Multi Vision® 2010TD/TA

Digital transmitters with remote seal, for level, differential pressure, and absolute pressure

Spans: 10 mbar ... 100 bar / 20 bar abs.
4 in. H_2O ... 1500 psi / 300 psia

10/15-4.14 EN

M01521x1.tif

- **Isolation between process and transmitter for media with**
  - **high temperatures and viscosities**
  - **corrosive ingredients, a tendency to polymerization**
- **Prevention of deposits in the connection flanges by extended remote seals**
- **Mounting to various DIN or ANSI flanges**
- **One-sided overload up to rated pressure, max. 100 bar**
- **Span and zero externally adjustable**
- **Transfer response configurable:**
  - **linear** • **square rooting** • **freely programmable**
- **In conjunction with the LCD indicator, the transmitter can be configured with the external keys**
- **Communication protocol:**
  - **PROFIBUS PA** • **FOUNDATION Fieldbus**
  - **HART 4...20mA**
- **Surge voltage resistant acc. to IEC 61000-4**
- **Interchangeable electronics with self reconfiguration**

Application

The Multi Vision® - series is a complete series of differential pressure, gauge pressure and absolute pressure transmitters with an analogue or digital output signal for the process industry.

The transmitters with remote seal(s) measure level, differential pressure, absolute pressure of aggressive/non-aggressive media.

They are based on a highly-stable sensor, on which a remote seal in flange design is fitted (directly or with capillary tube). The internal sensing diaphragm is slightly deflected corresponding to the pressure present between the remote seal and the equalizing side and converted into an electrical signal by the electronics.

The process wetted parts of the remote seal can be selected from different materials such as stainless steel, Hastelloy C or tantalum and others, depending on the required resistance to corrosion. Various filling liquids, for example for the food and beverages industry, complete the spectrum of applications.

Description

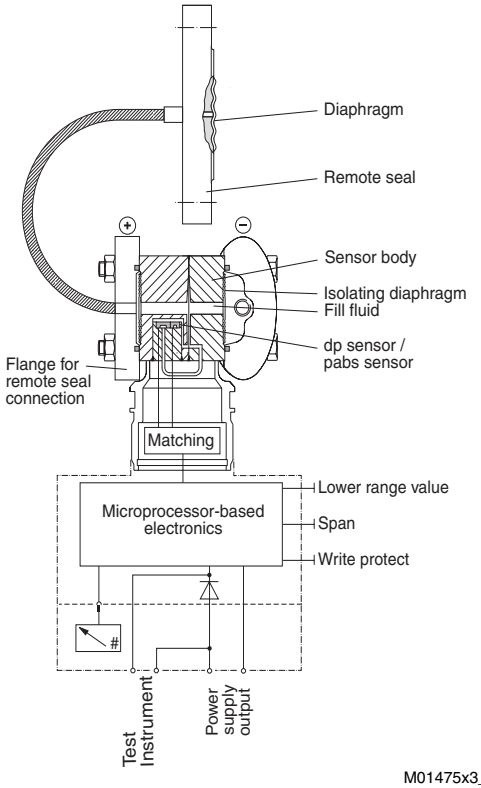
Principle of operation and construction

The transmitter has a modular design and consists of the differential / absolute pressure sensor module on which a remote seal in flange design is fitted (directly or with capillary tube) with an integrated electronic (matching unit) and an amplifier with control unit.

The completely welded sensor module is a twin-chamber system with an integral overload diaphragm, an internal absolute pressure sensor, and a silicon differential pressure sensor. The absolute pressure sensor, which is only exposed to the pressure at the high pressure side (⊕), acts as a reference value to compensate for the static pressure. The differential pressure sensor is connected via a capillary tube to the negative side / the reference vacuum of the sensor module. The applied differential pressure (dp) / absolute pressure (pabs) is transferred via the remote seal diaphragm and the fill fluid to the diaphragms of the silicon differential pressure sensor.

A minimal deflection of the silicon diaphragm changes the output voltage of the pick-up system. This output voltage, proportional to the pressure, is converted by the matching unit and the amplifier into an electrical signal.

Transmitter 2010TD with remote seal, for level, differential pressure (design in the example; with capillary tube)



Technical data

Input

Measured value

2010TD: Differential pressure, level, flow
2010TA: Absolute pressure

Measuring range (upper and lower range values)

Lower range value (continuously adjustable)
2010TD: -100 % to +100 % of the URL
2010TA: 0% to +100% of the URL

Upper range value (continuously adjustable)
Up to 100 % of the URL

Spans (dependent of remote seal type!)

dp-sensor
The adjusted span must not be lower than the minimum range.
Smallest span see Table 1 “Type of construction, spans ...”.

Measuring ranges

Code	min.	max.	MWP
2010TD			see flange rating of remote seal
B	see Table 1	60 mbar	
C		400 mbar	
D		2.5 bar	
E		20 bar	
G		100 bar	
2010TA			
L	see Table 1	400 mbar abs.	see flange rating of remote seal
M		2.5 bar abs.	
N		20 bar abs.	

Measuring ranges

Code	min.	max.	MWP
2010TD			see flange rating of remote seal
B	see Table 1	6 kPa (24 in. H_2O)	
C		40 kPa (160 in. H_2O)	
D		250 kPa (1000 in. H_2O)	
E		2 MPa (300 psi)	
G		10 MPa (1500 psi)	
2010TA			
L	see Table 1	40 kPa (160 in. H_2O) abs.	see flange rating of remote seal
M		250 kPa (1000 in. H_2O) abs.	
N		2 MPa (300 psia)	

P_{abs} sensor:
Measuring range

Code	
1	41 MPa / 410 bar / 6000 psia

Output

Output signal

Transmitters with 4...20mA
Analogue signal 4 ... 20 mA
Output signal limits: I_{min} = 3.5 mA, I_{max} = 22.5 mA (conf.)
Standard setting: I_{min} = 3.8 mA, I_{max} = 20.5 mA

Alarm current
Min. alarm current: configurable from 3.5 mA to 4 mA, standard setting: 3.6 mA
Max. alarm current: conf. from 20 mA to 22.5 mA, standard setting: 21 mA
Standard setting: max. alarm current

Technical data

Output (continued)

Load of transmitters with 4...20 mA

$$R \leq \frac{Us - 10,5V}{I_{max}} \quad \text{in kOhm}$$

I_{max} = 20...22.5 mA (configurable)
Us = supply voltage
Min. power supply: 10.5 VDC, 14 V DC with backlit LCD-indic.
Min. load for digital communications > 250 Ohm

Fieldbus units (communication code: P / F)

Digital signal	
Transm. technique:	acc. to IEC 61158-2
Power supply:	10.2 V DC ... 32 V DC
Base current:	14 mA
Transmission rate:	31.25 kbd/s
PROFIBUS-PA:	Version 3.0, Profile B for pressure transmitters; Ident No.: 04C2 HEX
Foundation Fieldbus:	FF-890 / 891 and FF-902 / 903

Characteristic
Linear, square-rooting, freely programmable with 20 ref. points

Accuracy

Reference conditions

to DIN IEC 60 770	
Temperature:	20 °C (68 °F)
Relative humidity:	65 %
Atmosph. pressure:	1013 mbar (1013 hPa / 14.7 psia)
Add. conditions:	Sep. diaphragm material “Hastelloy C“, fill fluid “silicone oil” and “linear output”

All specifications are limits and relate to the output range or calibrated range. The influences marked * relate to the measuring range (URL) and are to be multiplied by the turn down factor (ratio range (URL)/calibrated span). The turn down factor should be kept to a minimum. The accuracy and response times depend upon the remote seal and the measuring point.

