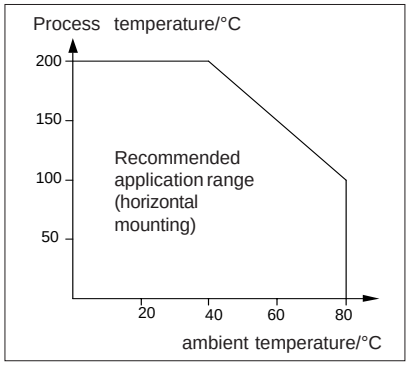
SATRON VL pressure transmitter

SATRON VL pressure transmitter belongs to the V transmitter family. The series V transmitters have both analog and smart properties. SATRON VL is used for 0-4 kPa...0-15 MPa ranges. The transmitter communicates in a 2-wire system. In pressure measuring applications SATRON VL transmitters are used for measuring the pressure of clean, sedimenting, crystallizing and sticking materials. The transmitter's sensor is piezoresistive. The rangeability is 25:1. The transmitter communicates digitally using the HART® protocol.

TECHNICAL SPECIFICATIONS

Measuring range and span
See Selection Chart.
Zero and Span adjustment
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using extern control shafts (analog option), keyboard (display option), HART®275 communicator.
Damping
Time constant is continuously adjustable 0,01 to 60 s.

Temperature limits
Ambient: -30 to +80 °C
Process: -30 to +125 °C / +200 °C
Shipping and storage: -40 to +80 °C.



Output 2-wire (2W), 4-20 mA, user selectable for linear, square root, inverted signal or the transfer function (16 points)specified by the user
Supply voltage and permissible load
See the load capacity diagram;
4-20 mA output: 12-35 VDC.

Humidity limits
0-100 % RH; freezing of condensed water not allowed in reference pressure channels.

Pressure limits
Minimum and maximum process pressure: see the appended tables.

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC770: Reference conditions, specified span, no range elevation, horizontal mounting; O-ring seals, AISI316L diaphragm, silicone oil fill

Accuracy
±0.1 % of calibrated span
(span 1:1-7.5:1 /max.range).
On the measuring ranges 7.5:1-25:1:

$$\pm[0.01+0.012 \times (\frac{\text{max.span}}{\text{calibrated span}})]\% \text{ of calibrated span}$$

(incl. nonlinearity, hysteresis and repeatability)

Long-term stability
• ±0.1 % of max. span / 1 year

Temperature effect on -30 °C to +80 °C range, optional
Zero and span error
• ±0.15 % of max. span, code **E**
• ±0.5 % of max. span, code **G**

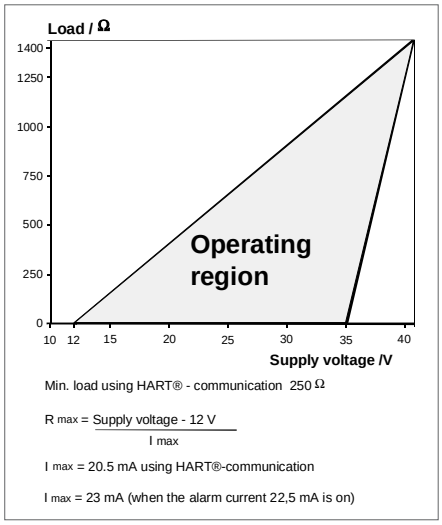
0 to +200 °C, code **H**
• ±1 % of max. span
• Process connection **P** (VL4 and 5): ±2 % of max. span

Mounting position effect
Deviation from horizontal position causes a zero shift that can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of span per 2 g to 10-2000 Hz.
Power supply effect
<±0.01 % of calibrated span per volt.

EMC-test standards
CENERIC EMISSION STANDARD:
EN 50081 - 2: 1993
Normative reference:
EN 55022:1987/class A
GENERIC IMMUNITY STANDARD:
EN 50082 - 2: 1995
Normative references:
EN 61000-4-2, -4, -5, -8, -11
ENV 50140, ENV 50204, ENV 50141

Insulation test voltage
500 V rms 50 Hz.



CONSTRUCTION AND CALIBRATION

Materials
Diaphragm [1]: AISI316L, Duplex, Hast. C22/276, Nickel, Tantalum or Titanium. Other sensing element materials: AISI316L, AISI316.

Fill fluid Silicone oil, inert oil or Food oil (Neobee M20).

