

SATRON VL_e Pressure Transmitter

SATRON VL_e pressure transmitter belongs to the V transmitter family. The series V transmitters have smart properties. It is a 2-wire transmitter with Hart® standard communication. **SATRON VL_e** is used for 0 - 4 kPa...0-40 MPa ranges. In pressure measuring applications **SATRON VL_e** transmitters are used for measuring the pressure of clean, sedimenting, crystallizing and sticking materials. The transmitter's sensor is piezoresistive. The rangeability is even 100:1 depending on the range. The versatile selection of diaphragm materials will meet the needs in most processes.



TECHNICAL SPECIFICATIONS

Measuring range and span

See Selection Chart.

Zero and Span adjustment

Zero elevation: Calibrated span is freely selectable on the specified range made by using HART®275/375 communicator.

Damping

Time constant is continuously adjustable 0,01 to 60 s.

Temperature limits

Ambient: -30...+80 °C
Process: -30...+125 °C
Shipping and storage: -40...+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 IEC60770: Reference conditions, specified span, no range elevation, horizontal mounting; AISI316L diaphragm, silicone oil fill

Accuracy

±0,1 % of calibrated span
(For spans 1:1-7.5:1).

For spans 7,5:1-25:1,

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

(incl. nonlinearity, hysteresis and repeatability)

¹⁾ Parts in contact with process medium.

Long-term stability

• ±0.1 % of max. span / 1 year

Temperature effect on -30 °C to +80 °C range

Zero and span error:
±0,5 % 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.

European Directive Information

European Pressure Equipment Directive (PED) (97/23/EC)
- Sound Engineering Practice
Electro Magnetic Compatibility (EMC directive 2004/108/EY)

Insulation test voltage

500 V rms 50 Hz.

CONSTRUCTION AND CALIBRATION Materials

Diaphragm ¹⁾: AISI316L (EN 1.4435), Duplex (EN 1.4462), Hast. C276 (EN 2.4819), Nickel, Tantalum or Titanium (EN 3.7035).
Other sensing element materials: AISI316L, AISI316.

Fill fluid Silicone oil, food oil or inert oil

Housing with PLUG connector,

housing type code **H**

Housing: AISI303/316

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, housing type codes **M** and **N**

Housing: AISI303/316; Seals: Nitrile and Viton®; Nameplates: Polyester

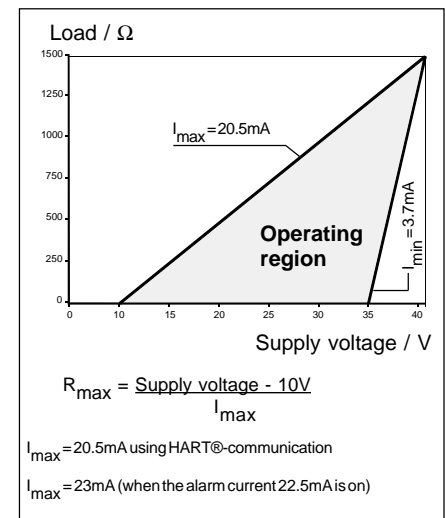
Calibration

For customer-specified range with 1 sec damping. (If range is not specified, transmitter is calibrated for maximum range.)

Enclosure class: IP66.

Process connections

See Selection Table and dimensional drawings.



Pressure limits

Maximum process pressure

Transmitter type	Max. overload pressure, MPa	Pressure class, max.
VL _e 4	0,3	PN40
VL _e 5	1,5	PN40
VL _e 6	7,5	PN100
VLA _e 7	40,0	PN400

Minimum process pressure

T _{proc.} °C	Minimum 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	-

Electrical connections

Housing with PLUG connector, code **H**
 PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0,5...1,5 mm².
 Housing with junction box/terminal strip, code **M**
 M16x1.5 inlet; screw terminals for 0,5...2,5 mm² wires

Product Certifications

European Directive Information

Electro Magnetic Compatibility (EMC directive 2004/108/EC)

All pressure transmitters

Atex Directive (94/9/EC)

Satron Instruments Inc. complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

All Pressure Transmitters :
 - Sound Engineering Practice

Hazardous Locations Certifications

European Certifications

ATEX Intrinsic Safety

Certification No. : DNV-2007-OSL-ATEX- 1346X

II 1 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

II 2 GD T135°C EEx ia II C T4 -20°C ≤ Tamb ≤ 50°C

Input Parameters :