For instruments with two remote seals a symmetrical construction should be selected, if possible (nominal diameter, capillary tube length, diaphragm material).

Data for the instrument combination are only possible after knowledge of all the data submitted in the questionnaire 80/15-105 EN (see pages 14 and 15).

Data for transmitters:

Differential pressure measurement 2010TD
Absolute pressure measurement 2010TA

Conformity:

Terminal based, including hysteresis and the dead band [1)]

linear	square root
0.075%	0.15%

Hysteresis[1)]

linear	square root
0.05%	0.1%

Reproducibility
0.01 %

The effect appearing at the output for non-linear output (e.g. square root function) depends on the function and is to be calculated accordingly.

Ambient temperature effect (dp sensor)
Temperature coefficient (-40 °C...+80 °C)[2)]/(-40 °F... +176 °F)[2)]
* on zero DN 50/2“ 0.04%/10K + 0.2 mbar/10K[1)]
DN 80/3“ 0.04%/10K + 0.6 mbar/10K[1)]
on span 0.04 % per 10K (50 °F)

Static pressure effect

Measuring range	≥ 60 mbar (≥ 24 in.H_2O)	100 bar (1450 psi)
* on zero	0.1%	0.1%
on span	0.05%	0.1%

Long-term drift
* 0.05 % per 12 months

Effect of electro-magnetic interference
* 0.05 %

Warm-up time
< 15 s

Rise time
The time behavior of this transmitter is composed of the rise time of the sensor and an adjustable integration time constant of the A/D converter. A high time constant results in a high resolution, e.g. required for a high span ratio, and at the same time in a higher rise time for the output signal. A low time constant means a lower resolution, but a shorter rise time and, thus, a faster reaction time of the transmitter. In case of the standard integration time constant the values shown in the table below apply.

range	linear		square root	freely programmable function
	turn down factor			
	≤ 1 : 10	> 1 : 10 up to ≤ 1 : 20		
60mbar (24 in.H_2O)	~ 0.8 s	~ 1.0 s	~ 1.4 s	~ 1.0 s
≥400mbar (160 in.H_2O)	~ 0.3 s	~ 0.5 s	~ 0.9 s	~ 0.5 s

additional adjustable time constant 0...60 s

Process pressure measuring 2010TD (2nd. meas. channel)

Conformity:

0.82 bar / (329 in. H_2O)

Ambient temperature effect 2010TD (2nd. measuring channel)
Thermal change (-40 °C...+80 °C)[2)]/(-40 °F...+176 °F)[2)]
* on zero 0.4 bar (160 in.H_2O)
Thermal change (-20 °C...+60 °C)[2)]/(-4 °F...+140 °F)[2)]
on span 2 bar (803 in.H_2O)
Thermal change (-40 °C...+80 °C)[2)]/(-40 °F...+176 °F)[2)]
on span 3 bar (1204 in.H_2O)

---

1) additionally with turn-down factor > 10:1

$$\pm\left(0.005 \times \frac{\text{measuring range}}{\text{adjusted span}} - 0.05\right)\%$$

2) with carbon fluoride filling liquid: -20 °C...+80 °C (-4 °F...+176 °F)

* please refer to “Accuracy” / “Reference conditions”

Technical data

Installation conditions

Notes on installation

The maximum difference in height between the remote seal and the transmitter when mounting the remote seal below the transmitter is:

with silicone oil	(IB)	5.0 m
with carbon fluoride	(L)	2.5 m
with high temperature oil	(IH)	5.0 m
with white oil	(WB)	2.5 m
with vacuum-proof design	(IC-V)	0.0 m

Caution:
With an operating pressure < 1000 mbar abs, the transmitter must be mounted at the same height or below the remote seal.

Mounting

The remote seal is mounted to the DIN / ANSI connection flange with a gasket (soft packing) and fixing screws. **(Gasket and fixing screws not supplied)**.
For transmitters with two remote seals, if possible the capillary tubes should be arranged so that they are subject to the same ambient temperature.
The mounting of the transmitter effected wall mounting, tube mounting or lateral mounting to a tank (design: direct mounting).
Observe the minimum bending radius of the capillary tube of 75 mm. Do not kink!
The electronic housing can be rotated through 360° ∠ and can be fixed in any position. A stop prevents the housing from being turned excessively.

Ambient conditions

Ambient temperature
-40 °C ... +85 °C (with O-ring Viton: -20 °C ... +85 °C)
(-40 °F ... +185 °F) (with O-ring Viton: -4 °F ... +185 °F),
Observe approvals for explosion-protected transmitters!

Storage temperature / transport temperature
-50 °C ... +85 °C, with LCD-indicator -40 °C ... +85 °C
(-58 °F ... +185 °F), with LCD-indicator (-40 °F ... +185 °F)

Humidity

Relative humidity:	≤ 95 % annual average
Condensation, icing:	admissible

Protection class

IP 67 acc. to EN 60 529	(≡ NEMA Standard Type 6);
with Han 8U plug: IP 65	(≡ NEMA Standard Type 4x)

Protective varnish
epoxy resin, grey-white, RAL 9002

Electromagnetic compatibility (EMC)
to EN 50 082-2

Definition:	Class 3
Radio suppression (EN 55 011):	Limit class B

Fulfills NAMUR recommendation.

Process conditions

Temperature limits

Operating temperature (max. ambient temperature in brackets)

Direct mounting:	-30°C...+180°C (max. +40°C) (-22°F...+356°F (max.+104°F))
(Code-No. 729)	-30°C...+140°C (max. +60°C) (-22°F...+284°F (max.+140°F))
Mounting with capillary tube:	see Table 2
Filling liquid “white oil“ and “high-temperature oil“	Min. operat. temp. -10 °C (14 °F)
PTFE O-rings	-20 °C (-4 °F)

Pressure limits

2010TD
Static pressure limits
Minimal pressure: see Table 2
Maximal permissible pressure: up to MWP (PN) of the remote seal. Test pressure up to 1.5-times of the max. work pressure simultaneously on both sides of the transmitter admissible.

2010TA
Static pressure limits
From vacuum (only with Code 739) up to MWP (PN) of the remote seal. Test pressures up to 1.0-times of the max. work pressure admissible.

Overload limit
One-sided overload up to the maximal work pressure. Possibly occurring zero offsets can be corrected.