Housing with PLUG connector, codes **H** and **T**
Housing: AISI316
Seals: Viton® and NBR
TEST jacks: MS358Sn/PVDF, protected with silicone rubber shield.
PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Housing with junction box/terminal strip, codes **M** and **N**
Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

Connection cable between sensing element and housing
Codes **L** and **K** :
PTFE hose with AISI316 braiding.

Pressure limits

Pressure capacity

Trans-mitter type	Max. over-load pres-sure, MPa	Pressure class, max.
VL4	0,3	PN40
VL5	1,5	PN40
VL6	7,5	PN100
VL7	40,0	PN250

Minimum process pressure:

$T_{proc.}$ ℃	Min.pressure for different fill fluids (kPa, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	10	28
120	15	53
160	25	90
200	40	-

[1] Parts in contact with process medium.

Satron Instruments Inc., P.O.Box 22, FIN-33901 Tampere, Finland
Tel. +358 207 464 800, Telefax +358 207 464 801, www.satron.com

Calibration
For customer-specified range with minimum damping. (If range is not specified, transmitter is calibrated for maximum range.)
Enclosure class: IP66.

Process connections
See Selection Table and dimensional drawings.

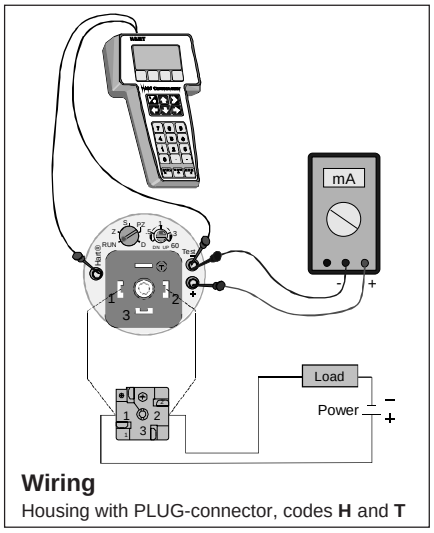
Electrical connections
Housing with PLUG connector, codes **H** and **T:** PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire gross-section 0.5 to 1.5 mm^2.

Housing with junction box/terminal strip**,** codes **M** and **N:**
Pg13.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm^2 wires.

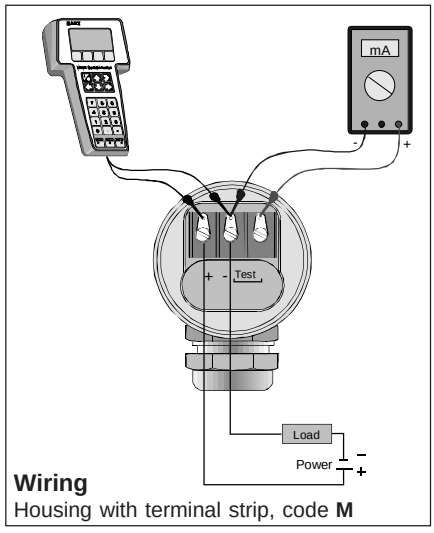
Weight

MOUNTING TYPE		Weight / kg EXTENSION CODE			
		0	**2**	**4**	**6**
Flange	DN50	4.1	4.7	4.9	5.1
	DN80	6.4	7.6	7.7	8.1
SA (Sandvik)		-	3.8	5.0	6.1
Tx (Tri-Clamp)		0.9	-	-	-
PA (PMC 1")		0.6	-	-	-
BA (M45x2)		0,9			
UA (Varivent)		1.0	-	-	-

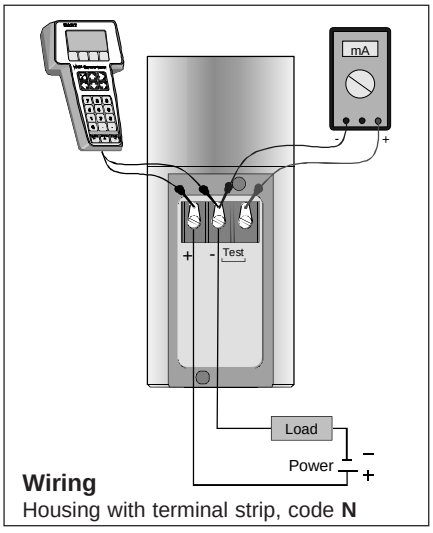
Type M : add 0.5 kg and type N : add 0.6 kg to the specified weights.