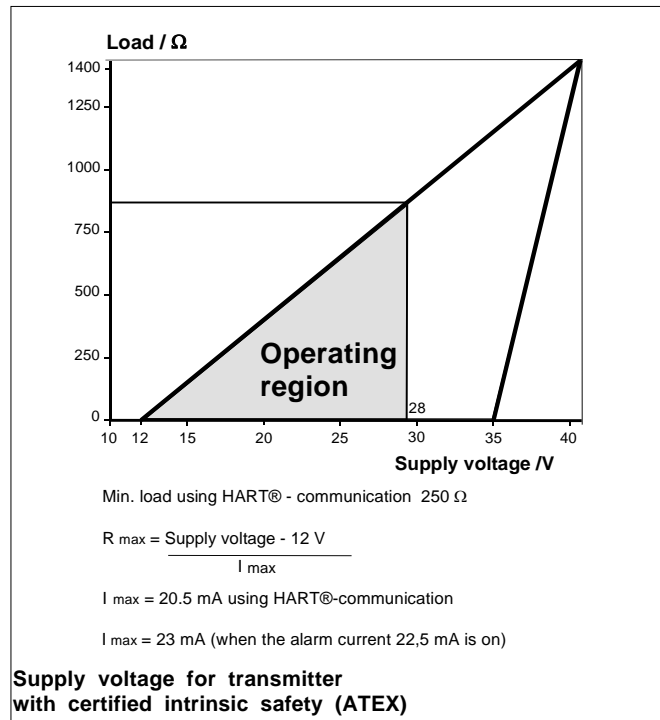
- U_i = 28 V
- I_i = 93 mA
- P_i = 0.651 W
- C_i = 5 nF
- L_i = 0.2 mH

Special Conditions for Safe Use (X) :

The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus.

The non-conducting surface of the sensor element may be charged by the flow of non-conducting media, so there may be electrostatic hazard with IIC-gases. These units should be marked 2 GD.

The equipment shall be installed and connected according to the manufacturers instructions.



Weight

MOUNTING TYPE	EXTENSION CODE	Weight / kg			
		0	2	4	6
Flange	DN50	3.3	3.9	4.1	4.3
	DN80	5.6	6.8	6.9	7.3
SA (Sandvik)	-	3.0	4.2	5.3	-
Tx (Tri-Clamp)	-	0.7	-	-	-
BA (M45x2)	-	0.7	-	-	-
UA (Varivent)	-	0,7	-	-	-
VA, VB, WA, WB	-	0,7	-	-	-