Technical data

Design features

Weight

Direct mounting design, DN 80, PN 16/40
approx. 12 kg

Transmitter 2010TD/TA
approx. 4 kg
plus approx. 3 / 5.5 kg for flush diaphragm remote seal DN 50 / DN 80 - PN16/40 or
plus approx. 3.5 / 6.5 kg for extended diaphragm remote seal (50 mm length) DN50 / DN80 - PN16/40

Capillary tube
0.15 kg / m

Material

Remote seal diaphragm
316 L st.st. (1.4404) * /Hastelloy C * / Tantalum

Measuring cell
316 L stainless steel

Separating diaphragm(s)
Hastelloy C *

Process flange
316 L st. st.(1.4404) *

Nuts and bolts
Stainless steel (A4) *

Plugs
316 L st. st. (1.4404) *

Fill fluid
Silicone oil / carbon fluoride

O-rings
Viton (FPM) / Perbunan (NBR) / PTFE / EPDM

Amplifier housing /housing cover
Aluminium with epoxy resin coat / stainless steel

* in compliance with NACE MR0175 Class II

Construction and design

Separating element
Welded diaphragm

Maximum working pressure
acc. to DIN from PN 16...PN 100
acc. to ANSI from class 150 psi...class 600 psi

Materials in contact with the measuring medium
see ordering details

Materials **not** in contact with the measuring medium

Capillary tube	Stainless steel
Protective tube	Stainless steel or with PVC coating
Flange for remote seal connection	Stainless steel

Connections

Electrical connections
see specifications on the next page

Process connections
see “Model ordering number“

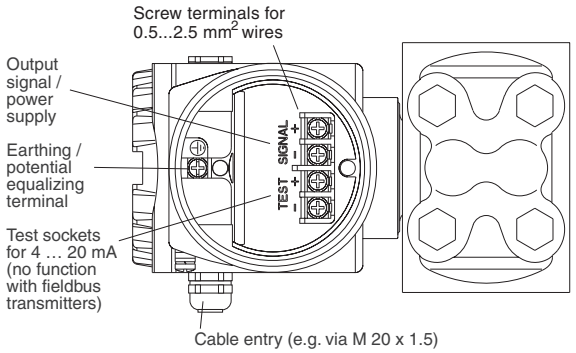
Technical data

Electrical specifications

Electrical connections

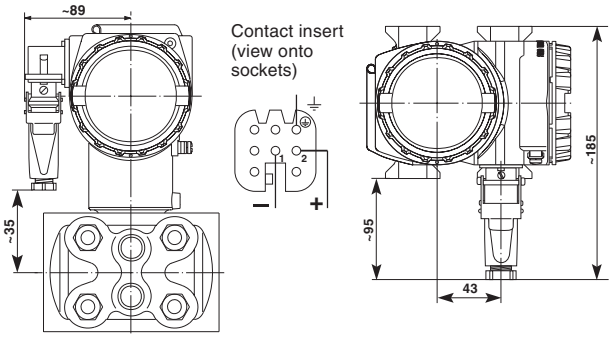
Two female threads 1/2-14 NPT or M 20 x 1.5 or one plug Han 8 U. Screw terminals for wire cross-sections up to 2.5 mm^2.

Cable connection compartment /electrical connection (shown without remote seal)



M01431x2_en.eps

Electrical connection with plug (shown without remote seal, dimensions in mm)



M01440x1_en.eps

Auxiliary energy

Transmitters with 4...20 mA (communication code: H)

Power supply: 10.5...45 V DC (14...45 V DC with backlit indicator), inverse polarity protection. Explosion-protected transmitters, observe the approvals!

Harm. distortion: Maximal permissible voltage ripple of the power supply during communication:

7 V_{pp}	at 50 Hz	$\leq f \leq$ 100 Hz
1 V_{pp}	at 100 Hz	$< f \leq$ 200 Hz
0.2 V_{pp}	at 200 Hz	$< f \leq$ 300 Hz

Fieldbus units (communication code: P/F)

Power supply 10.2...32 V DC, inverse polarity protection Explosion-protected transmitters, observe the approvals!

Display and operating interface

Operation with keys

Retrofit / optional key unit for external adjustment of zero and span and a write protect switch. There are no physical connections through the housing for the keys.

In conjunction with an LCD indicator, the transmitter can be configured with the keys as follows:

Zero and span with or without applied pressure, oblique sensor, damping, output current during faults, displayed value, pressure unit, linear or square rooting, temperature unit, as well as address with fieldbus devices.

Operation via remote communications

Communication protocol
PROFIBUS-PA® or FOUNDATION Fieldbus® or HART®

Hardware
for HART®: FSK modem for PC / notebook

Handheld terminal
STT 04 or HHT 275 or 691 HT

Management software
SMART VISION®: from version 4.01 + DTM (Device Type Manager) 2000T

LCD indicator

2-line, 6-character 19-segment alphanumeric display with additional bar chart display, optionally with back illumination.

User-specific displays:
Pressure value as a physical unit or
percentage of the output current or
output current in mA or
instrument temperature in freely selectable units or
free process variable
address (only with fieldbus transmitters)

Diagnostic messages, alarms, measuring range infringements and changes in the configuration are also displayed.

Technical data

Hazardous atmospheres

Transmitters of protection type "Intrinsically safe EEx ia" according to Directive 94 / 9 / EC (ATEX)

- Transmitters with 4...20 mA output signal and HART communication

  Marking : II 1/2 GD T 50°C EEx ia IIC T6
  II 1/2 GD T 95°C EEx ia IIC T4

  EC type examination certificate number: ZELM 01 ATEX 0064 and 1st. / 2nd. Supplement

  Supply and signal circuit with type of protection Intrinsic Safety EEx ib IIB/IIC or EEx ia IIB/IIC for connection to supply units with the following maximum values:
  II 1/2 GD T 50°C EEx ia or ib IIC T6
  II 1/2 GD T 95°C EEx ia or ib IIC T4

  for Temperature Class T4:
  U_i = 30 V
  I_i = 200 mA
  P_i = 0.8 W for T4 with Ta = -40...+85 °C / (-40...+185 °F)
  P_i = 1.0 W for T4 with Ta = -40...+70 °C / (-40...+158 °F)

  for Temperature ClassT6:
  P_i = 0.7 W for T6 with Ta = -40...+40 °C (-40...+104 °F)

  Effective internal capacitance $C_i \leq 10$ nF
  Effective internal inductance $L_i \approx 0$

- Fieldbus transmitters (PROFIBUS PA / FOUNDATION Fieldbus)

  Marking : II 1/2 GD T 50°C EEx ia IIC T6
  II 1/2 GD T 95°C EEx ia IIC T4

  EC type examination certificate number ZELM 01 ATEX 0063 and 1st. Supplement

  Supply and signal circuit with type of protection Intrinsic Safety EEx ia IIB/IIC or EEx ib IIB/IIC for connection to FISCO supply units with rectangluar or trapezoidal characteristics with the following maximum values:
  II 1/2 GD T 50°C EEx ia or ib IIC T6 U_i = 17.5 V
  II 1/2 GD T 95°C EEx ia or ib IIC T4 I_i = 360 mA
  P_i = 2.52 W
  II 1/2 GD T 50°C EEx ia or ib IIB T6 U_i = 17.5 V
  II 1/2 GD T 95°C EEx ia or ib IIB T4 I_i = 380 mA
  P_i = 5.32 W

  or for connecion to supply unit / barrier with linear characteristic.