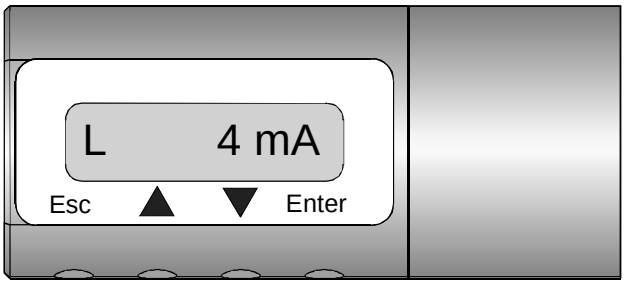
Wiring
Housing with PLUG-connector, codes **H** and **T**



Wiring
Housing with terminal strip, code **M**



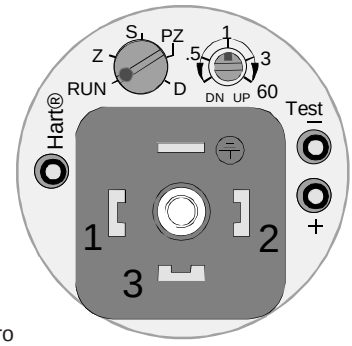
Wiring
Housing with terminal strip, code **N**



Keyboard :

Esc	=	Press **Esc** move back towards the top of the main menu.
▲	=	Use the **UP** arrow key to move up on the current menu level or to increase the selected parameter value.
▼	=	Use the **DOWN** arrow key to move down on the current menu level or to decrease the selected parameter value.
Enter	=	Press **ENTER** to move to a lower level in a menu or to accept a command or parameter value.

Housing with display, code N



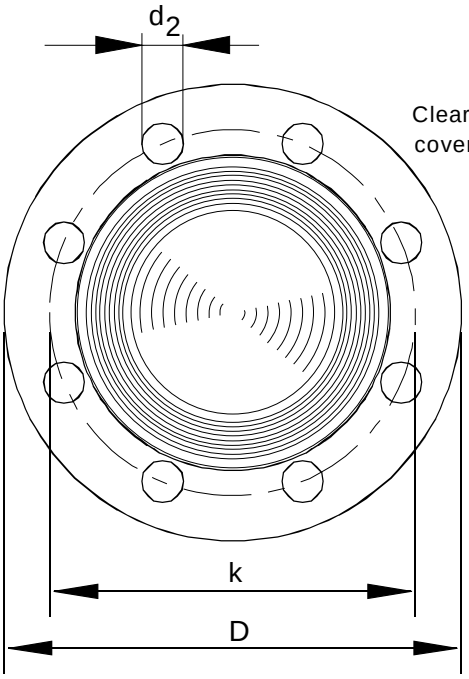
Use of selector switch :

RUN	= working position
PZ	= Process value zero
D	= damping adjustment
S	= Span adjustment
Z	= Zero adjustment
DN	= Down
UP	= Up

Housing with PLUG-connector, code T

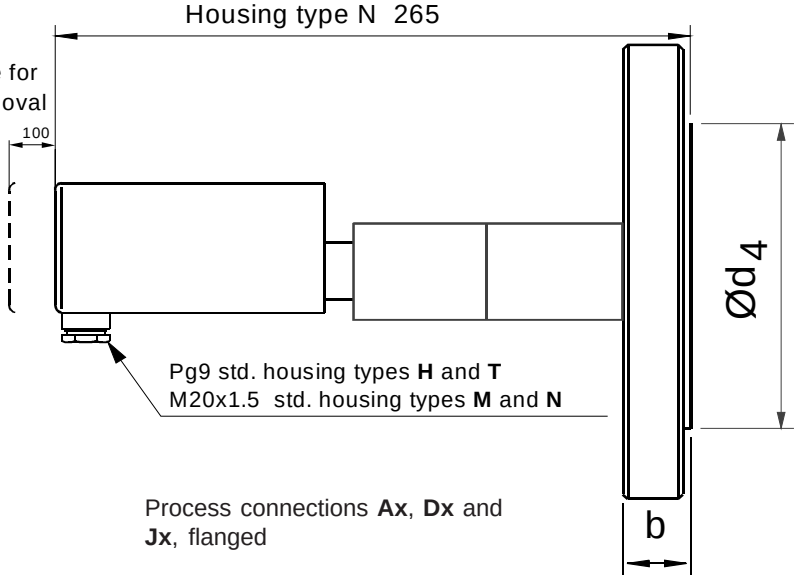
SATRON VL pressure transmitter

Dimensional drawings (dimensions in mm)

