 to 100 °F AB range 0 to 200 °F					
					AC range 0 to 200 °F					
					AD		0	10 to 140 °F		
					AE			40 to 200 °F		
					BB		_	40 to 60 °C		
					ВС		_	30 to 60 °C		
					BD range -30 to 150 °C			80 to 150 °C		
					BE	ran	- ge -3	30 to 70 °C		
					BG	ran	- ge -2	20 to 20 °C		
					ВН	ran	ge -2	20 to 60 °C		
					BI	ran	ge -1	0 to 40 °C		
					BK	ran	ge 0	to 50 °C		
					BL	ran	ge 0	to 100 °C		
					ВМ	ran	ge 0	to 150 °C		
					XX Customized range			ized range		
					Version					
					1 Not selected					
					2 With certificate of compliance					
					3 With cable M12x1, L=5 meters (16.4 ft)					
						9		cial version		
							Mo			
TCM 470P					\vdash	$\vdash \vdash$	K	Standard		
TSM470P-	Α						K	Enter desired product structure		

Easytemp® TMR31 compact thermometer

TMR31, Industrial compact transmitters with fast true response sensor, threaded process connection or with compression fittings

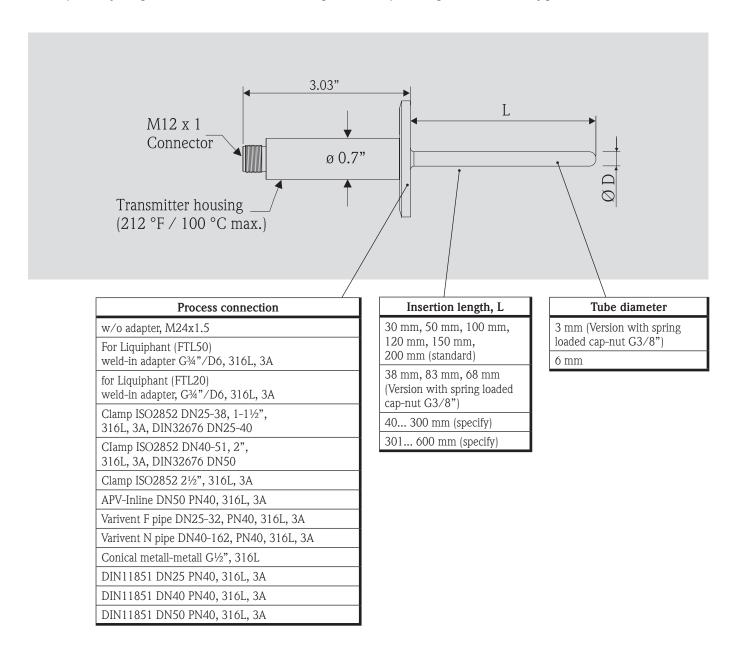


Product Structure, compact thermometer, 4-wire Pt100, general applications, TMR31

			ΓMR	31, cc	ompac	t thermor	neter	
	prova							
A	1			ous are		:0:- 4		
Y	- I -	Special version to be specified						
		Electrical connection:						
	1	Y Special version, to be specified 1 Plug M12, IP66/67						
	1					range:		
		A		0 mA;				
		В		0 mA;				
		С		,		100 °C		
İ	1	D	4-2	0 mA;	; -50	150 °C		
		Е		,		200 °C		
		F	1	0 mA;				
		X				lditional sp		
		Y 1	1 *		,	to be speci s A, 4-wire		
		1		ck:	IIN CIAS	5 A, 4-WII		
			A	witho	011†			
			В	35 m				
			С	50 m				
				Proc		nnection		
				AA			ting, 316L, $L => 100$ mm, insertion length; compr. fitting, to order separately	
				AB			" NPT, 316L	
				AC			" NPT, 316L	
				BA BB			G¼", 316L G½", 316L	
				BC			G ¹ / ₂ , 310L, thermal isolatad	
				JA			½", JIS 0203, 316L	
				MA	Thre	ad M14x1.	5, 316L	
				MB		ad M18x1.		
				YY			to be specified	
							gth L; Diameter D:	
						50 mm; 6		
						120 mm;		
						150 mm;		
						200 mm;		
					AH	250 mm;	6 mm	
					AJ	300 mm;		
							6 mm (40 300 mm)	
					BA	20 mm; 4		
					BX YY	· /	6 mm (301 600 mm) ersion, to be specified	
					1 1	_	strion, to be specified	
							; Ra <= 0.8 μm (32 μ-inch)	
							ial version, to be specified	
							erial certificate:	
							without	
						E	EN10204-3.1 cast analysis + surface finish, long form	
						Y	special version, to be specified Calibration:	
							A without	
							B Work; 2-points: 0 °C, 1x variable from > 35 mm, -20 °C 150 °C	
							E ISO/IEC17025; 3-point: 0 °C; 2x variable from > 40 mm, -20 °C 150 °C	
							Y Special version to be specified	
							Version:	
ĺ							A Standard	
<u> </u>	\perp			<u> </u>			Y Special version to be specified	
							Enter desired product structure	