  Maximum values:
  II 1/2 GD T 50°C EEx ia or ib IIC T6 U_i = 24 V
  II 1/2 GD T 95°C EEx ia or ib IIC T4 I_i = 250 mA
  P_i = 1.2 W
  Effective internal inductance $L_i \leq 10$ µH,
  Effective internal capacitance $C_i \approx 0$
  Maximum permissible ambient temperatures depending on the temperature class:

Temperature class	Min. permissible ambient temperature	Max. permissible ambient temperature
T4	-40 °C (-40 °F)	+85 °C (+185 °F)
T5, T6	-40 °C (-40 °F)	+40 °C (+104 °F)

Transmitters of Category 3 for use in "Zone 2" according to Directive 94 / 9 / EC (ATEX)

- Transmitters with 4...20 mA output signal and HART communication

  Marking: II 3 GD T 50°C EEx nL IIC T6
  II 3 GD T 95°C EEx nL IIC T4

  EC type examination certificate number: ZELM 01 ATEX 3059 and 1st. Supplement

  Operating conditions:
  Supply and signal circuit (terminals signal + / -): U ≤ 45 V
  I ≤ 22.5 mA

  Max. permissible ambient temperatures depending on the temperature class:
  T4 Ta = -40...+85 °C / (-40...+185 °F)
  T5, T6 Ta = -40...+40 °C / (-40...+104 °F)

Transmitters of protection type "Flameproof enclosure EEx d" according to Directive 94 / 9 / EC (ATEX)

- Transmitters with 4...20 mA output signal and HART communication and fieldbus transmitters (PROFIBUS PA / FOUNDATION Fieldbus)

  Marking: II 1/2 G EEx d IIC T6
  EC type examination certificate number: PTB 00 ATEX 1018

  Operating conditions:
  Ambient temperature range: -40...+75 °C / (-40...167 °F)

Factory Mutual (FM)

- Transmitters with 4...20 mA output signal and HART communication

  Intrinsically Safe Class I; Division 1; Groups A, B, C, D; Class I; Zone 0; Group IIC; AEx ia IIC
  Degree of protection: NEMA Type 4X (indoor or outdoor)

  Maximum permissible ambient temperatures depending on the temperature class

U_{max} = 30 V, C_i = 10.5 nF, L_i = 10 µH			
Ambient temperature	Temperature class	I_{max}	P_i
-40…+85 °C (-40...+185 °F)	T4	200 mA	0.80 W
-40…+70 °C (-40...+158 °F)			1.00 W
-40…+40 °C (-40...+104 °F)	T5	25 mA	0.75 W
	T6		0.50 W

Technical data

Hazardous atmospheres (continued)

- Fieldbus transmitters
  (PROFIBUS PA / FOUNDATION Fieldbus)
  Intrinsically Safe Class I, II, and III Division 1
  Groups A, B, C, D, E, F, G;
  Class I, Zone 0, AEx ia Group IIC T6; T4
  Non-incendive Class I, II, and III, Div. 2,
  Groups A, B, C, D, F, G

- Transmitters with 4...20 mA output signal and HART communication and fieldbus transmitters (PROFIBUS PA / FOUNDATION Fieldbus)
  Explosion-Proof: Class I, Division 1, Groups A, B, C, D
  Class II / III, Division 1, Groups E, F, G
  Degr. of protection: NEMA Type 4X (indoor or outdoor)

Canadian Standard (CSA)

- Transmitters with 4...20 mA output signal and HART communication and fieldbus transmitters (PROFIBUS PA / FOUNDATION Fieldbus)
  Explosion-Proof: Class I, Division 1, Groups B, C, D
  Class II/III, Division 1, Groups E, F, G
  Degr. of protection: NEMA Type 4X (indoor or outdoor)

Overfill protection for non-inflammable and inflammable toxic liquids

2010TD as a part of Overfill protection on vessels for water polluting and flammable liquids.

Flammable liquids:
only when combined with Ex-Code 5A3

Total pressure
up to 40 bar / (580 psi)

Process temperature limits:

2010TD with remote seal and capillary tube(s)
≤ 250°C / (482°F)

2010TD with directly mounted remote seal
≤ 180°C / (356°F)

Approval
Z-65.11-271

Tables

Table 1: Type of construction, spans and length of capillary tube

Remote seal type	Nominal diameter	Min. spans		Max. length of capillary tube
		2010 TD and 2010 TA with one remote seal	2010TD with two remote seals in same construction	
Flush Diaphragm	DN 50 / DN 2"	100 mbar	20 mbar	16 m
	DN 80 / DN 3"	60 mbar[1)]	10 mbar	16 m
Extended Diaphragm	DN 50 / DN 2"	160 mbar	30 mbar	16 m
	DN 80 / DN 3"	60 mbar[1)]	10 mbar	16 m

1) Min. span for "direct mounting"(code No. 729): 10 mbar (2010TD) or 20 mbar (2010TA).

When selecting the transmitter range, consider the nominal pressure (PN) of the remote seal !

Table 2: Application limits: Permissible temperature / minimum operating pressure

Note: The pressure has to be linearly interpolated between the stated temperatures.
Flush diaphragm remote seals with tantalum diaphragm (Code-No. P02, P05, P08, P11, P14, P17, P20, P23, M02, M05, M08, M11, M14, M17, M20, M23) should not be used with operating temperature > 220 °C (428 °F)

Filling Liquid Identification Density at 20 °C (68 °F) in kg/m³	Silicone Oil IB 924	Carbon Fluoride L 1880	High-temperature Oil IH 1070	White Oil WB 849	Vacuum-proof Design IC-V 1055
Operating temperature in °C (in °F)	-30...+250 [2)] (-22...+482) [2)]	-30...+150 (-22...+302)	-10...+400 [2)] (+14...+752) [2)]	-10...+200 [2)] (+14...+392) [2)]	-30 ... +200 [2)] (-22 ... +392) [2)]
Pressure rating in mbar abs.					
at 20 °C (68 °F)	> 500	> 1000	> 500	> 500	> 5
100 °C (212 °F)	> 500	> 1000	> 500	> 1000	> 25
150 °C (302 °F)	> 500	> 1000	> 500	> 1000	> 38
200 °C (392 °F)	> 750	---	> 750	> 1000	> 50
250 °C (482 °F)	> 1000	---	> 1000	> 1000	---
400 °C (752 °F)	---	---	> 1000	---	---

2) For "direct mounting" refer to Section "Process conditions".