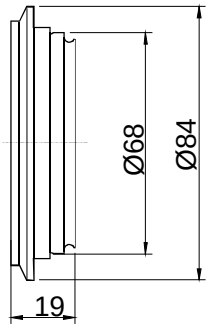


Clearance for cover removal

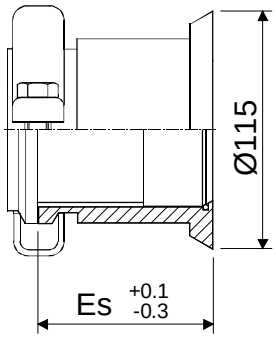
Housing types H, T and M 235
Housing type N 265



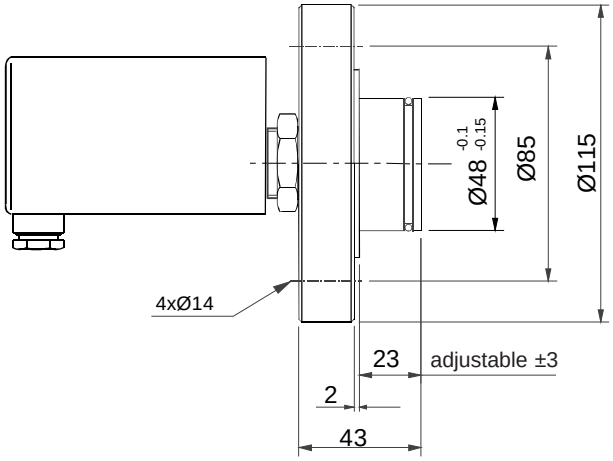
Process connections **Ax**, **Dx** and **Jx**, flanged



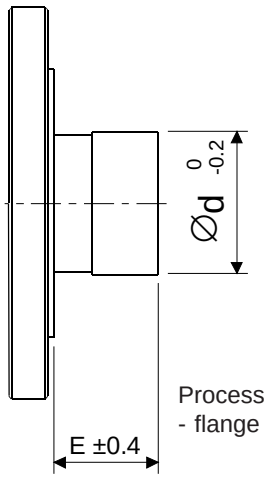
Process connection **UA**
- Tuchenhagen DN50/40 (Varinent)



Process connection **SA**
- Sandvik-clamp



Process connections **DA**, DN25 PN40 flange with extension, process temperature max. +125°C



Process connection **Ax**, **Dx** and **Jx**
- flange with extension

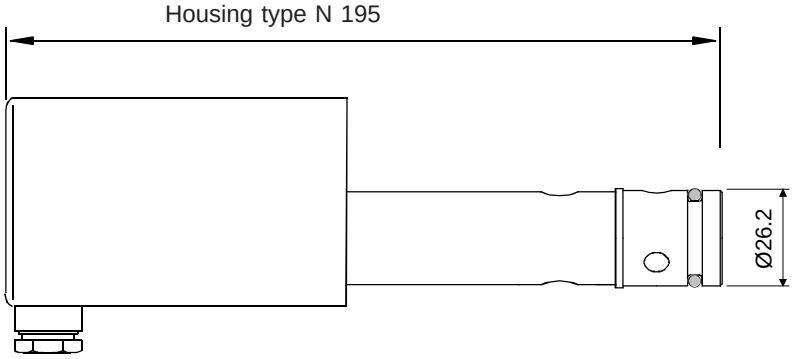
Code	E +0.4 -0.4	Es +0.3 -0.2
0	0	-
2	51	53
4	102	104
6	152	155