Easytemp® TMR35 sanitary compact thermometer

TMR35, Sanitary compact transmitters with fast true response sensor, tri-clamp and other sanitary process connections



Product Structure, compact thermometer, 4-wire Pt100, sanitary applications, TMR35

			TMR	35, c	ompa	ct the	rmoı	neter	
_	prov		· · · · ·						
A				us are		.:6:1			
Y	_				be spec	пеа			
	Y	Electrical connection: Y Special version, to be specified							
	1		g M12, IP66/67						
	1	_	<u> </u>	M12, 1P00/0/ put; Measuring range:					
		A			; 0 1	`			
		В			; 0 1				
		С	4-2	0 mA	; -50	100	°C		
		D	4-2	0 mA	; -50	150	°C		
		Е			; -50				
		F			; 0 2				
		X			, see a				
		Y			ersion,				
	-	1	Ne		IN clas	S A, 2	-WII		
			A	with	011†				
			В	35 m					
			C	50 m					
					ess C	onne	ction		
				AA				24x1.5	
				AB	For I	iquipl	nant (FTL50) weld-in adapter G¾"/D6, 316L, 3A	
				AC				FTL20) weld-in adapter, G¾"/D6, 316L, 3A	
				DB				DN25-38, 1-1½", 316L,3A, DIN32676 DN25-40	
				DL	1	-		DN40-51, 2", 316L, 3A, DIN32676 DN50	
				DP HL	1	-		. 2½", 316L, 3A 60 PN40, 316L, 3A	
				LB				DN25-32, PN40, 316L, 3A	
				LL	1		1 1	DN40-162, PN40, 316L, 3A	
				MB	1		1 1	netal G½", 316L	
				PG	DIN:	1851	DN2	5 PN40, 316L, 3A	
				PH	1			10 PN40, 316L, 3A	
				PL	1			50 PN40, 316L, 3A	
				YY				to be specified	
						30 n		th L; Diameter D:	
						50 n			
					1		,	6 mm	
					1		,	6 mm	
					1	l	,	6 mm	
					AG	200	mm;	6 mm	
					1		,	6 mm (40 300 mm)	
					1	38 n	,		
					1	83 n	,		
					BC		nm; 3		
					BX YY			o mm (301 600 mm) rsion, to be specified	
					1 1			surface roughness:	
						1		; Ra <= 0.8 μm (32 μ-inch)	
						2		μ ; Ra <= 0.4 μ m (15 μ -inch)	
						3	316	L; Ra $<=0.4 \mu m$ (15 μ -inch) electro-polished	
						9		al version, to be specified	
								erial certificate:	
								without	
							- 1	EN10204-3.1 cast analysis + surface finish, long form	
								special version, to be specified	
								Calibration: A without	
							- 1	B Work; 2-points: 0 °C, 1x variable from > 35 mm, -20 °C 150 °C	
								E ISO/IEC17025; 3-point: 0 °C; 2x variable from > 40 mm, -20 °C 150 °C	
								Y Special version to be specified	
								Version:	
								A Standard	
L		L	L	L	L		_	Y Special version to be specified	
	T							Enter desired product structure	

Transmitters: high quality, leading edge technology

TMT162

Designed to perform and built to last!