Ordering information

Observe questionnaires!			Catalog No.								Code		
Transmitter 2010TD for differential pressure measurement			**V15712-**										
Transmitter 2010TA for absolute pressure measurement			**V15713-**										
Communication													
HART, 4...20 mA				H									
FOUNDATION Fieldbus				F									
PROFIBUS-PA				P									
Measuring Ranges dp / pabs													
60 mbar	(6kPa / 24 inch H_2O)	adjusted to ...		B									
400 mbar	(40kPa / 160 inch H_2O)	adjusted to ...		C									
2.5 bar	(250kPa / 1000 inch H_2O)	adjusted to ...		D									
20 bar	(2MPa / 300 psi)	adjusted to ...		E									
100 bar	(10MPa / 1500 psi)	adjusted to ...		G									
400 mbar abs.	only sensing diaphragm	adjusted to ...		L									
2.5 bar abs.	made of Hastelloy C and only with	adjusted to ...		M									
20 bar abs.	Catalog No. V15713	adjusted to ...		N									
Measuring Ranges pabs-sensor (second value, only with 2010TD)													
410 bar / 6000 psi					1								
without „second value“ (only with 2010TA)					0								
Measuring sensor													
Diaphragm	Fill fluid												
Hastelloy C	Silicone oil					A							
	Carbon fluoride					B							
Process flange, HP and LP sides identical													
(2010TA: Blank process flange made of 316 L st.st. (1.4404) on the minus side)													
Material	Nominal Pressure (SWP)						1						
316 L stainless steel (1.4404)	100 bar / 1500 psi												
Process Connection	**Position of the thread holes for the drain / vent valves** (scope of delivery: plugs only, no vent valves)												
7/16 UNF and 1/4-18 NPT	upright							A					
female thread	side (only in conjunction with Code 395 / 396)							B					
acc. to DIN 19213	upright							C					
(M10/M12 and 1/4-18 NPT)	side (only in conjunction with Code 395 / 396)							D					
attached remote seal [1]								E					
Screws	**Flange O-rings**												
Stainless Steel	Viton (Temperature Limits: -20 °C … +120 °C)								6				
	Perbunan								7				
	PTFE ($T_{operating} \geq$ -20 °C)								8				
	EPDM (for NACE application)								9				
	for vacuum proof remote seals (only in conjunction with Code 739								B				
Amplifier Housing													
Type	Material	Electrical connection											
Barrel - Type, ID Plate, Stainless Steel	Aluminium	1/2 NPT								A[3]			
Barrel - Type, ID Plate Plastic	Aluminium	1/2 NPT								D			
		One M20 x 1.5 cable gland								E			
		Plug Han 8U (with Profibus PA: plug M12 [2])								F			
Barrel - Type, ID Plate Plastic	Stainless Steel	1/2 NPT								J			
		One M20 x 1.5 cable gland								K			
DIN - Type, ID Plate Plastic	Aluminium	1/2 NPT								L			
		One M20 x 1.5 cable gland								M			
		Plug Han 8U (with Profibus PA: plug M12 [2])								N			
Function													
square rooting											224		

[1] 2010TA: 1 remote seal, 2010TD: 2 remote seals, but with 1 remote seal please indicate the „Process connection Code“ A, B, C or D

[2] without mating plug (female), see Data Sheet 10/63-6.44

[3] for Explosion Proof acc. to FM

Ordering information (continued)

	Catalog No.	Code		
Amplifier housing accessories				
Local keys (not with amplifier housing Code J, K)		5C2		
LCD indicator		5C4		
LCD indicator, back lit (only with communication HART, 4…20 mA)		5C5		
Transient Suppression (not with Ex-Protection "Intrinsically Safe")		5C6		
Explosion Protection (acc. to ATEX)				
II 1/2 G EEx d IIC T6 (not with housing Code F or N; without cable gland)		5A1		
FM Explosion Proof (only with amplifier housing code A)		5A2		
II 1/2 GD EEx ia IIC T6		5A3		
FM Intrinsically Safe		5A4		
II 3 GD EEx nL IIC T6 (supply without cable gland)		5AC		
Overfill protection				
for water polluting liquids; (flammable liquids: only with Ex-Code 5A3)		546		
for 2010TD with close coupled				
or remotely coupled chemical seal(s) via capillary tube (only with range Code B, C and D)				
Mounting Bracket				
Wall mounting, stainless steel		143		
Wall and pipe mounting, stainless steel		144		
Vent / drain plugs				
Stainless Steel (2 pieces)		395		
Hastelloy (2 pieces)		396		
Flange Adapter (material: oval flange / bolts)				
Oval flange 1/2-14 NPT(stainless steel / stainless steel)		377		
Tag-No.				
on Type plate (max. 30 characters)		205		
Stainless Steel Tag Plate (max. 30 characters)		5C8		
Operating manual (1 pcs. free of charge)				
German	each	Z2D		
English	each	Z2E		
Certificates				
Factory Certificate „EN 10 204“ of the instrument design		530		
Acceptance Test Certificate B „EN 10 204“ of the conformity, hysteresis		531		
Acceptance Test Certificate B „EN 10 204“ of the pressure testing		532		
Factory Certificate „EN 10 204“ of process-wetted parts		533		
Acceptance Test Certificate B „EN 10 204“ of the Cleanliness Stage acc. to DIN 25410		534		
Accept. Test Certificate B „EN 10 204“ Helium leakage test of the sensor module (only w. Code 150)		535		
Acceptance Test Certificate B „EN 10 204“ of the pressure-bearing and process-wetted parts with analysis certificates as material verification (minor parts with Factory Certificate acc. to "EN 10 204")		536		
Factory Certificate „EN 10 204“ of the pressure-bearing and process-wetted parts		537		
Measuring mechanism leak-tested with helium		150		

Scope of Delivery
1 Instructions
1 Instrument socket with plug connector Han 8 U
1 Plug (with one-sided remote seal connection)

Supplied against special order:
Power supply e.g: TZN 128 (Data Sheet 18-8.39 EN)
or Contrans I module (catalogue 17.1)
Spare Parts Transmitter 2010TD / 2010TA

Flush diaphragm seal / Extended diaphragm seal DN 50 / DN 2” (complete, with flange)

Options			Code-Nr.					
Remote seal mounting		at	HP side		LP side			
Directly mounted (**without** capillary tube)			729		-			
Remote coupled to sensor **with** capillary tube - bottom			751		753			
Nominal diameter	**Sealing surface**	**Diaphragm / sealing**						
DN 50	Form E	316 L st.st. (1.4404)	P00		M00			
	(DIN 2526)	Hastelloy C	P01		M01			
		Tantalum	P02		M02			
	Form V 13	316 L st.st. (1.4404)	P03		M03			
	(DIN 2513)	Hastelloy C	P04		M04			
		Tantalum	P05		M05			
	Form N	316 L st.st. (1.4404)	P06		M06			
	(DIN 2512)	Hastelloy C	P07		M07			
		Tantalum	P08		M08			
DN 2"	Form RF	316 L st.st. (1.4404)	P09		M09			
	(ANSI B 16.5)	Hastelloy C	P10		M10			
		Tantalum	P11		M11			
Flange / Pressure rating								
DN 50	PN 16 / 40		P30		M30			
	PN 64	diaph. Tantalum on request	P31		M31			
	PN 100	diaph. Tantalum on request	P32		M32			
DN 2"	Class 150 psi	only sealing RF	P33		M33			
	Class 300 psi	only sealing RF	P34		M34			
	Class 600 psi	only sealing RF, diaph. Tantalum on request	P35		M35			
Flush diaphragm / extended diaphragm								
Remote seal with flush diaphragm (without extension)			P50		M50			
Remote seal with extension (not with diaphragm "Tantalum")								
DN 50 / 2"	Extension made	Extension length 50 mm	P51		M51			
	of 316 L st.st.	Extension length 100 mm	P52		M52			
		Extension length 150 mm	P53		M53			
	Extension made	Extension length 50 mm	P54		M54			
	of Hastelloy C	Extension length 100 mm	P55		M55			
		Extension length 150 mm	P56		M56			
Filling liquid [1]								
Silicone oil				074				
Carbon fluoride				687				
White oil (suitable for the use in the food and beverage industry)				660				
High-temperature oil (not for 'close coupled to sensor' design,Code-No.729)				663				
Vacuumproof design				739				
Lengths of capillary tube								
1 m			755		765			
2 m			757		767			
4 m			759		769			
6 m			760		770			
8 m			761		771			
11 m			762		772			
16 m			763		773			
Special length between 1 m and 16 m								
Basic price of the next longer standard length plus an extra fee			764		774			
Special features								
Diaphragm with FEP-coating [2]			662		672			
(for material 316L (1.4404) and Hast.C; medium temperature < 150°C)								
Capillary tube with PVC protective cover				775				
Other variations regarding pressure rating, materials, sealing surface, filling liquid on request								
For mounting from **remote seals in "sandwich construction"** (additional blank flange required) **see data sheet 15-8.14 EN**								

The three-digit code numbers are added to the order number, separated by diagonal strokes.