FLANGE SIZE	Flange dimens.			Holes			Exten.
	b	D	Ød4	Kpl	d2	k	Ød -0.2
ISO DN25 PN40	18	115	68	4	14	85	48
ISO DN50 PN40	20	165	102	4	18	125	51
ISO DN80 PN40	24	200	138	8	18	160	73
ISO DN100 PN40	24	235	162	8	22	190	73
ANSI 1" 150 lbs	15	108	51	4	16	79.4	-
ANSI 1" 300 lbs	18	124	51	4	20	88.9	-
ANSI 2" 150 lbs	23	152	92	4	20	120.6	51
ANSI 2" 300 lbs	25	165	92	8	20	127	51
ANSI 3" 150 lbs	26	191	127	4	20	152.4	73
ANSI 3" 300 lbs	31	210	127	8	23	168.3	73
ANSI 4" 150 lbs	26	229	157	8	20	190.5	73
ANSI 4" 300 lbs	34	254	157	8	23	200	73
JIS 10K-50	16	155	96	4	19	120	51
JIS 40K-50	26	165	105	8	19	130	51
JIS 10K-80	18	185	126	8	19	150	73
JIS 40K-80	32	210	140	8	23	170	73
JIS 10K-100	18	210	151	8	19	175	73
JIS 40K-100	36	250	165	8	25	205	73

SATRON VL pressure transmitter

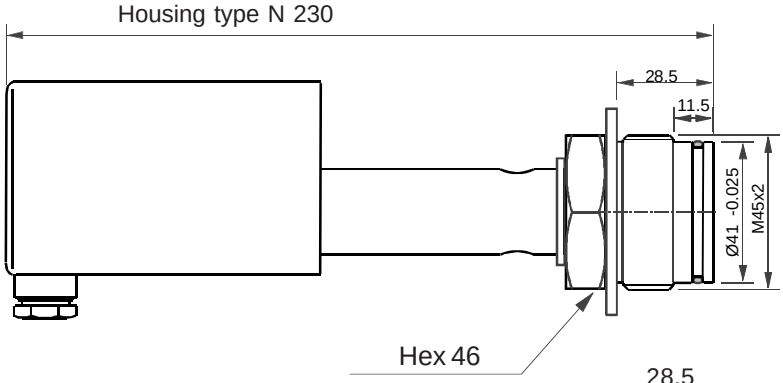
Dimensional drawings (dimensions in mm)

Housing types H, T and M 165
Housing type N 195

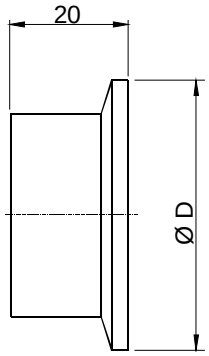


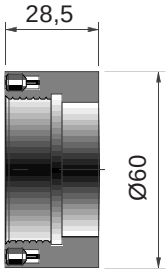
Process connection **PA**
- PMC 1"

Housing types H, T and M 200
Housing type N 230



Process connection **BA**
- M45x2





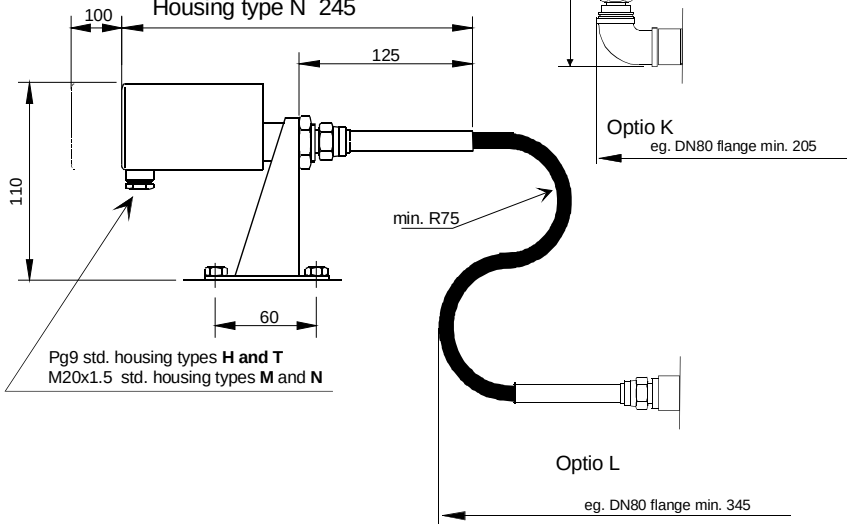
Coupling M45x2 with adjust,
order code M1050459

Process connection **TA**, **TB** and **TC**
- Tri-clamp DN38 ... 63.5

DN	ØD
38	50,5
51	64
63,5	77,5

Clearance for
cover removal

Housing types H, T and M 215
Housing type N 245



Remote electronics,
connecting cable with
protection hose, codes **L** and **K**

SATRON VL pressure transmitter

Selection Chart

Adjustability (±)

	Span, min.	Span, max.	Measuring range
VL4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VL5	26.5 kPa (265 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VL6	0.145 MPa (1,45 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VLA6	0.145 MPa (1,45 bar)	3 MPa (30 bar)	0...+3 MPa (0...30 bar), abs.
VL7	1 MPa (10 bar)	15 MPa (150 bar)	0...+15 MPa (0...150 bar), abs.