TMT162 is an advanced, extremely rugged transmitter with very high accuracy. It is convenient to install and highly reliable and safe in operation!

Salient features:

- Dual compartment housing and fully potted electronics
- Blue backlit display (optional). Large digits, visible in the dark or in direct sunlight
- Bar graph and fault condition indication for ease of reading
- Universal input for reduced inventory
- Dual sensor input capability
- 4 to 20 mA, HART, FOUNDATION Fieldbus output options
- Galvanic isolation 2 kV

Advanced features:

- SIL 2, for highest safety to your measurement point
- Sensor backup, avoids otherwise costly unplanned shutdowns
- Drift alarm, to enable a guick maintenance intervention
- Min./max. value log
- Terminal corrosion detection
- Differential temperature or averaging temperature functions for energy applications
- Multi-channel (2+4) display function with FOUNDATION Fieldbus communication option
- Optional, stainless steel housings for sanitary or explosion-proof application

Easy installation:

- Operation, visualization and maintenance with PC, e.g. using FieldcareTM software, AMS, PDM
- Full support for DTM FDT configuration
- HART® support for handhelds
- Output simulation for a quick and easy check of the loop

Approvals:

- FM and CSA (IS, NI, XP and DIP)
- ATEX (EEx ia, EEx nA, EEx d and dust-Ex)



TMT142

A field transmitter at a competitive price:

- Explosion proof and intrinsically safe approvals
- Single compartment housing



Head mounted (hockey puck) transmitters

- Fully potted electronics
- Advanced diagnostic features



DIN rail

- Universal models or economical RTD/TC
- Slim line housing option for saving space







Protection and simplicity is the prime consideration when designing field housings.









		ŀ	Head transmitter	'S	
Model	TMT180	TMT181	TMT182	TMT84	TMT85
Special features	Low cost, accurate	PC interface, universal	HART® interface, SIL2, universal	PROFIBUS®-PA, universal	FOUNDATION Fieldbus TM , universal
Measurement type	Pt 100	RTD/TC/Ω/mV	RTD/TC/Ω/mV	RTD/TC/Ω/mV	RTD/TC/Ω/mV
Design		440			
Communication	ReadWin® 2000	ReadWin® 2000	HART®	PROFIBUS®	FOUNDATION Fieldbus™
Number of inputs	1	1	1	2	2
RTD input	Pt50/100 Cu50/100	Pt50/100/500/1000, Ni100/500/1000 Cu50/100	Pt100, Pt500, Pt1000, Ni100, Ni500, Ni1000	Pt100, Pt500, Pt1000, Ni100, Ni500, Ni1000	Pt100, Pt500, Pt1000, Ni100, Ni500, Ni1000
TC input	-	B, C, D, R, S, E, J, K, L, N, T, U	B, C, D, R, S, E, J, K, L, N, T, U	B, C, D, R, S, E, J, K, L, N, T, U	B, C, D, R, S, E, J, K, L, N, T, U
Ω input	-	10 to 2000 Ω	10 to 2000 Ω	10 to 2000 Ω	10 to 2000 Ω
mV input	-	-10 to 100 mV	-10 to 75 mV	-10 to 75 mV	-20 to 100 mV
Accuracy (Pt100, -58 to +392°F/-50 to +200°C)	≤0.1 K / 0.08 % (Option)	≤0.2 K	≤0.2 K	≤0.15 K	≤0.15K
Output	4 to 20 mA 20 to 4 mA	4 to 20 mA 20 to 4 mA	4 to 20 mA 20 to 4 mA	PROFIBUS®-PA	FOUNDATION Fieldbus TM
Power supply (DC)	10 to 35 V	8 to 35 V	11.5 to 35 V	Powered by PROFIBUS®-PA	9 to 32 V
Galvanic isolation 2 kV	-	Yes	Yes	Yes	Yes
Approvals	CSA, UL		FM, CSA,	UL, ATEX	