[1] When mounted on an absolute or gauge pressure transmitter for measurement < 500 mbar (abs,), the vacuumproof design must be ordered (Code.No. 739).

[2] With "extended diaphragm" on request.

Flush diaphragm seal / Extended diaphragm seal DN 80 / DN 3" (complete with flange)

Options			Code-No.					
Remote seal mounting		at	HP side		LP side			
Directly mounted (**without** capillary tube)			729		-			
Remote coupled to sensor **with** capillary tube - bottom			751		753			
Nominal diameter	**Sealing surface**	**Diaphragm / sealing**						
DN 80	Form E	316 L st.st. (1.4404)	P12		M12			
	(DIN 2526)	Hastelloy C	P13		M13			
		Tantalum	P14		M14			
	Form V 13	316 L st.st. (1.4404)	P15		M15			
	(DIN 2513)	Hastelloy C	P16		M16			
		Tantalum	P17		M17			
	Form N	316 L st.st. (1.4404)	P18		M18			
	(DIN 2512)	Hastelloy C	P19		M19			
		Tantalum	P20		M20			
DN 3"	Form RF	316 L st.st. (1.4404)	P21		M21			
	(ANSI B 16.5)	Hastelloy C	P22		M22			
		Tantalum	P23		M23			
Flange / Pressure rating								
DN 80	PN 16 / 40		P36		M36			
	PN 64	diaph. Tantalum on request	P37		M37			
	PN 100	diaph. Tantalum on request	P38		M38			
DN 3"	Class 150 psi	only sealing RF	P39		M39			
	Class 300 psi	only sealing RF	P40		M40			
	Class 600 psi	only sealing RF, diaph. Tantalum on request	P41		M41			
Flush diaphragm / extended diaphragm								
Remote seal with flush diaphragm (without extension)			P50		M50			
Remote seal with extension (not with diaphragm "Tantalum)								
DN 80 / 3"	Extension made	Extension length 50 mm	P57		M57			
	of 316 L st.st.	Extension length 100 mm	P58		M58			
		Extension length 150 mm	P59		M59			
	Extension made	Extension length 50 mm	P60		M60			
	of Hastelloy C	Extension length 100 mm	P61		M61			
		Extension length150 mm	P62		M62			
Filling liquid [1]								
Silicone oil				074				
Carbon fluoride				687				
White oil (suitable for the use in the food and beverage industry)				660				
High-temperature oil (not for 'close coupled to sensor' design, Code-No.729				663				
Vacuumproof design				739				
Lengths of capillary tube								
1 m			755		765			
2 m			757		767			
4 m			759		769			
6 m			760		770			
8 m			761		771			
11 m			762		772			
16 m			763		773			
Special length between 1 m and 16 m								
Basic price of the next longer standard length plus an extra fee			764		774			
Special features								
Diaphragm with FEP-coating [2]			662		672			
(for material 316L (1.4404) and Hast.C; medium temperature < 150°C)								
Capillary tube with PVC protective cover				775				
Other variations regarding pressure rating, materials, sealing surface, filling liquid on request								
For mounting from **remote seals in "sandwich construction"** (additional blank flange required) **see data sheet 15-8.14 EN**								

The three-digit code numbers are added to the order number, separated by diagonal strokes.

[1] When mounted on an absolute or gauge pressure transmitter for measurement < 500 mbar (abs,), the vacuumproof design must be ordered (Code.No. 739).

[2] With "extended diaphragm" on request.

Questionnaire "Customer-specific configuration"

Customer-specific configuration

Output signal (please tick)

☐ 4...20 mA ☐ linear
☐ PROFIBUS-PA ☐ square root: Zero suppression ..... %
lin / Sq.Rt. transition point ..... %
☐ Foundation Fieldbus ☐ characteristic, programmable (please complete table):

Characteristic	Input (%)	Output (%)
1	0	0
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22	100	100

Electrical damping

..... s (0...60 s)

Output current

Max. output current ..... mA (20...22.5 mA)
Min. output current ..... mA (3.5...4 mA)

Max. alarm current ..... mA (20...22.5 mA)
Min alarm current ..... mA (3.5...4 mA)

Tag-No.

.....

Digital display

Displayed value .....

Questionnaire 80/15-105 EN (page 1 of 2)

Measuring instruments with remote seals for measuring gauge pressure, differential pressure, flowrate and level

The information given in this questionnaire is binding for the technical design of measuring system.
Only when exact and correct information is provided it can be ensured satisfactory measurement results .
The questions identfied by ◯ will be answered by **ABB**.

☐ Company

☐ Location

☐ Customer number: ◯ Offer number:

☐ Measuring-point number: ◯ Contract number:

◯ Position number:

Level Measurement

	Measuring instrument with one remote seal (see Fig. 1)	Measuring instrument with two remote seals (see Fig. 2)
1 Medium to be measured _____		
2 Operating data of the medium to be measured which will be referred to for the calculation and design Temperatures Process pressure Density Density of the gas above the process Process variable (e.g. 0 ... 5m ≙ 0 ... 20mA)	t = _____ °C ϱ_M = _____ kg/m³ _____ ≙ 0/4...20mA)	t = _____ °C p = _____ bar ϱ_M = _____ kg/m³ ϱ_G = _____ kg/m³ _____ ≙ 0/4...20mA)
3 Elevation between remote seal and measuring instr. Instrument above the remote seal Instrument below the remote seal	a = + _____ m a = – _____ m	
4 Difference in elevation of the two remote seals		e = _____ m
5 Tank dimensions: Difference in height of levels Dimension: from lower remote seal up to lower level from lower remote seal up to upper level	c = _____ m b = _____ m d = _____ m	c = _____ m b = _____ m d = _____ m
6 Capillary tube length + (HP) side – (LP) side	_____ m	_____ m _____ m
7 Additional data Process temperature range Average ambient temperature at the measuring instr. Average ambient temperature at the capillary tube	t_M = from ..... to ..... °C t_{uM} = _____ °C t_{uK} = _____ °C	t_M = from ..... to ..... °C t_{uM} = _____ °C t_{uK} = _____ °C
8 Data of limits which for example can occur with cleaning processes or blowing through (not measuring operation) Temperature Pressure	t_{max} = _____ °C t_{min} = _____ °C p_{max} = _____ bar p_{min} = _____ bar	t_{max} = _____ °C t_{min} = _____ °C p_{max} = _____ bar p_{min} = _____ bar

Note: Remote seals with silicone oil (standard) may be mounted up to a maximum of 5m below the measuring instrument.

H_1 = lower level
H_2 = upper level

Fig. 1

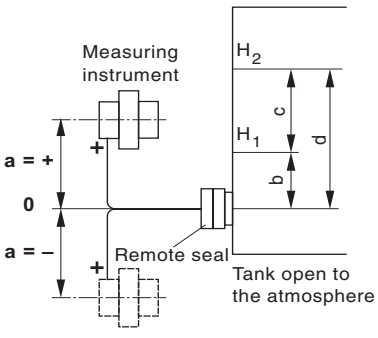
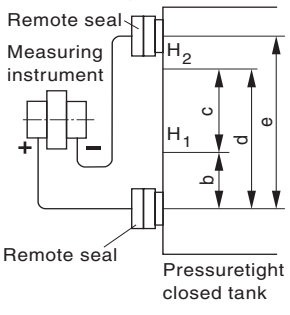


Fig. 2



M01281E2.eps

Questionnaire 80/15-105 EN (page 2 of 2)

Gauge pressure, Differential pressure and Flowrate Measurement

	Measuring instrument with one remote seal (see Fig. 3)	Measuring instrument with two remote seals (see Fig. 4)
1 Medium to be measured _____		
2 Operating data of the medium to be measured which will be referred to for the calculation and design Temperatures Process pressure Measuring span Differential pressure Density of the gas above the process Process variable (e.g. 0 ... 500mbar ≙ 0 ... 20mA)	t = _____ °C p = _____ bar △M = _____ bar ϱ_M = _____ kg/m³ _____ ≙ 0/4...20mA	t = _____ °C p_1 = _____ bar p_2 = _____ bar △M = _____ bar △p = $p_1 - p_2$ = _____ bar ϱ_M = _____ kg/m³ _____ ≙ 0/4...20mA
3 Elevation between remote seal and measuring instr. Instrument above the remote seal Instrument below the remote seal	a = + _____ m a = – _____ m	
4 Difference in elevation of the two remote seals		e = _____ m
5 Capillary tube length + (HP) side – (LP) side	_____ m	_____ m _____ m
6 Additional data Process temperature range Average ambient temperature at the measuring instr. Average ambient temperature at the capillary tube	t_M = from ..... to ..... °C t_{uM} = _____ °C t_{uK} = _____ °C	t_M = from ..... to ..... °C t_{uM} = _____ °C t_{uK} = _____ °C
7 Data of limits which for example can occur with cleaning processes or blowing through (not measuring operation) Temperature Pressure	t_{max} = _____ °C t_{min} = _____ °C p_{max} = _____ bar p_{min} = _____ bar	t_{max} = _____ °C t_{min} = _____ °C p_{max} = _____ bar p_{min} = _____ bar

Note: Remote seals with silicone oil (standard) may be mounted up to a maximum of 5m below the measuring instrument.

Fig. 3

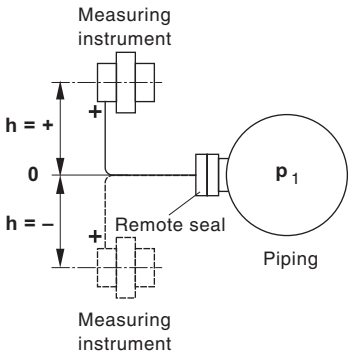
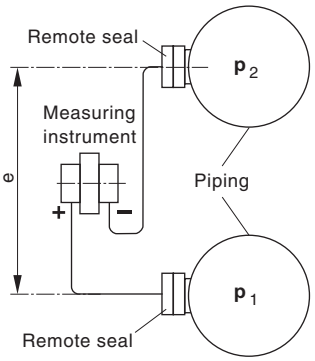


Fig. 4



e.g. also with filter measurements; in front of and behind the filter

Compiled: , Date 20

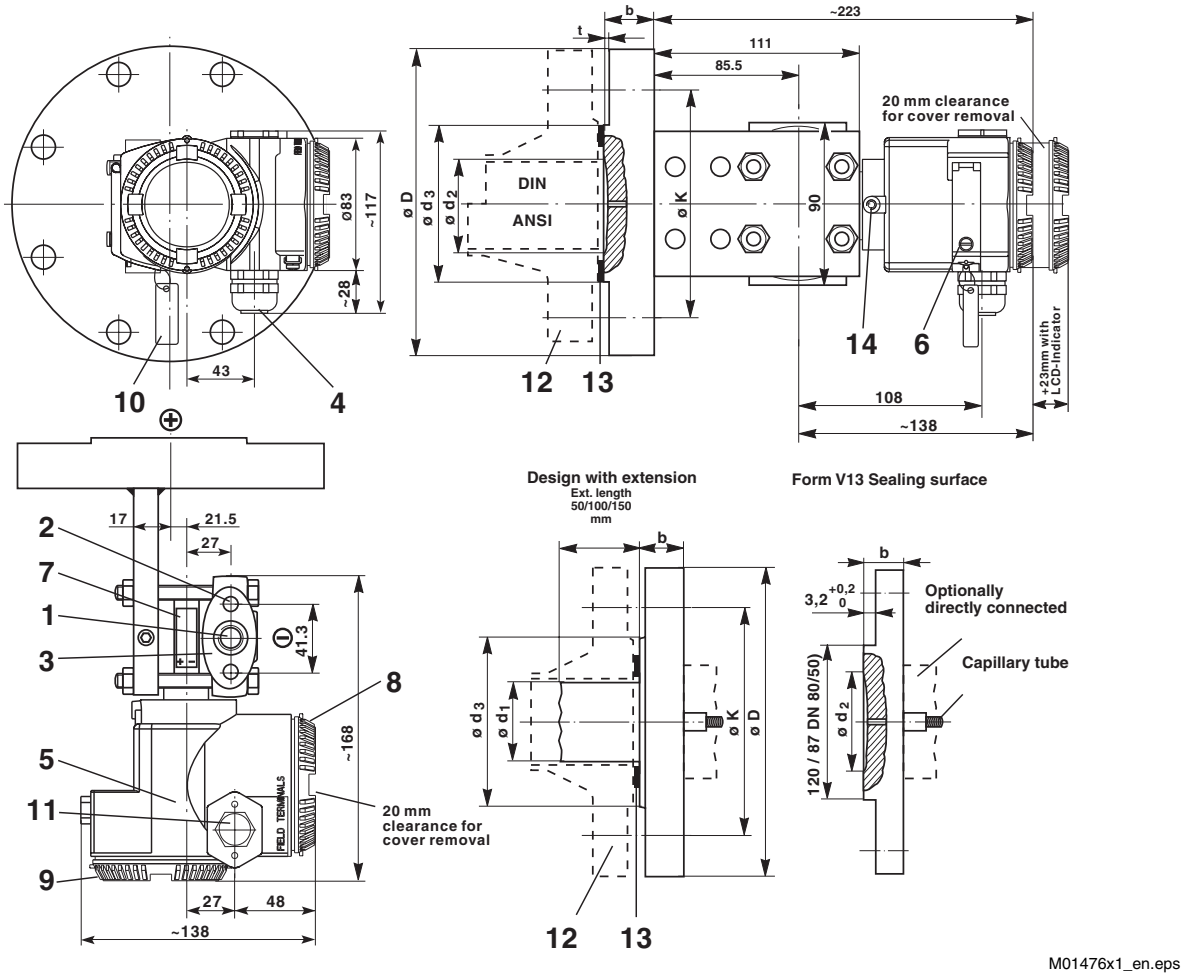
Company stamp (Signature)

M01282E2.eps

Dimensional drawings

Transmitter with DIN-type amplifier housing

Errors and omissions excepted. Dimensions are in millimeters.