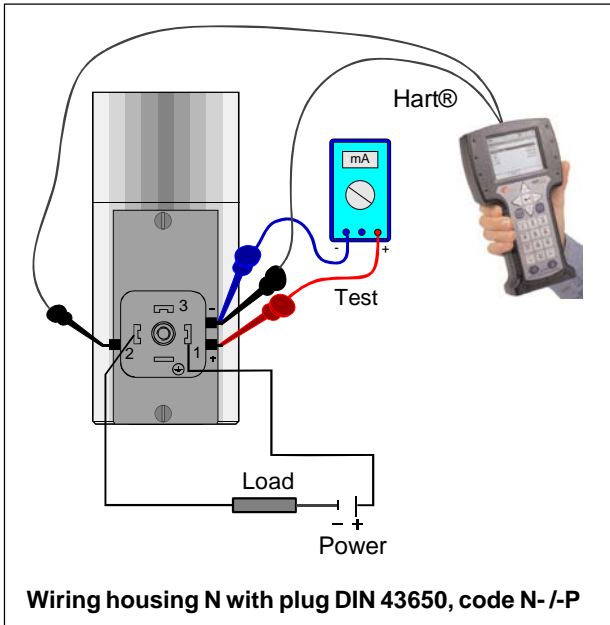
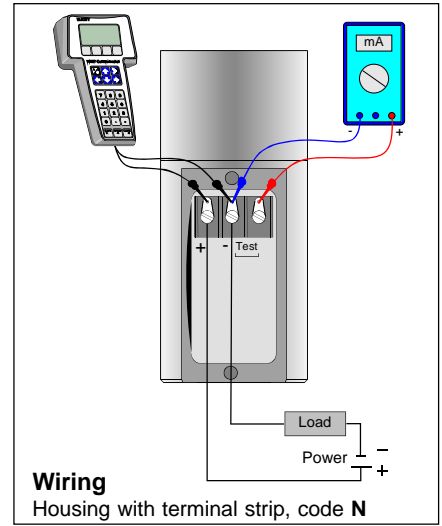
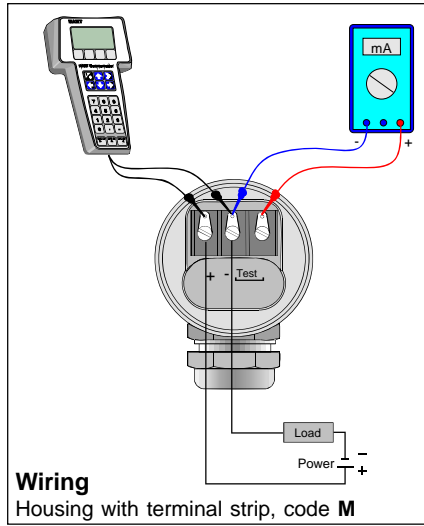
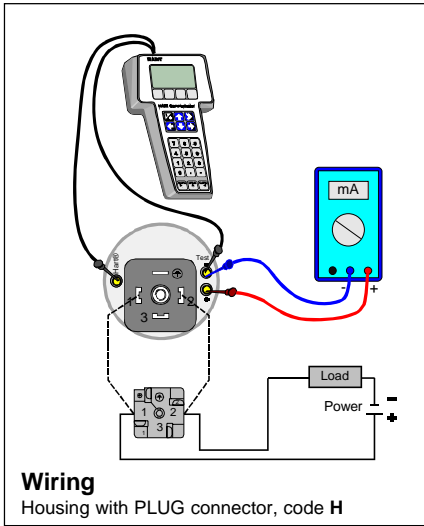
Types **M** and **N**: add 0,5 kg to the specified weights.



Keyboard :

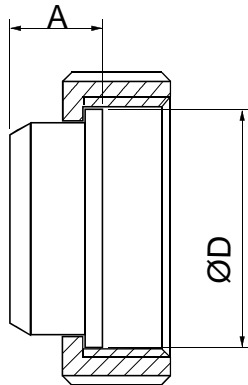
- Esc** = Press **Esc** to move back towards the top of the main menu.
- ▲** = Use the UP arrow key to move up on the current menu level or to increase the selected parameter value.
- ▼** = Use the DOWN arrow key to move down on the current menu level or to decrease the selected parameter value.
- Enter**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

Housing with display, code N



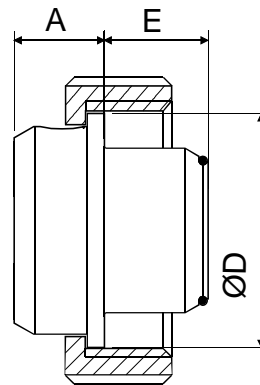
FLANGE SIZE	Flange dimensions			Holes			Extens. $\varnothing d - 0.2$
	b	D	$\varnothing d_4$	Pcs	d_2	k	
ISO DN25 PN40	18	115	68	4	14	85	48
ISO DN50 PN40	20	165	102	4	18	125	51
ISO DN80 PN40	24	200	138	8	18	160	73
ISO DN100 PN40	24	235	162	8	22	190	73
ANSI 1" 150 lbs	15	108	51	4	16	79.4	-
ANSI 1" 300 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

Dimensional drawings (dimensions in mm)



Process connection
VA and VB
- SMS38 and SMS51

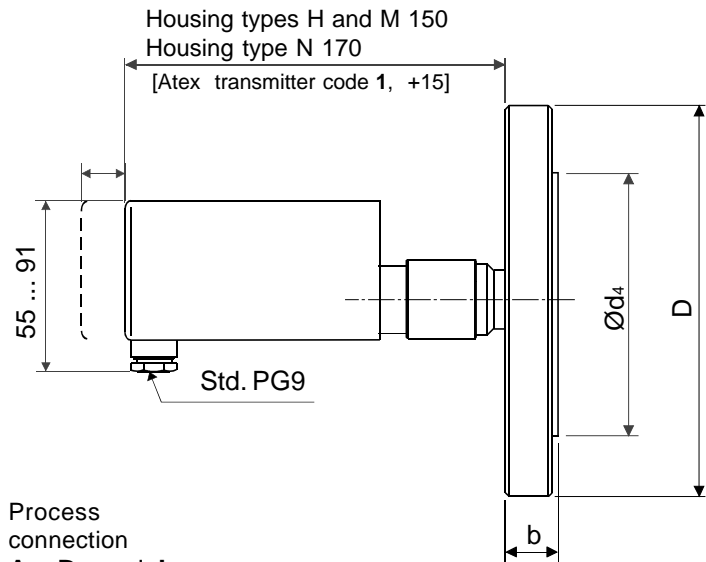
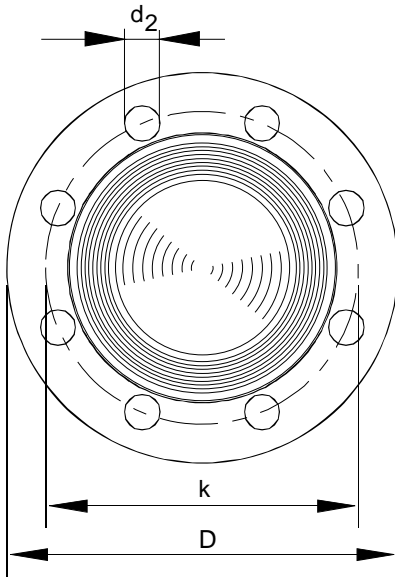
Size	Dimensions		Thread
	$\varnothing D$	A	
38	54	21	Rd 60 x 1/6
51	64	23	Rd 70 x 1/6



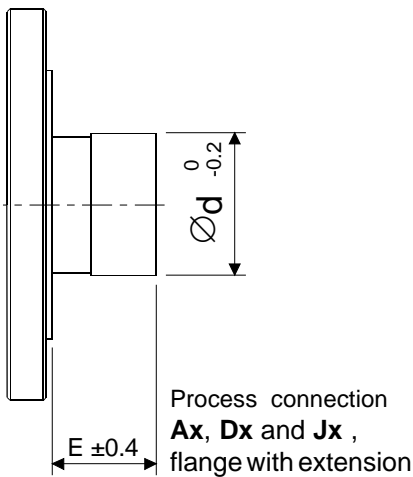
Process connection
WA and WB
- SMS-SI38 and SMS-SI51

Size	Dimensions			Thread
	$\varnothing D$	A	E	
SI38	54	21	24	Rd 60 x 1/6
SI51	64	23	27	Rd 70 x 1/6

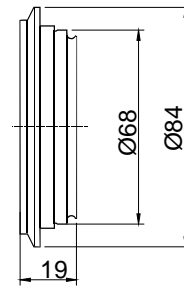
Dimensional drawings (dimensions in mm)



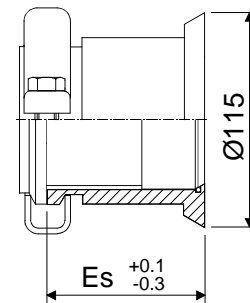
Process connection
Ax, Dx and Jx,
flanged



Process connection
Ax, Dx and Jx,
flange with extension



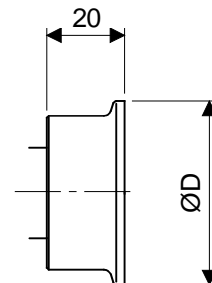
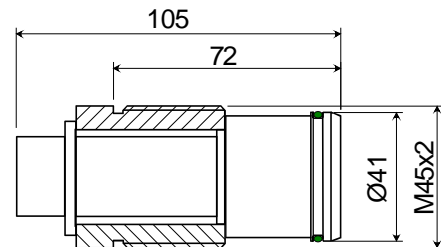
Process connection **UA**,
- Tuchenhagen DN50/40
(Varivent)



Process connection **SA**,
- Sandvik-clamp

Code	E $\begin{matrix} +0.4 \\ -0.4 \end{matrix}$	$E_s \begin{matrix} +0.3 \\ -0.2 \end{matrix}$
0	0	-
1	23	-
2	51	54,5
4	102	105
6	152	156

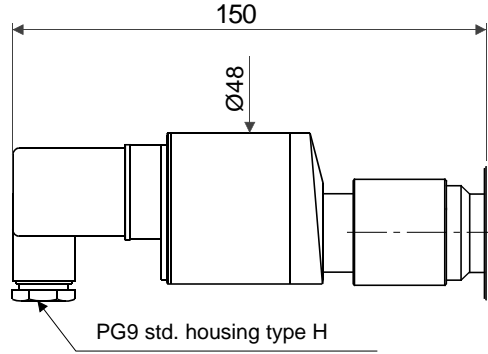
Process connection **BB**,
- Pasve BA installation



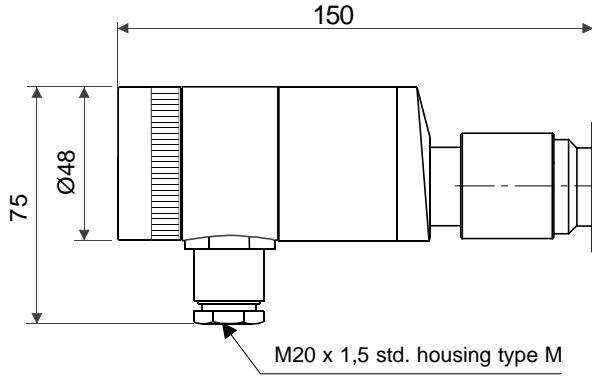
Process connection **TA, TB and TC**
- Tri-clamp DN38 ... 63,5

DN	$\varnothing D$
38	50,5
51	64
63,5	77,5

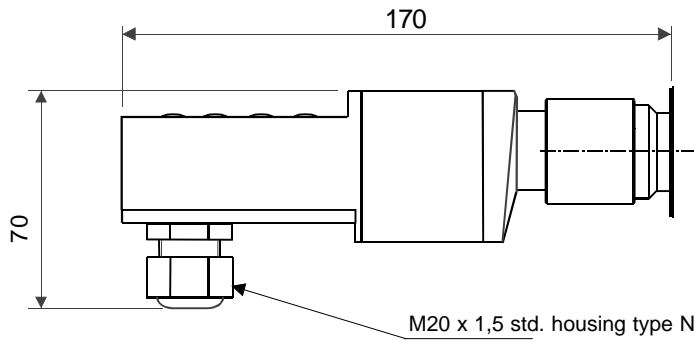
Dimensional drawings (dimensions in mm)



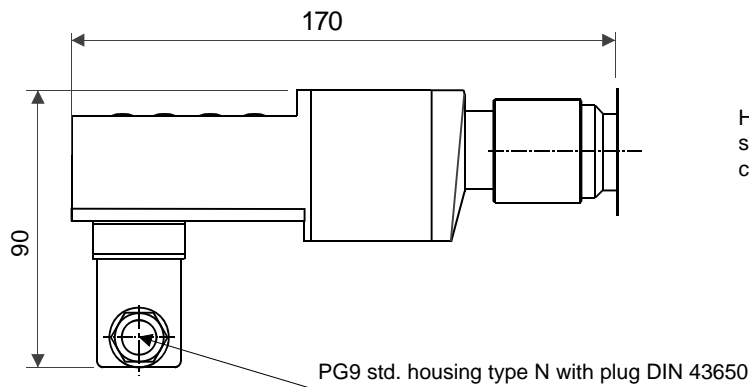
Housing with plug connector, DIN 43650, code H



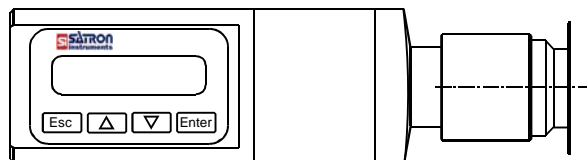
Housing with junction box/terminal strip, code M



Housing with junction box/terminal strip, with display, code N



Housing with junction box/terminal strip, with display and plug-connector DIN 43650, code N- / -P



Selection Chart

Adjustability (±)	Span, min.	Span, max.	Measuring range
VL _e 4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VLA _e 5	10 kPa (100 mbar)	500 kPa (5000 mbar)	0...+500 kPa (0...5000 mbar), abs.
VL _e 5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VLA _e 6	0.03 MPa (0,3 bar)	3 MPa (30 bar)	0...+3 MPa (0...30 bar), abs.
VL _e 6	0.03 MPa (0,3 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VLA _e 7	0.4 MPa (4 bar)	40 MPa (400 bar)	0...+40 MPa (0...400 bar), abs.