	Rail mounted		Field transmitters		
Model	TMT121/122	RIT261	TMT162	TMT142	
Special features	PC interface/HART® interface, SIL2, universal	Field display with built-in head transmitter	Safe, illuminated display, 2 compartment housing, SIL 2, universal	Safe, illuminated display, universal	
Measurement type	RTD/TC/Ω/mV	RTD/TC/mV	RTD/TC/Ω/mV	RTD/TC/Ω/mV	
Design		84754		B	
Communication	ReadWin® 2000, HART®	ReadWin® 2000, HART®	HART®, FOUNDATION Fieldbus™	HART®	
Number of inputs	1	1	2	1	
RTD input	Pt100/500/1000 Ni100/500/1000	Pt100/500/1000 Ni100/500/1000	Pt50/100/200/500/1000 Ni100/120/500/1000 Cu10/50/100	Pt50/100/200/500/1000 Ni100/120/500/1000 Cu50/100	
TC input	B, E, J, K, N, R, S, T, C, D, L, U	B, C, D, E, J, K, L, N, R, S, T, U	B, C, D, R, S, E, J, K, L, N, T, U	B, E, J, K, N, R, S, T, C, D, L, U	
Ω input	10 to 400 Ω, 10 to 2000 Ω	10 to 400 Ω , 10 to 2000 Ω	10 to 2000 Ω	10 to 400 Ω , 10 to 2000 Ω	
mV input	-10 to 100 mV	-10 to 75 mV	-20 to 100 mV	-20 to 100 mV	
Accuracy (Pt100, -58 to +392°F/-50 to 200°C)	≤0.2 K	≤0.2 K	≤0.15 K	≤0.2 K (≤0.2 K)	
Output	4 to 20 mA 20 to 4 mA	0/4 to 20 mA 20 to 0/4 mA	4 to 20 mA 20 to 4 mA FOUNDATION® Fieldbus	4 to 20 mA 20 to 4 mA	
Power supply (DC)	12 to 35 V	12.5 to 35 V (loop powered)	11 to 40 V (8.5 V without display)	11 to 40 V (8 V without display)	
Galvanic isolation 2 kV	Yes	Yes	Yes	Yes	
Approvals	FM, CSA, UL	FM, CSA	FM, C	SA, UL	

Calibration of sensor probes

Temperature is the most frequently measured parameter in process automation. Temperature measurement technology is applied world wide in industry. In order to be able to uniformly define and check the accuracy of the measurement, it was necessary to establish worldwide calibrating standards.

Endress+Hauser fulfills these standards and calibrates industrial resistance sensors and thermocouples according to the ISO/IEC 17025, DKD- and SIT-guidelines. The high calibrating competence at Endress+Hauser becomes evident through the accredited laboratories and calibration documentation using internationally recognized calibration certificates from the European co-operation for Accreditation (EA).

Over and above this, Endress+Hauser offers further services such as Sensor-Transmitter-Matching or the calibration of complete measurement chains including loop powered displays. This makes Endress+Hauser the right partner in all aspects of thermometer calibration.

Basics

Calibrating sensor probes

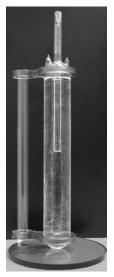
Here the phrase calibration generally means the comparison of the measurements from a test piece with the corresponding measurements from a very accurate referencing a defined and reproducible measurement procedure. The aim is to define the measurement deviations of the test piece to the so-called true value of the measurand.

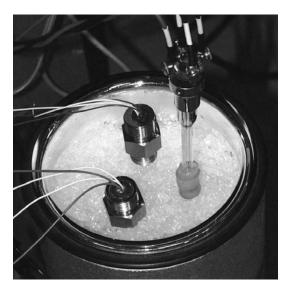
Basis for a practical temperature measurement and the traceability of thermometer calibration is the International Temperature Scale ITS-90. This defines a number of special temperatures, so-called fixed point temperatures, as well as procedures and measurement instruments with which every temperature can be interpolated between fixed points.