M01476x1_en.eps

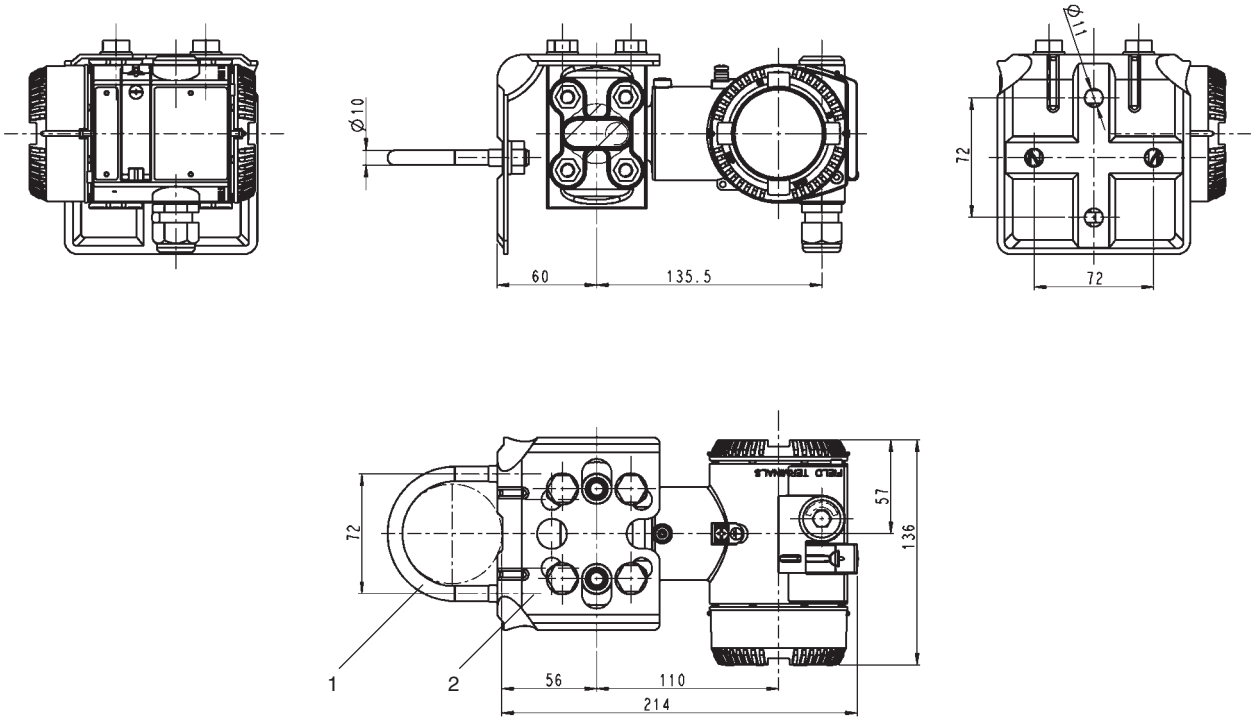
Nominal diameter	Ø D	Ø K	Extension Ø d_1	Ø d_2	Ø d_3	t	b	Maximum working pressure	Required screws	
									Number	Thread
DN 50	165	125	51	57	102	$3^{+0.5}$	20	PN 16 / 40	4	M16
	180	135	51	57	102	$3^{+0.5}$	26	PN 64	4	M20
	195	145	51	57	102	$3^{+0.5}$	28	PN100	4	M20
DN 80	200	160	76	75	138	$3^{+0.5}$	24	PN 16 / 40	8	M16
	215	170	76	75	138	$3^{+0.5}$	28	PN 64	8	M20
	230	180	76	75	138	$3^{+0.5}$	32	PN100	8	M24
DN 2”	152.4	120.6	51	57	92.1	$3^{+0.5}$	17.4	class 150	4	M18
	165.1	127.0	51	57	92.1	$3^{+0.5}$	20.6	class 300	8	M18
	165.1	127.0	51	57	92.1	6.35	31.75	class 600	8	M18
DN 3”	190.5	152.4	76	75	138	$3^{+0.5}$	22.2	class 150	4	M16
	209.5	168.3	76	75	138	$3^{+0.5}$	27.0	class 300	8	M20
	209.5	168.3	76	75	138	6.35	38.05	class 600	8	M20

1 1/4-18 NPT female thread for process connection or sealing plug.
2 Thread for fixing screws: 7/16-20 UNF, 16mm deep. Minimum screw-in length is 12mm. With a flange according to DIN 19 213: M 10, minimum screw-in length according to DIN 19 213.
3 60x32 mm oval flange.
4 Electrical connections: M20 x 1.5 cable gland or 1/2-14 NPT female threads on both sides or one plug HAN 8U.
5 Type plate.
6 Captive screw for key unit cover
7 Measuring mechanism plate.
8 Enclosure cover (electrical connection).
9 Enclosure cover (connection for Digital instrument).
10 Tie-on plate, e.g. for tag number (optional).
11 Blind plug.
12 Mating flange acc. to DIN / ANSI (not supplied).
13 Flat seal (Not supplied)
14 Housing rotation stop screw

Dimensional drawings

Possible mounting with bracket (optional, Code 143/144) for transmitters with capillary tube connection (illustration: barrel-type electronic housing, however without capillary tube)

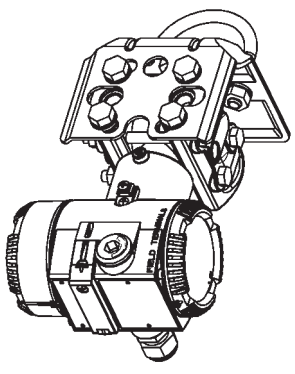
Errors and omissions excepted. Dimensions are in mm.



M01517x1.eps

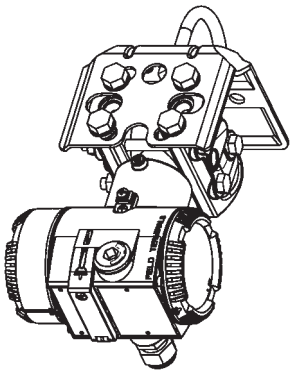
1 U-bolt for pipe mounting. Pipe: 2“ (internal-Ø).
Permissible pipe-Ø: 53 ... 64mm.
Rearrange the brackets for horizontal pipe mounting.
2 Brackets, hole-Ø: 11mm.

Vertical pipe mounting



M01518x1.eps

Horizontal pipe mounting



M01519x1.eps

ABB Ltd.
Howard Road, St. Neots
Cambridgeshire, PE19 8EU
UK
Tel.: +44 (0) 1480 47 53 21
Fax: +44 (0) 1480 21 79 48

ABB Inc.
125 E. County Line Road
Warminster, PA 18974
USA
Tel.: +1 215 674 6000
Fax: +1 215 674 7183

ABB Automation Products GmbH
Schillerstraße 72
D-32425 Minden
Germany
Tel.: +49 571 830 - 1691
Fax: +49 571 830 - 1368

Subject to technical changes
Printed in the Fed. Rep. of Germany
10/15-4.14 EN 04.03