Output **S** 4-20mA DC/HART®

Process connection

DA DN25 PN40 ISO 2084-1974	AA ANSI 1" 150 lbs ANSI B16-5	TA Tri-clamp DN38 PN40 ISO 2852
DB DN50 PN40 ISO 2084-1974	AB ANSI 1" 300 lbs ANSI B16-5	TB Tri-clamp DN51 PN40 ISO 2852
DC DN80 PN40 ISO 2084-1974	AC ANSI 2" 150 lbs ANSI B16-5	TC Tri-clamp DN63.5 PN40 ISO
DD DN100 PN40 ISO 2084-1974	AD ANSI 2" 300 lbs ANSI B16-5	UA Tukenhagen DN50/40 (Varivent) PN40
JA JIS 10K 50 JIS B 2220	AE ANSI 3" 150 lbs ANSI B16-5	SA Sandvik DN70 PN64
JB JIS 40K 50 JIS B 2220	AF ANSI 3" 300 lbs ANSI B16-5	VA SMS 38
JC JIS 10K 80 JIS B 2220	AG ANSI 4" 150 lbs ANSI B16-5	VB SMS 51
JD JIS 40K 80 JIS B 2220	AH ANSI 4" 300 lbs ANSI B16-5	WA SMS-SI 38, with the extension 24 mm
JE JIS 10K 100 JIS B 2220		WB SMS-SI 51, with the extension 27 mm
JF JIS 40K 100 JIS B 2220		BB M45x2 PN160, with the extension 72 mm

Extension length (mm)	(Flanged conn.)	(Sandvik-conn.)	
0	0	-	(not proc.conn. BB, SA, WA and WB)
2	51	54.5	(not proc.conn. BB, Tx, UA, DA, VA, VB, WA and WB)
4	102	105	(not proc.conn. BB, Tx, UA, DA, VA, VB, WA and WB)
6	152	156	(not proc.conn. BB, Tx, UA, DA, VA, VB, WA and WB)

Wetted materials

Diaphragm


Code	Material	Code	Material	Code	Material
1	Nickel (*)	5	Tantalum	2	AISI316L (EN 1.4404)
2	AISI316L (EN 1.4435)	6	Titanium Ti-2 (*)	3	Hast.C 276 (EN 2.4819)
3	Hast.C 276 (EN 2.4819)	8	Duplex (EN 1.4462)	8	Duplex (EN 1.4462)

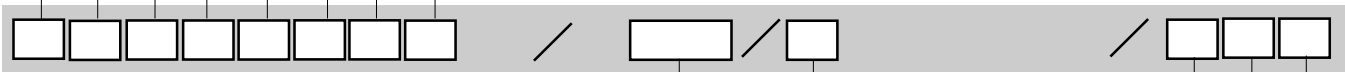
Fill fluid **S** Silicone oil **A** Food industry oil **G** Inert oil

Housing type

- H** Housing with PLUG-connector, DIN43650, no display, inlet PG9
- M** Housing with junction box/terminal strip, no display, inlet M16x1,5
- N** Housing with junction box/terminal strip, with display, inlet M20x1,5

Explosion proof

0 No explosion proof classification **1** Atex Intrinsic Safety,  II 1 GD T135°C (**)



Process coupling (for types BB, SA, TA, TB, TC, VA, VB, WA and WB)	Material
0 No coupling	2 AISI316L
A With coupling	3 Hast.C276
B With coupling and seal	8 Duplex (EN 1.4462)

Pasve® BA sampling valve for process connection BB, specify in order
Special couplings will be specified separately in the order.

Special size of electrical inlet

N 1/2 NPT **G** Pg13,5 **P** PLUG connector, DIN43650

Documentation

Calibration Certificate **AE** English

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

Material certificates

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

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Viton is a registered trademark of DuPont Down Elastomer.

(*) = only the process connections with flanges