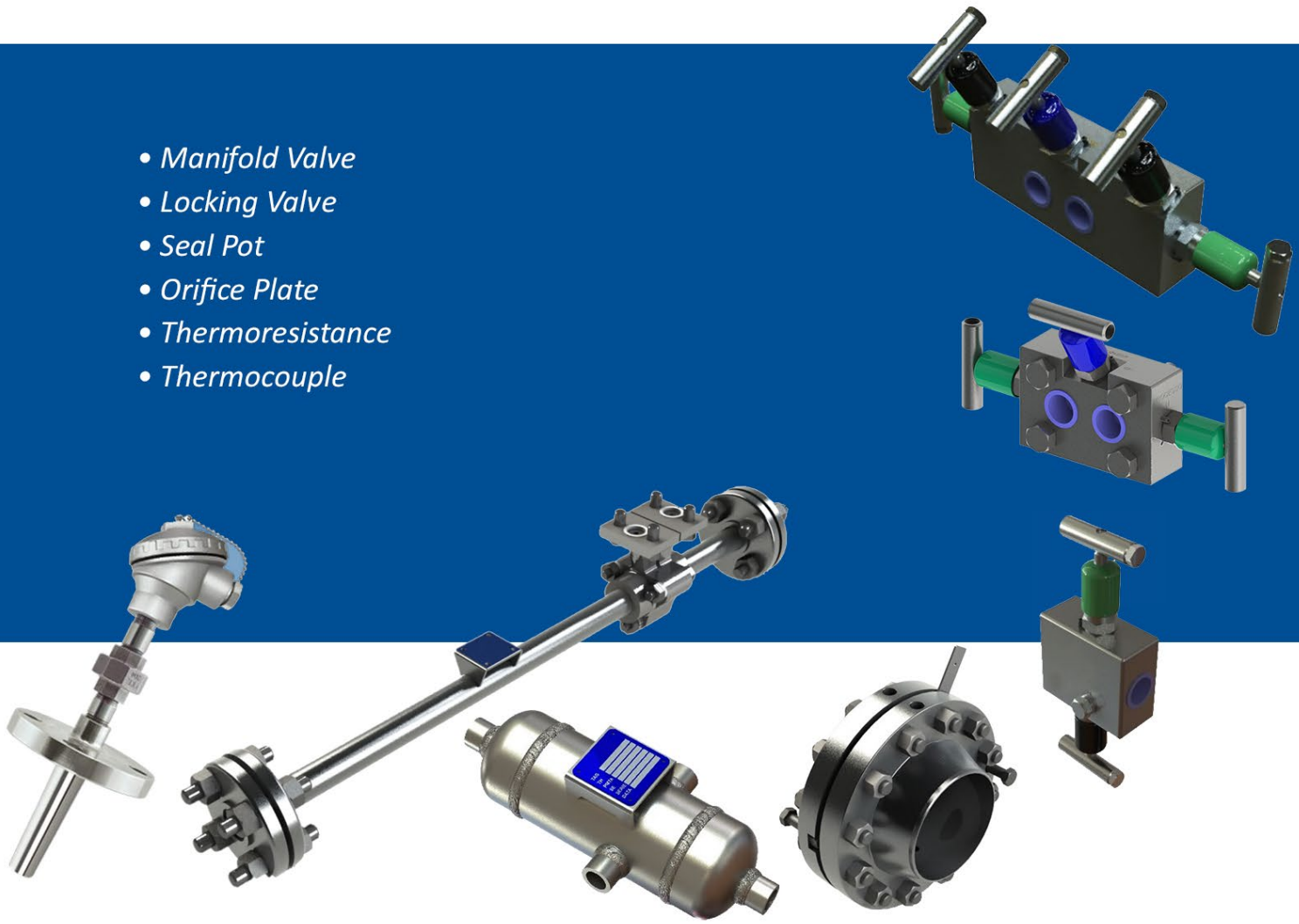
Auxiliary Equipment

- *Manifold Valve*
- *Locking Valve*
- *Seal Pot*
- *Orifice Plate*
- *Thermoresistance*
- *Thermocouple*



Flow and Temperature

Auxiliary Equipment

Auxiliary equipment is equipment to complement and aid in the measurement of flow and temperature in conjunction with the transmitters of the Smar product line. They are equipment certified and approved by Smar quality department and follow standards for use in industrial processes.

smar
Technology Company

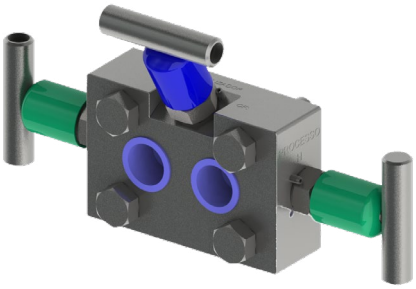
BLOCKING AND MANIFOLD VALVES

Smar's line valves are composed of Block Valves, 2, 3 and 5 way Manifold Valves. Made of stainless steel and other materials on request. Its design presents the concept of needle valves for high pressure with a non-rotating plug, providing great watertightness to the process. With this obturator there is no friction with the valve block, which frees the contact region between them from roughness. This eliminates the leakage typically found in valves with a rotary plug.

The product can be vacuum applied, special cleaning for use with **oxygen**** and conforms to **NACE MR-0175**** for use with **H2S.**

Types offered by default is type "**Y**", but can be type "**H**" or type "**T**" upon request.

- **Type Y:** general use in all processes depending on the project developed.
- **Type H:** due to their connection characteristic and independent fixing on both sides (flange x flange), they are widely used in conjunction with an integral hole.
- **Type T:** little used in processes and generally replaced by the type “Y” flange x thread.



Type Y *

Type H *

Type T *

* Illustrative images
** On request

TABLE OF MANIFOLD VALVE TYPES AND APPLICATIONS IN SMAR TRANSMITTERS

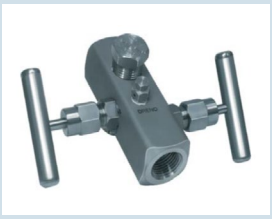
MANIFOLD

VM2L - Connection to the instrument - Male Thread

LD290 Series LD400G

Gauge standard for transmitter with female connection

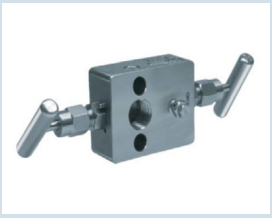
VM2L - Connection to the instrument - Female Thread



LD290 Series LD400G

Gauge standard for transmitter with male connection

VM2L - Connection to the instrument - Threaded Flange / Flange Flange



LD300M/A Series LD400M/A Series

Always Manifold with 1/2" NPT Flange and 1/4" NPT Transmitter

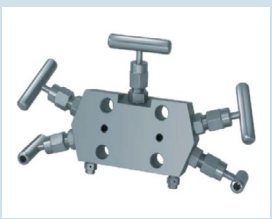
VM3L - Threaded Flange / Flange Flange

LD300D/H Series LD400D/H Series

Wheelbases	
Range 1,2 and 3	54mm
Range 4	56mm
Range 5 and 6	58mm

Always Manifold with 1/2" NPT Flange and 1/4" NPT Transmitter

VM5L - Threaded Flange / Flange Flange



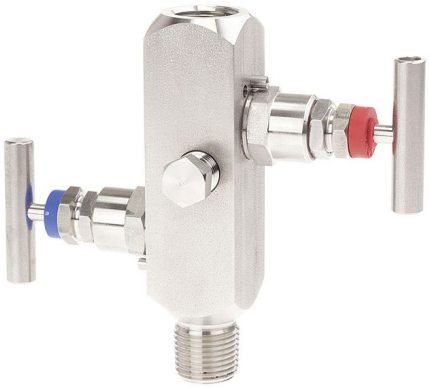
LD300D/H Series LD400D/H Series

Wheelbases	
Range 1,2 and 3	54mm
Range 4	56mm
Range 5 and 6	58mm

Always Manifold with 1/2" NPT Flange and 1/4" NPT Transmitter

* Illustrative images

2 WAYS MANIFOLD VALVE



2 ways Manifold*
Female Thread X Male Thread Connection

2 ways Manifold*
Female Thread X Female Thread Connection

2 ways Manifold*
Flange X Thread Connection

* Illustrative images

ORDER CODE

CODE	DESCRIPTION
VM2L	2 WAYS MANIFOLD VALVE

MATERIAL

COD.	
C	PLATED CARBON STEEL
D	SUPER DUPLEX
H	HASTELLOY C276
I	INCONEL 825
M	MONEL 400
N	SS904L
S	316 SST BODY AND 304 SST FOR BOLTS
T	FORGED STAINLESS STEEL A182 F316
U	INCONEL 625

INSTRUMENT CONNECTION/PROCESS CONNECTION

COD.	
0	1/2" NPT (FEMALE) / 1/2" NPT (FEMALE)
1	1/2" BSP (FEMALE) / 1/2" BSP (FEMALE)
2	1/2" NPT (MALE) / 1/2" NPT (FEMALE)
3	1/2" BSP (MALE) / 1/2" BSP (FEMALE)
4	FLANGE / 1/2" NPT (FEMALE)
5	FLANGE / 1/2" BSP (FEMALE)
6	1/2" NPT (FEMALE) / 1/4" NPT (FEMALE)
7	1/2" NPT (FEMEA) / 1/2" NPT (MALE)
8	1/2" NPT (MALE) / 1/2" NPT (MALE)

PACKING MATERIAL (GASKET)

COD.	
G	GRAFOIL
T	TEFLON - PTFE (-50ºC A +200ºC)

PRESSURE RATING

COD.	
S	6000 PSI (414 BAR)
T	8000 PSI (552 BAR)
U	10000 PSI (690 BAR)

DRAIN TYPE

COD.	
DS	DRAIN/VENT VALVE (1/4" NPT)

CLEANING FOR OXYGEN USE

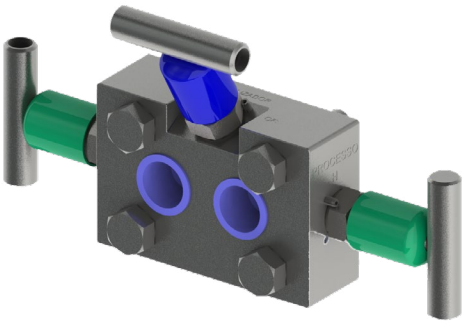
COD.	
C0	WITHOUT CLEANING FOR OXYGEN USE
C1	WITH OXYGEN CLEANING

NACE STANDARDIZATION

COD.	
N0	WITHOUT NACE STANDADIZATION
NA	WET AND NON-WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175
NB	WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175

VM2L - S / 7 / T / S / DS / C0 / N0 ← TYPICAL MODEL

5 WAYS AND 3 WAYS MANIFOLD VALVE



3 ways manifold*

5 ways manifold*

* Illustrative images

ORDER CODE

CODE	DESCRIPTION
VM3L VM5L	3 WAYS MANIFOLD VALVE 5 WAYS MANIFOLD VALVE

COD.	MATERIAL	COD.	MATERIAL
C	PLATED CARBON STEEL	N	SS904L
D	SUPER DUPLEX	S	316 SST BODY AND 304 SST FOR BOLTS
H	HASTELLOY C276	T	FORGED STAINLESS STEEL A182 F316
I	INCONEL 825	U	INCONEL 625
M	MONEL 400		

COD.	INSTRUMENT CONNECTION/PROCESS CONNECTION
0	0 FLANGE / 1/2" NPT (FEMALE)
1	1 FLANGE / 1/2" BSP (FEMALE)
2	2 FLANGE / FLANGE

COD.	PACKING MATERIAL (GASKET)
G	GRAFOIL
T	TEFLON - PTFE (-50ºC A +200ºC)

COD.	PRESSURE RATING
S	6000 PSI (414 BAR)
T	8000 PSI (552 BAR)
U	10000 PSI (690 BAR)

COD.	DISTÂNCIA ENTRE CENTROS
0	54 MM
4	56 MM
5	58.3 MM

COD.	DRAIN TYPE
DS	DRAIN/VENT VALVE (1/4" NPT)

COD.	CLEANING FOR OXYGEN USE
C0	WITHOUT CLEANING FOR OXYGEN USE
C1	WITH OXYGEN CLEANING

COD.	NACE STANDARDIZATION
N0	WITHOUT NACE STANDADIZATION
NA	WET AND NON-WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175
NB	WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175

COD.	TIPO
S0	STANDARD TYPE Y
S1	SPECIAL - TYPE H
S2	SPECIAL - TYPE T

VM3L - S / 0 / T / S / 0 / DS / C0 / N0 / S0 ← TYPICAL MODEL

NEEDLE LOCKING VALVE

* Illustrative images

ORDER CODE

CODE	DESCRIPTION
VBL	NEEDLE LOCKING VALVE

COD. MATERIAL

C	PLATED CARBON STEEL	M	MONEL 400
D	SUPER DUPLEX	S	316 SST BODY AND 304 SST FOR BOLTS
H	HASTELLOY C276		

COD. INSTRUMENT CONNECTION/PROCESS CONNECTION

0	1/2" NPT (FEMALE) / 1/2" NPT (FEMALE)	4	FLANGE / 1/2" NPT (FEMALE)
1	1/2" BSP (FEMALE) / 1/2" BSP (FEMALE)	5	FLANGE / 1/2" BSP (FEMALE)
2	1/2" NPT (MALE) / 1/2" NPT (FEMALE)	6	1/2" NPT (FEMALE) / 1/2" NPT (MALE)
3	1/2" BSP (MALE) / 1/2" BSP (FEMALE)		

COD. PACKING MATERIAL (GASKET)

T	TEFLON - PTFE (-50ºC A +200ºC)

COD. PRESSURE RATING

S	6000 PSI (414 BAR)

COD. DRAIN TYPE

DS	DRAIN/VENT VALVE (1/4" NPT)

COD. CLEANING FOR OXYGEN USE

C0	WITHOUT CLEANING FOR OXYGEN USE
C1	WITH OXYGEN CLEANING

COD. NORMALIZAÇÃO NACE

N0	WITHOUT NACE STANDADIZATION
NA	WET AND NON-WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175
NB	WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175

VBL - S 0 T S DS C0 N0 ← TYPICAL MODEL

2 WAY LOCKING VALVE

* Illustrative images

ORDER CODE

CODE	DESCRIPTION
VBM2	2 WAY LOCKING VALVE

COD.	MATERIAL
S	AÇO INOX 316

COD.	INSTRUMENT CONNECTION/PROCESS CONNECTION
6	1/2" NPT (FEMALE) / 1/2" NPT (MALE)

COD.	PACKING MATERIAL (GASKET)
T	TEFLON - PTFE (-50ºC A +200ºC)

COD.	PRESSURE RATING
S	6000 PSI (414 BAR)

COD.	DRAIN TYPE
DS	DRAIN/VENT VALVE (1/4" NPT)

COD.	CLEANING FOR OXYGEN USE
C0	WITHOUT CLEANING FOR OXYGEN USE
C1	WITH OXYGEN CLEANING

COD.	NORMALIZAÇÃO NACE
N0	WITHOUT NACE STANDADIZATION
NA	WET AND NON-WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175
NB	WET PARTS IN COMPLIANCE W/ STANDARD NACE MR-0175

VBM2 - S 6 T S DS C0 N0 ← TYPICAL MODEL

SEAL POT / CONDENSATE POT

* Illustrative images

ORDER CODE

CODE	DESCRIPTION
PSEL	SEAL POT / CONDENSATE POT

COD.	MATERIAL
1	ASTM A 106 GR B
2	ASTM A 240-304 (AISI - 304)
3	ALLOY P11 STEEL
4	ALLOY P22 STEEL
Z	OTHERS - SPECIFY (CONSULT)

COD.	OPERATION LIMIT
1	1500 PSI 350C
2	2000 PSI 350C
3	3000 PSI 350C
4	1000 PSI 350C
Z	OTHERS - SPECIFY (CONSULT)

COD.	POSITION AND TAP TYPE
1	4 RADIAL NOZZLE 90 FEMALE THREAD 1/2 NPT 2 LID
2	2 RADIAL NOZZLE 90 AND 2 CAP FEM TH 1/2 NPT 2 LID
3	2 RADIAL NOZZLE 180 AND 2 CAP FEM TH 1/2 NPT 2 LID
4	4 RADIAL NOZZLE 90 AND 1 CAP FEM TH 1/2 NPT 3 LID
5	2 RADIAL NOZZLE 90 AND 1 CAP FEM TH 1/2 NPT 1 LID
6	2 RADIAL NOZZLE 180 AND 1 CAP FEM TH 1/2 NPT 1 LID
7	2 RADIAL NOZZLE 180 FIT FOR IT WELDS TUBE DN 1/2
8	2 RADIAL NOZZLE 180 FIT FOR IT WELDS TUBE DN 1/2
9	1 RADIAL NOZZLE 1 CAP FIT FOR IT WELDS TUBE DN 1/2
Z	OTHERS - SPECIFY (CONSULT)

PSEL - 1 2 3 ← TYPICAL MODEL

EQUIPMENT FOR FLOW

ORIFICE PLATE

Due to its simplicity in installation, low manufacturing cost and high durability, the Orifice Plate is more favorable than other types of flow meters.

For each industrial process situation, we has the solutions in flow measurement through Orifice Plates with the types: Concentric, Eccentric, Segmental, Quadrant Edge, Conical Entrance.

Atende às normas ISO 5167 and AGA-3 Standards.

Materials: 304/316 Stainless Steel, Duplex, Super Duplex, Hastelloy, Monel. Others on request.

Orifice Palte*

* Illustrative images

ORIFICE FLANGE ASSEMBLY

It is used to measure the flow of liquids or gases through the plate orifice.

It consists of an Orifice Plate with union flange. It incorporates the 1/2" NPT or SW pressure taps into the flanges, as requested by the customer.

This flow meter can be applied to a wide variety of measurements, involving most gases and liquids, including fluids with solids in suspension, as well as viscous fluids over a wide range of temperature and pressure.

According to ISO 5167 and AGA-3 Standards.

Materials: Carbon Steel, 304/316 Stainless Steel, Duplex, Super Duplex. Others on request.

Flanges Set and Mounting Kit*

* Illustrative images

Auxiliary Equipment

ORDER CODE

CODE	DESCRIPTION
OPF	HOLE PLATE, PAIR OF FLANGES AND MOUNTING KIT

COD. PIPE DIAMETER

2	2"	6	6"	A	10"	E	18"
3	3"	7	1 1/2"	B	12"	F	20"
4	4"	8	8"	C	14"	H	24"
5	5"	9	2 1/2"	D	16"	Z	SPECIAL - SEE NOTES

COD. PIPE SCHEDULE

1	SCH 40	4	DIN 2440	7	SCH 20S
2	SCH 80	5	SCH 5S	8	SCH 40S
3	SCH 120	6	SCH 10S	Z	SPECIAL - SEE NOTES

COD. PRESSURE RATING

1	150 #	5	1500 #
2	300 #	6	2500 #
3	600 #	Z	SPECIAL - SEE NOTES
4	900 #		

COD. TAPS TYPE

1	FLANGES TAPS	4	CORNER TAPS
2	RADIUS TAPS A D AND 1/2	5	PIPE TAPS 2.5D AND 8D
3	VENA CONTRACTA TAPS	Z	SPECIAL - SEE NOTES

COD. ORIFICE PLATE (MATERIAL)

H	HASTELLOY C276	T	TEFLON
I	STAINLESS STEEL 316	Z	SPECIAL - SEE NOTES
L	STAINLESS STEEL 316L		

COD. ORIFICE PLATE (THICKNESS)

3	1/8" (OR 3 MM) - UP TO 6"	R	ACCORDING TO QUADRANT EDGE RADIUS
6	1/4" (OR 6 MM) - 8" OR HIGHER	Z	SPECIAL - SEE NOTES

COD. ORIFICE PLATE (TYPE)

C	CONCENTRIC MSS-SP6	S	SEGMENTAL BORE
E	ECCENTRIC	Z	SPECIAL - SEE NOTES

COD. ORIFICE PLATE (ORIFICE TYPE)

B	QUADRANT EDGE	V	SQUARE EDGE
C	CONIC	Z	SPECIAL - SEE NOTES

COD. ORIFICE PLATE (DRAIN/VENT)

1	NOT APPLICABLE	R	VENT
D	DRAIN TYPE	Z	SPECIAL - SEE NOTES

COD. PAIR OF FLANGES (TYPE)

F	MOUNTING BLOCK (FLOWMETER)
P	WELDING NECK - ANSI B16.36 - TAPS 1/2 NPT
Q	WELDING NECK - ANSI B16.36 - TAPS 3/4 NPT
S	SLIP-ON - ANSI B16.5 - WITHOUT TAPS
Z	SPECIAL - SEE NOTES

COD. PAIR OF FLANGES (MATERIAL)

4	304 STAINLESS STEEL	J	316 STAINLESS STEEL
C	ASTM-A-105 CARBON STEEL	P	PVC
I	316L STAINLESS STEEL	Z	SPECIAL - SEE NOTES

COD. PAIR OF FLANGES (FACE)

0	PAIR OF FLANGES NOT INCLUDED
2	RF - RAISED FACE (ANSI, DIN, JIS)
3	RTJ - RING TYPE JOINT (ANSI B16.20)
Z	SPECIAL - SEE NOTES

COD. PAIR OF FLANGES (GROOVE)

0	PAIR OF FLANGES NOT INCLUDED	E	MSS-SP6 - SPIRAL
1	NOT APPLICABLE	Z	SPECIAL - SEE NOTES
C	CONCENTRIC MSS-SP6		

COD. MOUNTING KIT (PRISONERS AND NUTS MATERIAL)

0	MOUTING KIT NOT INCLUDED
4	304 STAINLESS STEEL-ASTM 193 B8/ASTM 194 GR B8
6	STELL ASTM A193 B7/ASTM A194 2H
I	316 SST ASTM 193 B8M/ASTM 194 GR B8M
Z	SPECIAL - SEE NOTES

COD. MOUNTING KIT (GASKET MATERIAL)

0	MOUTING KIT NOT INCLUDED
C	COPPER RING
G	GRAFOIL
I	316 STAINLESS RING
L	OILIT
P	GRAPHITED CARDBOARD (HYDRAULIC)
T	TEFLON
Z	SPECIAL - SEE NOTES

COD. CLEANING FOR OXYGEN USE

C0	WITHOUT CLEANING FOR OXYGEN USE
C1	WITH OXYGEN CLEANING

OPF	-	2	1	1	1	I	3	C	V	1	P	C	2	C	6	P	C0

TYPICAL MODEL

INTEGRAL ORIFICE

The Integral Orifice is a flow meter for pipes with diameters below 2", and can be set directly with a secondary element (transmitter).
It is generally used for flow measurement of clean fluids (liquid, gas) in laboratories and industrial pilot plants.
According to ASME MFC 14M Standard.
Materials: Carbon Steel, 304/316 Stainless Steel, Duplex, Super Duplex. Others on request.

ORDER CODE

CODE	DESCRIPTION
OIT	INTEGRAL ORIFICE

COD. PIPE DIAMETER

1	1 1/2"	3	3 1 1/2"
2	2 1"	Z	Z SPECIAL - SEE NOTES

COD. PIPE SCHEDULE

1	SCH 40	4	DIN 2440	7	SCH 20S
2	SCH 80	5	SCH 5S	8	SCH 40S
3	SCH 120	6	SCH 10S	Z	SPECIAL - SEE NOTES

COD. BODY - PROCESS CONNECTION

B	BSP THREAD	T	SUPLIED WITH STRAIGHT PIPE
N	NPT THREAD	Z	SPECIAL - SEE NOTES
S	SOCKET WELD (SW)		

COD. BODY - TRANSMITTER CONNECTION

1	INTEGRAL MOUNTING (DIST. BETWEEN CENTERS 54 MM)
2	REMOTE MOUTING (1/4 NPT THREAD FOR IMPULSE TUBING)
Z	SPECIAL - SEE NOTES

COD. BODY - MATERIAL

H	HASTELLOY C276
I	STAINLESS STEEL 316
Z	SPECIAL - SEE NOTES

COD. BODY - ORIFICE TYPE

I	IN LINE
T	TAYLOR (DEFAULT)
Z	SPECIAL - SEE NOTES

COD. PLATE - MATERIAL

H	HASTELLOY
I	C276
Z	316 SST

COD. STRAIGHT PIPE - MATERIAL

0	STRAIGHT PIPE NOT INCLUDED	H	HASTELLOY C276
4	304 STAINLESS STEEL	I	316 SST
6	ASTM-A-106 CARBON STEEL	Z	SPECIAL - SEE NOTES
C	ASTM-A-105 CARBON STEEL		

COD. STRAIGHT PIPE-ENDS (DIAM./SCHEDULE ACCORDING PIPE)

0	STRAIGHT PIPE NOT INCLUDED	N	NPT THREAD
1	RF FLANGE (ANSI, DIN, JIS)	S	SOCKET WELD (SW)
2	RTJ FLANGE (ANSI B16.20)	Z	SPECIAL - SEE NOTES
B	BSP THREAD		

COD. STRAIGHT PIPE - PRESSURE RATING

0	STRAIGHT PIPE NOT INCLUDED
1	150 #
2	300 #
3	600 #
N	STRETCH PIPE AND PRESSURE CLASS NOT APPLICABLE
Z	ESPECIAL - VER NOTAS

COD. STRAIGHT PIPE - LENGTH

0	STRAIGHT PIPE NOT INCLUDED	3	36D UPSTREAM / 8D DOWNSTREAM
1	16D UPSTREAM / 8D DOWNSTREAM	Z	SPECIAL - SEE NOTES
2	24D UPSTREAM / 8D DOWNSTREAM		

COD. MOUNTING KIT

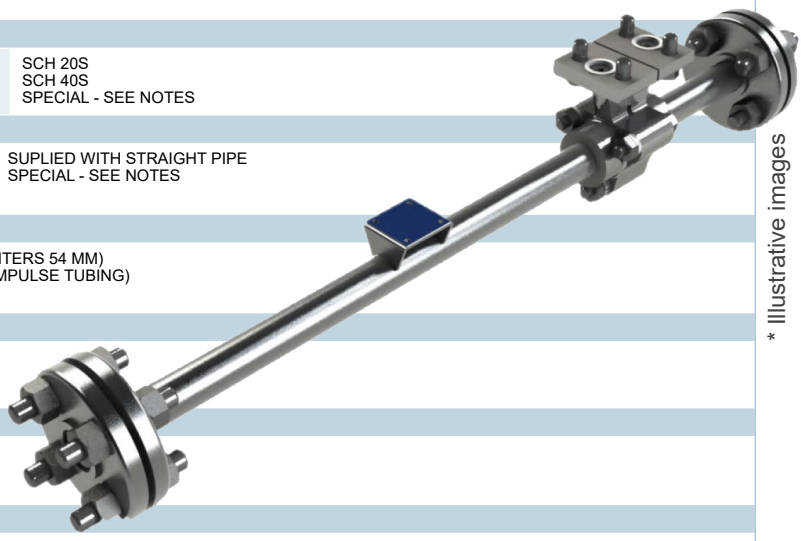
0	MOUTING KIT NOT INCLUDED
1	BOLTS/O-RINGS FOR TRM INST. (INTEGRAL MOUNTING)
2	FLANGE BOLTS/GASKETS FOR ENDS (REMOTE MOUNTING)
3	BOLTS,O-RINGS,GASKETS FOR TRM AND ENDS (COMPLETE KIT)
Z	SPECIAL - SEE NOTES

COD. CLEANING FOR OXYGEN USE

C0	WITHOUT CLEANING FOR OXYGEN USE
C1	WITH OXYGEN CLEANING

OPF	-	1	1	T	1	I	T	4	I	1	1	1	1	C0

TYPICAL MODEL



* Illustrative images

TEMPERATURE ELEMENTS

THERMORESISTANCE

The principle of temperature measurement using resistance thermometers is based on the variation of the electrical resistance value of a metallic conductor as a function of temperature. In an approximate way, but not so far from the real.

THERMOCOUPLE

When a metallic conductor is subjected to a temperature difference between its ends, an electromotive force (e.m.f.) arises, whose value does not usually exceed the order of magnitude of millivolts, as a result of the redistribution of electrons in the conductor, when they are subjected to a temperature gradient.

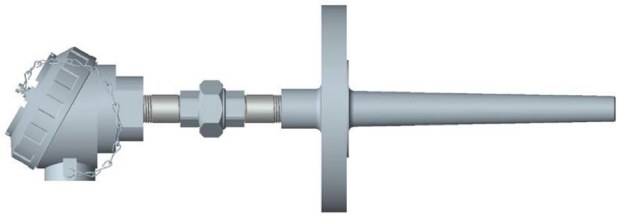
The value of the e.m.f. depends on the nature of the material and the temperature gradient between its ends. In the case of a homogeneous material the value of the e.m.f. It does not depend on the temperature distribution along the conductor, but, as mentioned before, on the temperature difference between its ends.

The phenomenon described above is basic to the understanding of thermoelectricity and its application in temperature measurement.

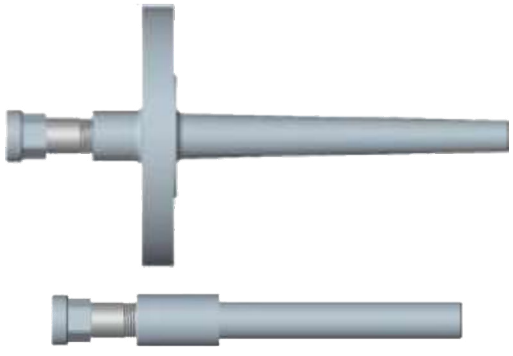
DRAWINGS OF TEMPERATURE ELEMENTS

Thermoelement without well*

Thermoelement with well*



Flanged thermoelement with well*

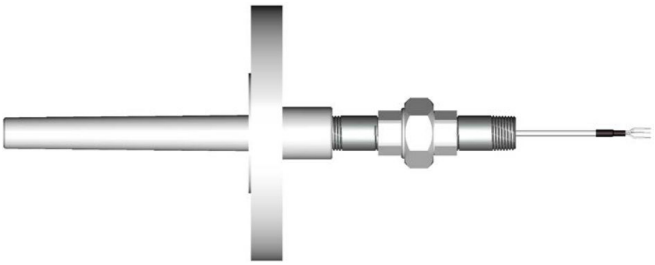


Flanged well and threaded well*

* Illustrative images

THERMOELEMENT WITH CABLE FOR DIRECT CONNECTION TO THE TRANSMITTER

Threaded thermoelement without well*



Flanged Thermoelement*

* Illustrative images

SENSORS TABLE

THERMOELEMENT		2, 3 or 4 wires				DIFFERENTIAL			
SENSOR	TYPE	RANGE °C	RANGE °F	MINIMUM SPAN °C	°C DIGITAL ACCURACY*	RANGE °C	RANGE °F	MINIMUM SPAN °C	°C DIGITAL ACCURACY*
RTD	Cu 10 GE	-20 to 250	-4 a 482	50	± 1.0	-270 to 270	-486 to 486	50	± 2.0
	Ni120 Edison Curve #7	-50 a 270	-58 a 518	5	± 0.1	-320 a 320	-576 a 576	5	± 0.5
	Pt50 IEC	-200 to 850	-328 to 1562	10	± 0.25	-1050 to 1050	-1890 to 1890	10	± 1.0
	Pt100 IEC	-200 to 850	-328 to 1562	10	± 0.2	-1050 to 1050	-1890 to 1890	10	± 1.0
	Pt500 IEC	-200 to 450	-328 to 842	10	± 0.2	NA	NA	NA	NA
	Pt1000 IEC	-200 to 300	-328 to 572	10	± 0.2	NA	NA	NA	NA
	Pt50 JIS	-200 to 600	-328 to 1112	10	± 0.25	-800 to 800	-1440 to 1440	10	± 1.0
	Pt100 JIS	-200 to 600	-328 to 1112	10	± 0.25	-800 to 800	-1440 to 1440	10	± 1.5
	Pt100 MILT	-40 a 540	-40 a 1000	10	± 0,2	-580 a 580	-1040 a 1040	10	± 1,0
	Ni120 MILT	-40 a 205	-40 a 400	5	± 0,13	-245 a 245	-440 a 440	5	± 0,5
	Pt100 IEC	-200 a 850	-328 a 1562	10	± 0,2	-1050 a 1050	-1890 a 1890	10	± 1,0
	Pt100 GOST	-200 a 850	-328 a 1562	10	± 0,2	-1050 a 1050	-1890 a 1890	10	± 1,0
	Pt50 GOST	-200 a 850	-328 a 1562	10	± 0,2	-1050 a 1050	-1890 a 1890	10	± 1,0
	Cu100 GOST	-50 a 200	-58 a 392	10	± 0,15	-350 a 350	-450 a 450	10	± 1,0
	Cu50 GOST	-50 a 200	-58 a 392	10	± 0,15	-350 a 350	-450 a 450	10	± 1,0
THERMO-COUPLE	B NBS	100 to 1800	212 to 3272	50	± 0.5**	-1700 to 1700	-3060 to 3060	60	± 1.0**
	E NBS	-100 to 1000	-148 to 1832	20	± 0.2	-1100 to 1100	-1980 to 1980	20	± 1.0
	J NBS	-150 to 750	-238 to 1382	30	± 0.3	-900 to 900	-1620 to 1620	30	± 0.6
	K NBS	-200 to 1350	-328 to 2462	60	± 0.6	-1550 to 1550	-2790 to 2790	60	± 1.2
	N NBS	-100 to 1300	-148 to 2372	50	± 0.5	-1400 to 1400	-2520 to 2520	50	± 1.0
	R NBS	0 to 1750	32 to 3182	40	± 0.4	-1750 to 1750	-3150 to 3150	40	± 2.0
	S NBS	0 to1750	32 to 3182	40	± 0.4	-1750 to 1750	-3150 to 3150	40	± 2.0
	T NBS	-200 to 400	-328 to 752	15	± 0.15	-600 to 600	-1080 to 1080	15	± 0.8
	L DIN	-200 to 900	-328 to 1652	35	± 0.35	-1100 to 1100	-1980 to 1980	35	± 0.7
	U DIN	-200 to 600	-328 to 1112	50	± 0.5	-800 to 800	-1440 to 1440	50	± 2.5

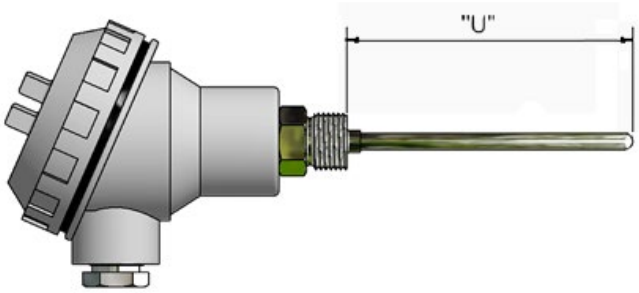
SENSOR	RANGE mV	MINIMUM SPAN mV	DIGITAL* ACCURACY %
mV	-6 to 22	0.40	± 0.02% or ± 2 µV
	-10 to 100	2.00	± 0.02% or ± 10 µV
	-50 to 500	10.00	± 0.02% or ± 50 µV

SENSOR	RANGE Ohm	MINIMUM SPAN Ohm	DIGITAL* ACCURACY %
Ohm	0 to 100	1	± 0.02% or ± 0.01 Ohm
	0 to 400	4	± 0.02% or ± 0.04 Ohm
	0 to 2000	20	± 0.02% or ± 0.20 Ohm

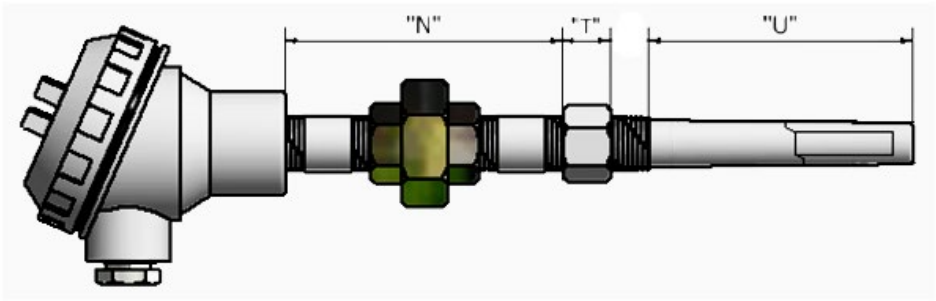
DIMENSIONS

The necessary measurements to be informed, when specifying the temperature element, are represented below by the letters **“N”, “T”** and **“U”.**

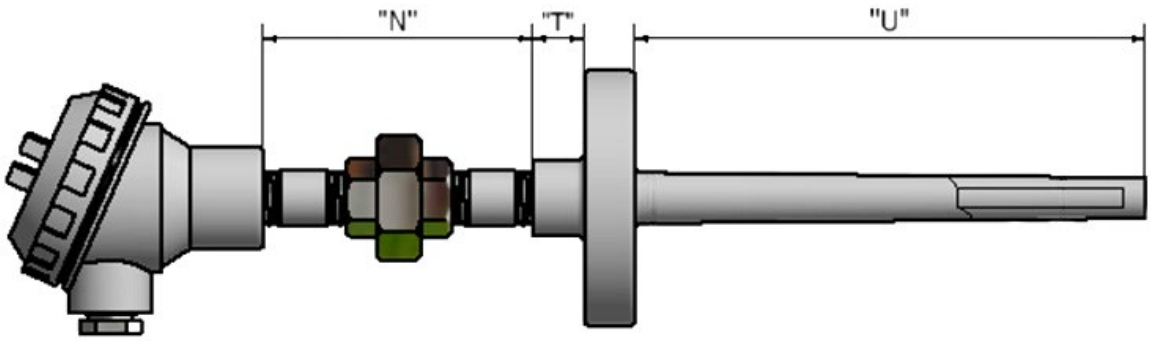
We warn that the **“N”** and **“T”** measurements can be informed or follow the manufacturer's standard. The measurement of the length **“U”** is of extreme necessity the element insertion size information by customer.



“U” dimension for threaded thermoelement without well*



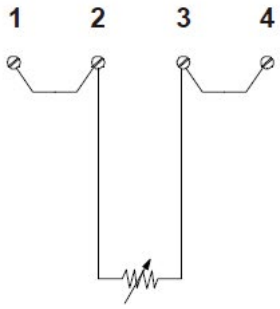
“N”, “T” and “U” dimensions for thread thermoelement with well*



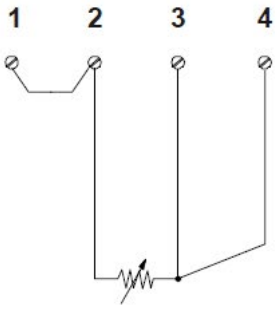
“N”, “T” and “U” dimensions for flanged thermoelement*

* Illustrative images

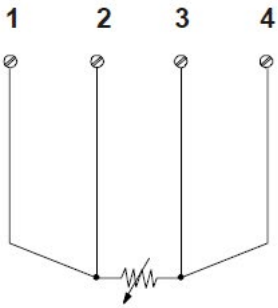
SENSORS CONNECTION TYPE IN SMAR TEMPERATURE TRANSMITTER



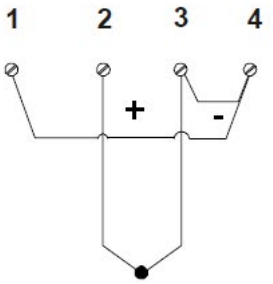
2 - WIRE RTD
OR OHM INPUT



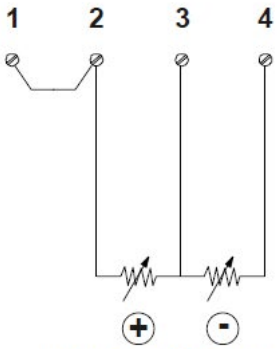
3 - WIRE RTD
OR OHM INPUT



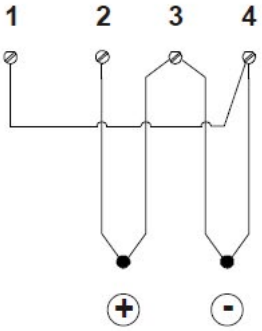
4 - WIRE RTD
OR OHM INPUT



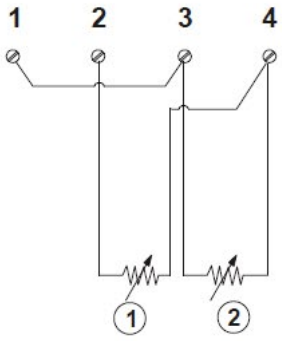
THERMOCOUPLE OR
MILIVOLT INPUT



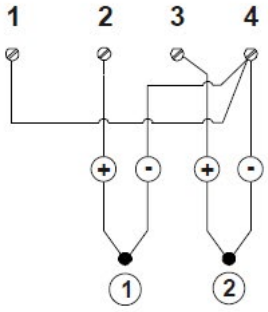
DIFFERENTIAL RTD
OR OHM INPUT



DIFFERENTIAL THERMOCOUPLE
OR MILIVOLT INPUT



BACKUP, MINIMUM,
MAXIMUM OR AVERAGE
WITH 2 RTD OR OHM



BACKUP, MINIMUM,
MAXIMUM OR AVERAGE
WITH 2 TC OR MILIVOLT

ORDER CODE THERMORESISTANCE

CODE	DESCRIPTION
RTD_STD	THERMORESISTANCE

COD. SENSOR: TYPE

1	PT100 - IEC	4	PT50 - JIS	7	NI100 - DIN
2	PT100 - JIS	5	PT500 - IEC	8	NI120 - DIN
3	PT50 - IEC	6	CU10 - GE	9	PT1000 - IEC

COD. SENSOR: NUMBER OF SENSORS

D	DOUBLE
S	SIMPLE
T	TRIPLE

COD. SENSOR: CONNECTION TYPE

2	2 WIRES
3	3 WIRES (STANDARD)
4	4 WIRES

COD. SENSOR: INSULATION

C	CERAMIC	O	OVAL INSULATOR
M	MINERAL	R	ROUND INSULATOR
N	MINERAL CABLE	T	MINERAL: TF+SL+TCAD CABLE INTERNAL ASSEMBLING

COD. SENSOR: PRECISION

A	CLASS A	D	1/5 DIN
B	CLASS B (STANDARD)	E	1/10 DIN
C	1/3 DIN		

COD. HEAD: TYPE

0	WITHOUT HEAD (EXTENSION WIRES LENGTH - SEE NOTES)
1	WITHOUT HEAD (WITH HERMETIC CONNECTOR)
2	SMALL GENERAL PURPOSE HEAD (WEATHER PROOF)
3	LARGE GENERAL PURPOSE HEAD (WEATHER PROOF)
4	EXPLOSION PROOF HEAD
5	MINIATURE HEAD
6	WITHOUT HEAD (WITH CONNECTOR PLUG-L DIN EM-175301)

COD. HEAD: TYPE

0	NOT APPLICABLE	2	IP66
1	IP65 (STANDARD)	3	IP68

COD. HEAD: COVER

0	WITHOUT HEAD	2	SCREWED COVER
1	QUICK RELEASE COVER	3	THREADED COVER

COD. HEAD: MATERIAL

0	WITHOUT HEAD	I	STAINLESS STEEL
A	ALUMINUM	L	COPPER FREE ALUMINUM
B	BAKELITE	N	NYLON
F	IRON	P	POLYPROLYLENE

COD. HEAD: ELECTRICAL CONNECTION

0	WITHOUT HEAD	5	3/8" BSP
1	1/2" NPT	M	M20 X 1.5
2	1/2" BSP	P	PG 13,5 DIN
3	3/4" NPT	Z	SPECIAL - SEE NOTES
4	3/4" BSP		

COD. HEAD: CONNECTOR BLOCK - MATERIAL

0	WITHOUT HEAD
B	BAQUELITE
C	CERÂMICA (PADRÃO)
N	NYLON
T	WITHOUT CONNECTOR BLOCK-ASSEMBLY W/ HEAD TRANSM. MANUF. SMAR
U	WITH IN-HEAD ASSEMBLY TEMP. TRANSMITTER - TE MANUFACTURER STANDARD

COD. HEAD: CONNECTOR BLOCK - TYPE

0	WITHOUT HEAD
D	DUAL FIXED
M	SIMPLE WITH SPRING
N	DOUBLE WITH SPRING
O	TRIPLE WITHOUT SPRING
P	TRIPLE WITH SPRING
S	SIMPLE FIXED (STANDARD)
T	WITHOUT CONNECTOR BLOCK-ASSEMBLY W/ HEAD TRANSM. MANUF. SMAR
U	WITH IN-HEAD ASSEMBLY TEMP. TRANSMITTER - TE MANUFACTURER STANDARD

RTD_STD - 1 S 3 M B 3 1 3 A 1 C S ← TYPICAL MODEL

CONTINUES NEXT PAGE

ORDER CODE THERMORESISTANCE (CONTINUATION)

CODE	DESCRIPTION
RTD_STD	THERMORESISTANCE

HEAD: CONNECTOR BLOCK - TYPE

COD.	
0	WITHOUT HEAD
2	PAINTING ACCORDING N1735 (SAFETY BLUE PAINTING)
8	WITHOUT PAINTING
9	SAFETY BLUE EPOXI PAINT - ELECTROSTATIC PAINTING
C	GRAY MUNSELL N 6.5
F	MANUFACTURER STANDARD (STANDARD)
H	ACCORDING IET (SEE NOTES)
Y	PAINTING ACCORDING N1735 (SAFETY ORANGE PAINTING)
Z	SPECIAL - SEE NOTES

SENSOR CONNECTION TO HEAD (OR TRANSMITTER)

COD.	
0	WITHOUT THREAD TO HEAD
1	1/2" NPT
2	1/2" BSP
3	3/4" NPT
4	3/4" BSP
5	1" NPT
6	1" BSP
E	UNION W/ ADAPTER EX-D 1/2" NPT(M) X 1/2" NPT (F)
F	UNION W/ ADAPTER EX-D M20 X 1.5 X 1/2" NPT (F)
H	WITH HERMETIC CONNECTOR
M	M20 X 1.5
P	PG 13,5 DIN

NIPLE/UNION/BUCIM

COD.	
0	WITHOUT NIPLE/UNION/BUCIM
1	DIRECT THREAD TO PROCESS (WITHOUT T)
2	FLAT NIPLE
3	NIPLE/UNION (WITHOUT THREAD TO PROCESS)
4	NIPLE/UNION/NIPLE
5	ADJUSTABLE BUCIM
6	FITTING SLEEVE

NIPLE/UNIÃO/BUCIM: MATERIAL

COD.	
0	WITHOUT NIPLE/UNION/BUCIM
A	304 STAINLESS STEEL
C	CARBON STEEL
I	316 SST

NIPLE CONNECTION (OR BUCIM) TO WELL (OR PROCESS) - TYPE

COD.	
0	WITHOUT THREAD TO PROCESS
B	BSP THREAD
N	NPT THREAD
S	WELD SOCKET
T	TRI-CLAMP (COMPLETE SET WITH 304 SS CLAMP)

NIPLE CONNECTION (OR BUCIM) TO WELL (OR PROCESS) - DIAMETER

COD.	
0	WITHOUT THREAD TO PROCESS
1	1/4"
2	1/2"
3	3/4"
4	1"
5	1 1/2"
6	2"
7	2 1/2"
8	3"

SHEATH: MATERIAL

COD.	
A	304 STAINLESS STEEL
I	316 SST

SHEATH: DIAMETER

COD.	
3	3,0 MM
4	4,7 MM
6	6,0 MM
7	6,35 MM (STANDARD)
8	8,0 MM
A	10 MM

WELL: MANUFACTURING SHAPE

COD.	
0	WITHOUT WELL
B	STRAIGHT DRILLED BARSTOCK STEPPED
C	CONIC DRILLED BARSTOCK
R	STRAIGHT DRILLED BARSTOCK
T	STRAIGHT SEAMLESS TUBE (DIAMETER SEE NOTES)
U	STRAIGHT SEAM TUBE (DIAMETER SEE NOTES)

WELL: MATERIAL

COD.		COD.		COD.	
0	WITHOUT WELL	D	DUPLEX UNS31803	L	316L STAINLESS STEEL
1	ASTM-A-335-P11	E	ASTM A182 F53	M	MONEL
2	ASTM-A-335-P22	F	ASTM A182 GR F22	N	INCONEL 600
3	CERAMIC	G	TANTALUM	O	SUPER DUPLEX S32760 - F55
9	904L STAINLESS STEEL	H	HASTELLOY C276	T	TITANIUM
A	304 STAINLESS STEEL	I	316 SST	U	HASTELLOY B/B-2
B	COPPER	J	310 STAINLESS STEEL	V	317 STAINLESS STEEL
C	CHROME STEEL 446	K	ASTM A182 GR F11	X	INCONEL 625

WELL: PROCESS CONNECTION - TYPE

COD.	
0	WITHOUT WELL
B	BSP THREAD
F	FLANGE
N	GAS (BSP)
N	NPT THREAD
R	SMS THREAD - SANITARY CONNECTION
S	WELD SOCKET
T	TRI-CLAMP (COMPLETE SET WITH 304 SS CLAMP)
V	VARIVENT

RTD_STD - F 1 4 I N 2 I 7 C I N ← TYPICAL MODEL

CONTINUES NEXT PAGE

ORDER CODE THERMORESISTANCE (CONTINUATION)

CODE	DESCRIPTION
RTD_STD	THERMORESISTANCE

COD. WELL: PROCESS CONNECTION - DIAMETER

0	WITHOUT WELL	A	DN40
1	1/4" (STRAIGHT SEAMLESS TUBE)	B	DN50
2	1/2"	C	DN80
3	3/4"	D	DN100
4	1"	E	1 1/4"
5	1 1/2"	G	4"
6	2"		
7	2 1/2"		
8	3"		
9	DN25		

COD. PROCESS CONNECTION - PRESSURE RATING

0	WITHOUT WELL	A	PN10/60
1	NOT APPLICABLE	B	PN25/40
2	150 # ANSI B16.5	C	PN63
3	300 # ANSI B16.5	D	PN63/100
4	600 # ANSI B16.5	E	PN100
5	900 # ANSI B16.5	F	PN160
6	1500 # ANSI B16.5	G	PN250
7	2500 # ANSI B16.5		
8	PN10/16		
9	PN10/40		

COD. PROCESS CONNECTION - FACE

0	WITHOUT WELL
F	FF
N	NOT APPLICABLE
R	RF
T	RTJ

COD. PROCESS CONNECTION - FLANGE FINISHING

0	WITHOUT WELL
1	NOT APPLICABLE
2	CONCENTRIC MSS-SP6
3	MSS-SP6 - SPIRAL

COD. CERTIFICATE

C0	BLANK IDENTIFICATION PLATE
C1	MATERIAL CERTIFICATE
C2	MATERIAL CERTIFICATE AND EXPLOSION PROOF
C3	NACE MR-01-75 CERTIFICATE
C4	CERTIFICATE OF CALIBRATION (SEE NOTES)

COD. TESTS

T0	CONCENTRICITY TEST
T1	DYE PENETRANT (INSPECTION FOR WELL)
T2	RADIOGRAPHY TEST (WELDING)
T3	WAKE FREQUENCY CALCULATIONS ASME PT19.3
T4	HIDRO TEST (1.5 * MAX. PRESSURE) - ASME VIII
T5	ULTRASONIC BORE CONCENTRICITY TEST
T6	TOTAL PENETRATION WELDING
T7	HARDNESS TEST (MAX. 22 HRC)
T8	CALIBRATION TEST (3 POINTS)

RTD_STD - 2 1 N 1 C0 - ← TYPICAL MODEL

ORDER CODE THERMOCOUPLE

CODE	DESCRIPTION
TC_STD	THERMOCOUPLE

SENSOR: TYPE

COD.	
1	THERMOCOUPLE TYPE B - NBS
2	THERMOCOUPLE TYPE E - NBS
3	THERMOCOUPLE TYPE J - NBS
4	THERMOCOUPLE TYPE K - NBS
5	THERMOCOUPLE TYPE N - NBS
6	THERMOCOUPLE TYPE R - NBS
7	THERMOCOUPLE TYPE S - NBS
8	THERMOCOUPLE TYPE T - NBS
9	THERMOCOUPLE TYPE J - DIN
A	THERMOCOUPLE TYPE K - DIN
B	THERMOCOUPLE TYPE S - DIN
C	THERMOCOUPLE TYPE T- DIN

SENSOR: NUMBER OF SENSORS

COD.	
D	DOUBLE
S	SIMPLE
T	TRIPLE

SENSOR: CONNECTION TYPE

COD.	
2	2 WIRES (STANDARD)

SENSOR: INSULATION

COD.	
C	CERAMIC
M	MINERAL
N	MINERAL CABLE
O	OVAL INSULATOR
R	ROUND INSULATOR

SENSOR: PRECISION

COD.	
P	STANDARD
Z	SPECIAL - SEE NOTES

HEAD: TYPE

COD.	
0	WITHOUT HEAD (EXTENSION WIRES LENGTH - SEE NOTES)
1	WITHOUT HEAD (WITH HERMETIC CONNECTOR)
2	SMALL GENERAL PURPOSE HEAD (WEATHER PROOF)
3	LARGE GENERAL PURPOSE HEAD (WEATHER PROOF)
4	EXPLOSION PROOF HEAD
5	MINIATURE HEAD
6	WITHOUT HEAD (WITH CONNECTOR PLUG-L DIN EM-175301)

HEAD: TYPE

COD.	
0	NOT APPLICABLE
1	IP65 (STANDARD)
2	IP66
3	IP68

HEAD: COVER

COD.	
0	WITHOUT HEAD
1	QUICK RELEASE COVER
2	SCREWED COVER
3	THREADED COVER

HEAD: MATERIAL

COD.	
0	WITHOUT HEAD
A	ALUMINUM
B	BAKELITE
F	IRON
I	STAINLESS STEEL
L	COPPER FREE ALUMINUM
N	NYLON
P	POLYPROLYLENE

HEAD: ELECTRICAL CONNECTION

COD.	
0	WITHOUT HEAD
1	1/2" NPT
2	1/2" BSP
3	3/4" NPT
4	3/4" BSP
5	3/8" BSP
M	M20 X 1.5
P	PG 13,5 DIN
Z	SPECIAL - SEE NOTES

HEAD: CONNECTOR BLOCK - MATERIAL

COD.	
0	WITHOUT HEAD
B	BAQUELITE
C	CERÂMICA (STANDARD)
N	NYLON
T	WITHOUT CONNECTOR BLOCK-ASSEMBLY W/ HEAD TRANSM. MANUF. SMAR

HEAD: CONNECTOR BLOCK - TYPE

COD.	
0	WITHOUT HEAD
D	DUAL FIXED
M	SIMPLE WITH SPRING
N	DOUBLE WITH SPRING
O	TRIPLE WITHOUT SPRING
P	TRIPLE WITH SPRING
S	SIMPLE FIXED (STANDARD)
T	WITHOUT CONNECTOR BLOCK-ASSEMBLY W/ HEAD TRANSM. MANUF. SMAR

HEAD: PAINTING

COD.	
0	WITHOUT HEAD
2	PAINTING ACCORDING N1735 (SAFETY BLUE PAINTING)
8	WITHOUT PAINTING
9	SAFETY BLUE EPOXI PAINT - ELECTROSTATIC PAINTING
C	GRAY MUNSELL N 6.5
F	MANUFACTURER STANDARD (STANDARD)
H	ACCORDING IET (SEE NOTES)
Y	PAINTING ACCORDING N1735 (SAFETY ORANGE PAINTING)
Z	SPECIAL - SEE NOTES

TC_STD - 4 S 2 M P 3 1 3 A 1 C S F ← TYPICAL MODEL

CONTINUES NEXT PAGE

ORDER CODE THERMOCOUPLE (CONTINUATION)

CODE	DESCRIPTION
TC_STD	THERMOCOUPLE

COD. SENSOR CONNECTION TO HEAD (OR TRANSMITTER)

0	WITHOUT THREAD TO HEAD	4	3/4" BSP	H	WITH HERMETIC CONNECTOR
1	1/2" NPT	5	1" NPT	M	M20 X 1.5
2	1/2" BSP	6	1" BSP	P	PG 13,5 DIN
3	3/4" NPT	E	UNION W/ ADAPTER EX-D 1/2" NPT(M) X 1/2" NPT (F)		

COD. NIPLE/UNIÃO/BUCIM

0	WITHOUT NIPLE/UNION/BUCIM	4	NIPLE/UNION/NIPLE
1	DIRECT THREAD TO PROCESS (WITHOUT T)	5	ADJUSTABLE BUCIM
2	FLAT NIPLE	6	FITTING SLEEVE
3	NIPLE/UNION (WITHOUT THREAD TO PROCESS)		

COD. NIPLE/UNION/BUCIM

0	WITHOUT NIPLE/UNION/BUCIM	C	CARBON STEEL
A	304 STAINLESS STEEL	I	316 SST

COD. NIPLE/UNION/BUCIM: MATERIAL

C	CERÂMICO	O	ISOLADOR OVAL
M	MINERAL	R	ISOLADOR REDONDO
N	CABO MINERAL		

COD. NIPLE CONNECTION (OR BUCIM) TO WELL (OR PROCESS) - TYPE

0	WITHOUT THREAD TO PROCESS
B	BSP THREAD
N	NPT THREAD
S	WELD SOCKET
T	TRI-CLAMP (COMPLETE SET WITH 304 SS CLAMP)

COD. SHEATH: MATERIAL

A	304 STAINLESS STEEL	L	ALLOY 600
I	316 SST	P	PYROSIL
J	310 STAINLESS STEEL	Z	SPECIAL -SEE NOTES

COD. SHEATH: DIAMETER

1	3/8"	7	6,35 MM (STARDARD)
3	3,0 MM	8	8,0 MM
4	4,7 MM	Z	SPECIAL -SEE NOTES
6	6,0 MM		

COD. WELL: MANUFACTURING SHAPE

0	WITHOUT WELL
B	STRAIGHT DRILLED BARSTOCK STEPPED
C	CONIC DRILLED BARSTOCK
R	STRAIGHT DRILLED BARSTOCK
T	STRAIGHT SEAMLESS TUBE (DIAMETER SEE NOTES)
U	STRAIGHT SEAM TUBE (DIAMETER SEE NOTES)

COD. WELL: MATERIAL

0	WITHOUT WELL	H	HASTELLOY C276
1	ASTM-A-335-P11	I	316 SST
2	ASTM-A-335-P22	J	310 STAINLESS STEEL
3	CERAMIC	K	ASTM A182 GR F11
9	904L STAINLESS STEEL	L	316L STAINLESS STEEL
A	304 STAINLESS STEEL	M	MONEL
B	COPPER	N	INCONEL 600
C	CHROME STEEL 446	S	SUPER DUPLEX S32760 - F55
D	DUPLEX UNS31803	T	TITANIUM
E	ASTM A182 F53	U	HASTELLOY B/B-2
F	ASTM A182 GR F22		
G	TANTALUM		

COD. WELL: PROCESS CONNECTION - TYPE

0	WITHOUT WELL
B	BSP THREAD
F	FLANGE
N	NPT THREAD
R	SMS THREAD - SANITARY CONNECTION
S	WELD SOCKET
T	TRI-CLAMP (COMPLETE SET WITH 304 SS CLAMP)
V	VARIVENT

COD. WELL: PROCESS CONNECTION - DIAMETER

0	WITHOUT WELL	8	3"
1	1/4" (STRAIGHT SEAMLESS TUBE)	9	DN25
2	1/2"	A	DN40
3	3/4"	B	DN50
4	1"	C	DN80
5	1 1/2"	D	DN100
6	2"	E	1 1/4"
7	2 1/2"	G	4"

TC_STD	-	1	4	I	N	2	I	7	C	I	N	2

TYPICAL MODEL

CONTINUES NEXT PAGE

ORDER CODE THERMOCOUPLE (CONTINUATION)

CODE	DESCRIPTION
TC_STD	THERMOCOUPLE

PROCESS CONNECTION - PRESSURE RATING

COD.	
0	WITHOUT WELL
1	NOT APPLICABLE
2	150 # ANSI B16.5
3	300 # ANSI B16.5
4	600 # ANSI B16.5
5	900 # ANSI B16.5
6	1500 # ANSI B16.5
7	2500 # ANSI B16.5
8	PN10/16
9	PN10/40
A	PN10/60
B	PN25/40
C	PN63
D	PN63/100
E	PN100
F	PN160
G	PN250

PROCESS CONNECTION - FACE

COD.	
0	WITHOUT WELL
F	FF
N	NOT APPLICABLE
R	RF
T	RTJ

PROCESS CONNECTION - FLANGE FINISHING

COD.	
0	WITHOUT WELL
1	NOT APPLICABLE
2	CONCENTRIC MSS-SP6
3	MSS-SP6 - SPIRAL

CERTIFICATE

COD.	
C0	BLANK IDENTIFICATION PLATE
C1	MATERIAL CERTIFICATE
C2	MATERIAL CERTIFICATE AND EXPLOSION PROOF
C3	NACE MR-01-75 CERTIFICATE
C4	CERTIFICATE OF CALIBRATION (SEE NOTES)

TESTS

COD.	
T0	CONCENTRICITY TEST
T1	DYE PENETRANT (INSPECTION FOR WELL)
T2	RADIOGRAPHY TEST (WELDING)
T3	WAKE FREQUENCY CALCULATIONS ASME PT19.3
T4	HIDRO TEST (1.5 * MAX. PRESSURE) - ASME VIII
T5	ULTRASONIC BORE CONCENTRICITY TEST
T6	TOTAL PENETRATION WELDING
T7	HARDNESS TEST (MAX. 22 HRC)
T8	CALIBRATION TEST (3 POINTS)

TC_STD - 1 N 1 C0 - ← TYPICAL MODEL

Auxiliary Equipment

Flow and Temperature Measurement

TT300 Series with coupled Thermoelement

LD400 Series with coupled 3 Way Manifold Valve

LD300 Series with coupled 5 Way Manifold Valve

Consult our representatives

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