Fixed point calibration

Thermometers can be calibrated directly using these fixed point temperatures. Basically, these are temperature values which have certain thermodynamic equilibrium states of pure substances, such as melting/freezing or the triple point (simultaneous appearance of solid, liquid and gaseous phase of a substance). Because such fixed point calibration procedures are very long winded, they are only used when very high requirements on the uncertainty of measurement are required.

In comparison, calibration using the so-called freezing point, the solidification point of water at 0 $^{\circ}$ C, is relatively easy to do. A water ice mixture is easier to produce and has become the standard calibration procedure for industrial resistance thermometers.





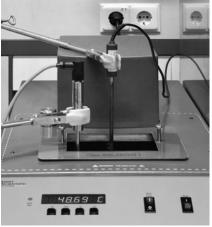
Fixed point calibration using a triple point cell and ice bath

Comparison calibration

In everyday use thermometers are more frequently calibrated applying the comparison procedure against reference or standard thermometers which were directly or indirectly calibrated to the fixed point temperature of the ITS-90 scale using further comparison thermometers. An essential prerequisite for the comparison procedure is that the thermometer to be calibrated and the comparison thermometer have exactly or as near as possible the same temperature. What has been proven and widely accepted is the use of calibration baths filled with liquids, salts or powders as measurement media. Both thermometers are dipped sufficiently deep and very close to each other into the bath. Stirrers or compressed air keep the liquid or the powder in the baths permanently in motion so that a homogeneous temperature distribution is reached within the measurement medium.

Special calibrating furnaces are particularly used for higher calibrating temperatures. These demand complex control mechanisms and contain heat pipes or solid equalizing blocks with high heat conductivity. The required zones with a largely constant and homogeneous temperature distribution for the comparison measurement can be realized in these furnaces.



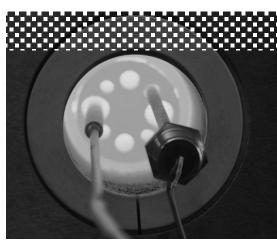








ITS-90 calibrated reference thermometer



Comparison procedure in a calibration furnace

What is calibrated?

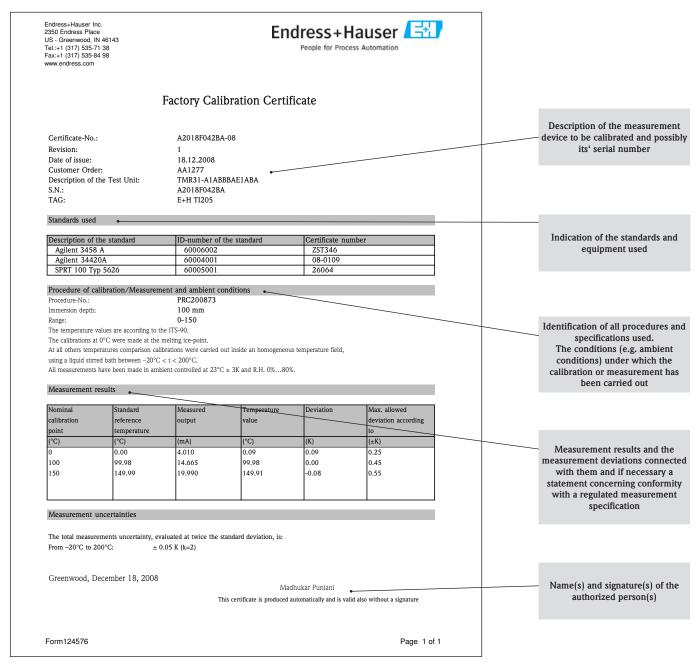
Resistance thermometers (RTD)	Measurement of the Ohmic resistance at various calibration temperatures.
Thermocouples (TC)	Measurement of the electromotive force (thermovoltage emf) at the calibration temperature related to cold junction temperature of 0 $^{\circ}$ C.
Analog transmitters with connected temperature sensor	Measurement of the analog output signal (4-20 mA current circuit) with a connected sensor element at the calibration temperature.
Digital transmitters with connected temperature sensor	Readout of the digital measured value – normally the temperature value – using standard field bus protocols (HART®, PROFIBUS®, FOUNDATION Fieldbus TM) with a connected sensor element at the calibration temperature.

Interpretation of a calibration certificate

Contents

A calibration certificate documents the measurement qualities of the test piece at the time of the calibration. It describes type, extent and result of the calibrated measurements carried out and makes statements on the traceability of the measurements to national standards and to the uncertainty of measurement.

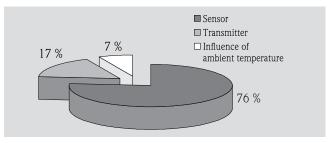
Each calibration certificate issued contains at least:



Sensor-Transmitter-Matching

Matching the transmitter to the sensor

In addition to the calibration the measurement accuracy can be optimized by using the Sensor-Transmitter-Matching possibility. To carry out such an optimization, the possible error sources must first be found. The complete uncertainty of measurement arises from the measurement error of the temperature transmitter and the sensor element. At a more exact consideration it can be seen that the largest part of the measurement inaccuracy results from the sensor, especially at high temperatures.



Composition of the complete measurement uncertainty - Analysis for a Class A Pt100 at a process temperature of 150 $^{\circ}$ C

Resistance thermometers show high linearity. Nevertheless every sensor has an individual temperature resistance characteristic. This characteristic must be described as exact as possible to achieve high precision on the transmitter measurement linearization.

This description is made, for example, for platinum resistors (Pt/RTD) by the Callendar/Van Dusen equation which can also be found in IEC 60751 standard applications:

$$R_T = R_0[1+AT+BT^2+CT^3(T-100 \text{ °C})]$$

 R_{τ} : Resistance value at a measured temperature T

R₀: Resistance value at 0 °C

A, B: Sensor specific constants

C: Sensor specific constants at T < 0 °C (for T \geq 0 °C, C = 0)

Temperature [°C]

Individual temperature resistance curve

----- Temperature resistance curve according to IEC 60751

Measured deviation

220

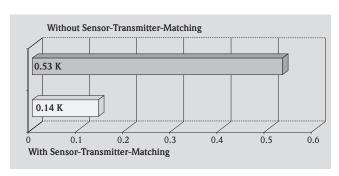
200

If, instead of the normalized standard coefficients from the IEC 60751, the sensor specific constants from the thermometer calibration are programmed into the transmitter this will then calculate the specific temperature resistance characteristic for the connected sensor.

This results in a significant accuracy improvement.

Applying Sensor-Transmitter-Matching

- High accuracy over a large measurement range.
- Economic alternative to paired sensors, especially at temperatures over 100 °C.
- In addition to platinum sensors (Pt), this can also be used for copper- (Cu) and nickel sensors (Ni).

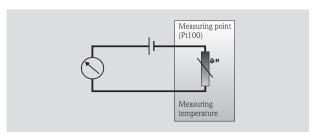


Uncertainty of measurement of the total measurement point in Kelvin for a class A Pt100 at a temperature of 150 $^{\circ}\text{C}$

Basic principles of temperature measurement

Temperature is the most frequently measured parameter in the process industry. In electrical contact sensors, two measurement principles have asserted themselves as a standard:

RTD - Resistance sensors

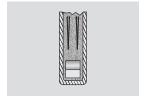


In RTD resistance sensors the electrical resistance changes with a change in temperature. They are suitable for the measurement of temperatures between –200 $^{\circ}\text{C}$ and approx. 800 $^{\circ}\text{C}$ and stand out due to high measurement accuracy and long-term stability.

The resistance sensor element most frequently used is a Pt100 which has a nominal value of 100 Ω at 0 °C. Pt100 sensors are manufactured in different formats:

- Wire wound ceramic sensors: A spiral of platinum wire is wound and embedded in ceramic powder within a capillary and is fed to the outside by platinum wires.
- Thin film sensors: A platinum layer is vaporized on a ceramic plate (sputtered). A glass layer is melted on in order to protect the connection wires and the platinum layer.

As a standard, Endress+Hauser RTD resistance sensors fulfill the IEC 60751 accuracy class F 0.15.

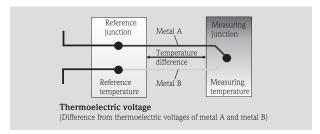


RTD TF-sensor, 4-wire with MgO insulation

Features of a quality sensing probe:

- Made from Magnesium oxide powder crushed to form a very tight packing.
- High voltage insulation tested as per standards.
- High purity metals or sensor chip and good quality end termination.
- Properly welded and end capped to avoid rupture due to vibration.
- Open end sealed and potted against moisture ingress.
- Calibrated and tested to standards.

TC - Thermocouples



A thermocouple is a component made of two different metals connected with each other at one end. An electrical potential (thermoelectric force) is caused due to the Seebeck effect at the open end if the connection and the free ends are exposed to different temperatures. With the help of the so-called thermocouple reference tables (see IEC 584), the temperature at the connection (measuring junction) can be concluded.

Thermocouples are suitable for temperature measurement in the range of 0 $^{\circ}$ C to +1800 $^{\circ}$ C. They stand out due to fast response time and high vibration resistance.



TC sensor, grounded and ungrounded, with MgO insulation

Good measurement practice

How to design a sensor assembly for an application

The important information you need is:

In a pipe

- Line size
- Process connection
- Pipe standoff
- Design pressure and temperature
- Flow rates
- Medium
- Area classification
- Preferred signal output
- Preferred accuracy
- Any other legal requirement

In a vessel or reactor

- Maximum insertion possible/required
- Sensor placement
- Number of measurements single or multipoint
- Process connection
- Design pressure and temperature
- Medium
- Preferred accuracy
- Area classification
- Preferred signal output
- Any other legal requirement

Selecting an Endress+Hauser sensor assembly replacement for an existing instrument, see flow charts.

Best installation practices

In an oven, the aim of the application or design engineer should be to install a thermocouple in a furnace, such that the sensing tip is always in equilibrium with the temperature of the zone of interest and, therefore, accurate measurements are made. Ideally, there should be no flow of heat from inside the zone of interest to outside or ambient. However, this cannot be achieved in real world conditions as most probes are made of metallic sheaths and or metals

Conductance errors

Temperature gradients cause conduction and thus induce errors in temperature measurement. This is a simple physics phenomenon– heat flows from a hotter body/area to a colder one. Since the temperature sensor is installed through the insulation, it automatically creates a conductive path along which heat flows from the inside of the hotter zone to the exterior, thus creating an error.

Other sources of gradients can be bad placement of heaters, causing uneven heating – and uneven distribution of product being treated.

A good sensing instrument

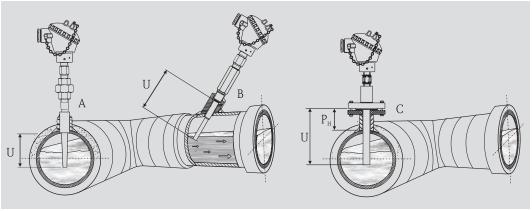
is classified by the following characteristics:

- High accuracy
- Long term stability
- Reproducibility
- Adequate response time
- Easy to maintain
- Reliable signal
- Noise immunity
- Must not disturb the temperature to be measured

To ensure all this we suggest:

- \blacksquare Have at least 20 times the O.D of the sensor as an isothermal area. So for $\frac{1}{4}$ " diameter use at least 5"
- Class 1 accuracy for TC, Class A for RTD
- Test the finished probe for insulation at high potential
- Use best quality MgO materials and stable sensor like RTD platinum 100 Ohm (Pt100) and Type N thermocouples
- Use transmitters wherever possible ensure proper ambient through remote mounting in very hot applications
- Use lowest possible O.D. for speed of response and low conduction interference

Follow the installation examples in pipes for best results



Examples for pipe installation - In pipes with a small cross section the sensor tip should reach or extend slightly past the center line of the pipe (=U).

Α Socket weld installation

В Threaded, tilted installation

C Flange installation

 \mathbf{P}_{H} Pipe stand off

Immersion depth

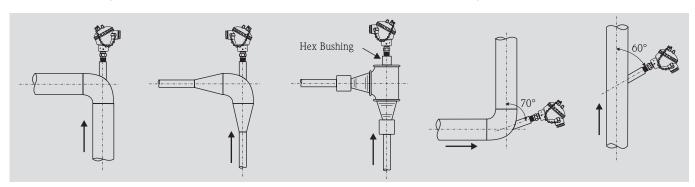
The thermowell immersion depth (U) should be sufficient to eliminate conduction error. A general rule is to use an insertion length equaling a minimum of 10 times the diameter of the protection tube or well. Another rule of thumb is to have the sensitive portion of the sensor immersed to a depth of a minimum of 3" (75 mm) plus the length of the sensitive portion.

In the case of expansion bulbs, the immersion depth may be specified by the supplier or can be indicated on a calibration report, if furnished.

NOTE:

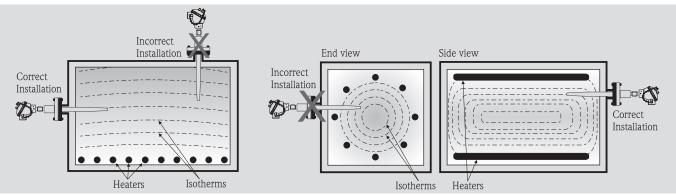
Calculate and factor in the pipe stand-off for computing the best fit U length.

For pipe installations, such as steam or hot water lines, insertion in an elbow on the axis of the pipe can permit an appropriate immersion depth should the diameter of the pipe be inadequate, see figure below.



Alternate ways of installing thermowells in pipes that are 3" (75 mm) or smaller in diameter (source Bela G Liptak - Handbook of instrumentation)

Examples of installations in furnaces



Furnace with bottom heaters

Furnace with heaters on all sides

Alabama

TriNova, Inc. 251-378-7837

TriNova, Inc. 205-426-0494

Artic Controls, Inc. Anchorage, AK 907-277-7555

Industrial Automation Services Chandler, AZ 480-413-0899

TriNova, Inc.

Mohile AI 251-378-7837

M & D Controls 918-664-7511

Endress+Hauser Houston, TX 713-300-6200

California

IPT Group San Francisco, CA 415-824-3679

Process Instruments & Controls, LLC Bakersfield, CA 661-617-6000

ProFlow Dynamics 951-279-5500

Endress+Hauser Brea, CA 714-524-8391

FOR MUNICIPAL INDIISTRY MRC Technologies Newbury Park, CA 805-498-3811

Beabout Company Littleton, CO 303-795-1000

Kentrol/SEVCO

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Philip R. Walker & Associates Cockeysville, MD 410-666-2142

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AMJ Equipment Corp. 863-682-4500

TriNova, Inc. Mobile, ÁL 251-378-7837

AMJ Equipment Corp. Savannah, GA 912-898-0388

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Endress+Hauser, Inc. 2350 Endress Place Greenwood, IN 46143 Tel: 317-535-7138 Sales: 888-ENDRESS

Fax: 317-535-8498 inquiry@us.endress.com www.us.endress.com

Service: 800-642-8737

Endress+Hauser Canada 1075 Sutton Drive Burlington, ON L7L 5Z8 Tel: 905-681-9292 800-668-3199 Fax: 905-681-9444 info@ca.endress.com www.ca.endress.com

Canada

Endress+Hauser México S.A. de C.V. Fernando Montes de Oca 21 Edificio A Piso 3 Frace Industrial San Nicolás 54030 Tlalnepantla de Baz Estado de México México Tel: +52 55 5321 2080 Fax: +52 55 5321 2099

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