Output **S** 4-20mA DC/HART® -protocol

Process connections

DA DN25 PN40 ISO 2084-1974
DB DN50 PN40 ISO 2084-1974
DC DN80 PN40 ISO 2084-1974
DD DN100 PN40 ISO 2084-1974
JA JIS 10K 50 JIS B 2220
JB JIS 40K 50 JIS B 2220
JC JIS 10K 80 JIS B 2220
JD JIS 40K 80 JIS B 2220
JE JIS 10K 100 JIS B 2220
JF JIS 40K 100 JIS B 2220

AA ANSI 1" 150 lbs ANSI B16-5
AB ANSI 1" 300 lbs ANSI B16-5
AC ANSI 2" 150 lbs ANSI B16-5
AD ANSI 2" 300 lbs ANSI B16-5
AE ANSI 3" 150 lbs ANSI B16-5
AF ANSI 3" 300 lbs ANSI B16-5
AG ANSI 4" 150 lbs ANSI B16-5
AH ANSI 4" 300 lbs ANSI B16-5

TA Tri-clamp DN38 PN40 ISO 2852 (max. +125°C)
TB Tri-clamp DN51 PN40 ISO 2852 (max. +125°C)
TC Tri-clamp DN63.5 PN40 ISO 2852 (max. +125°C)
UA Tuchenhagen DN50/40 (Varivent) PN40
PA PMC 1" PN40
SA Sandvik DN70 PN64
BA M45x2

Extension length (mm)	(Flanged conn.)	(Sandvik-conn.)	
0	0	-	(not proc. conn. SA)
1	23	-	(only proc. conn. DN25 PN40, max. +125°C)
2	51	54.5	(not proc. conn. Tx, UA, PA and BA)
4	102	105	(not proc. conn. Tx, UA, PA and BA)
6	152	156	(not proc. conn. Tx, UA and PA)

Wetted materials

Diaphragm				**Extension or other wetted parts**	
Code	Material	Code	Material	Code	Material
1	Nickel	**5**	Tantalum	**2**	AISI316L
2	AISI316L	**6**	Titanium	**3**	Hast.C 276
3	Hast.C 276	**8**	Duplex (1.4462)	**8**	Duplex (1.4462)

Fill fluid **S** Silicone oil **G** Inert oil

Housing type

H Housing with PLUG-connector, DIN43650, no display, inlet PG9
T Housing with PLUG-connector with manual adjust, DIN43650, no display, inlet PG9
M Housing with junction box/terminal strip, no display, inlet M20x1,5
N Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof **0** No explosion proof classification **1** Ex ia IIC T4 (not Atex)

Temperature effect on -30°C to +80°C range, % per max. span
G ±0,5% **E** ±0,15%
Temperature effect on 0°C to +200°C range, % per max. span
H ±1% (not possible process connections **DA1**, **TA**, **TB** and **TC**)

										/		/				/			

Process coupling (for types SA, Tx, PA and BA)
0 No coupling
A With Coupling

Material
2 AISI316L
3 Hast.C276
8 Duplex (1.4462)

Special size of electrical inlet
N 1/2 NPT **G** Pg13.5 **P** PLUG-connector DIN43650

Special features

Special electronics (specify only if housing connected with hose to sensing element)
- connecting cable with protection hose
L Hose protected with PTFE/AISI316 braiding, straight
K Hose protected with PTFE/AISI316 braiding, angle of 90º

Length of cable between sensing element and housing
(specify only if housing connected with cable to sensing element)
2 2 m cable **3** 3 m cable etc. (max. 10 m)

Mounting parts for remote electronics for Ø51 mm tube
0 No mounting parts **1** Mounting parts

Documentation

Calibration Certificate **AE** English

Installation and Operating Instructions **IE** English **IF** Finnish

Material Certificates
0 No material certificate
MC1 Raw materials certificate without appendixes, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
MC2 Raw materials certificate for wetted parts with appendixes, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
MC3 Raw materials certificate for wetted parts with appendixes, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard