



**SATRON®**

# PREON™ VL Pressure Transmitter

[www.satron.com](http://www.satron.com)

#LookCloser

**SATRON VL pressure transmitter** belongs to the V transmitter family. The V-series transmitters have both analog and smart properties. SATRON VL is used for 0–1.4 kPa...0–15 MPa ranges. It is a 2-wire transmitter with HART® standard communication. 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 100:1 for types VL6 – VL7. The versatile selection of diaphragm materials will meet the needs in most processes. Also the models with special accuracy are included to the series of VL transmitters



## TECHNICAL SPECIFICATIONS

### Measuring range and span

See Selection Chart.

### Zero and Span adjustment

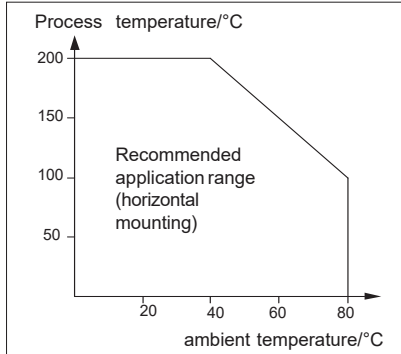
Zero elevation: Calibrated span is freely selectable on the specified range depending from the desired option. This can be made by using the local display option, HART® communicator, or Si-Tool.

### 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.  
Operating temperature of display: 0 to +50°C (does not affect operation of the transmitter)



**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 is not allowed in reference pressure channels.

### Pressure limits

Minimum and maximum process pressure: see the appended tables

↳ Parts in contact with process medium

### PERFORMANCE SPECIFICATIONS

Tested in accordance with IEC 60770:  
Reference conditions, specified span, norange elevation, horizontal mounting; AISI316L diaphragm, silicone oil fill

### Accuracy

±0.05 % of calibrated span  
(For spans 1:1–5:1).

For spans 5:1–100:1

$$\pm [0.0025 + 0.01 \times \left( \frac{\text{max. span}}{\text{calibrated span}} \right)] \% \text{ of calibrated span}$$

Special accurate diaphragm **AISI304**:  
±1.5 % of calibrated span  
(For spans 1:1–100:1). (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

### Temperature effect on +20 °C to +70 °C range, process connections BA and DA

Zero and span error  
• ±0.08 % of max. span, code S

### Temperature effect on 0 to +200 °C, code H

• ±1 % of max. span  
• Process connection PA (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.

### Insulation test voltage

500 V rms 50 Hz.

### CONSTRUCTION AND CALIBRATION

#### Materials

Diaphragm 1): AISI316L (EN 1.4435), AISI304 (EN 1.4301), Duplex (EN 1.4462), Hastelloy®C 276 (EN 2.4819), Tantalum or Titanium Gr2 (EN 3.7035).  
Other sensing element materials: AISI316L, AISI316.

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

#### Housing with PLUG connector, H

Housing: AISI303/316  
Seals: FPM  
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: FPM, EPDM  
Nameplates: PE

#### Connection cable between sensing element and housing

Codes L and K :  
PTFE hose with AISI316 braiding.

#### Calibration

For customer-specified range with 1 s. 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, code H: PLUG connector, connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm<sup>2</sup>.  
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<sup>2</sup> wires

## PRODUCT CERTIFICATIONS

**European Directive Information:**  
Electro Magnetic Compatibility  
EMC directive 2014/30/EU

### ATEX directive 2014/34/EU

Satron Instruments Inc. complies with the ATEX directive.

### European Pressure Equipment Directive (PED) 2014/68/EU


All pressure transmitters  
• Sound Engineering Practice

## Hazardous Locations Certifications

### European Certifications

ATEX Intrinsic Safety

Certification No. : DNV-2007-OSLATEX- 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 :

Ui = 28 V

Ii = 93 mA

Pi = 0.651 W

Ci = 5 nF

Li = 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 nonconducting 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.

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, VA, WA		0.9	-	-	-
UA, VB, WB		1.0	-	-	-

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

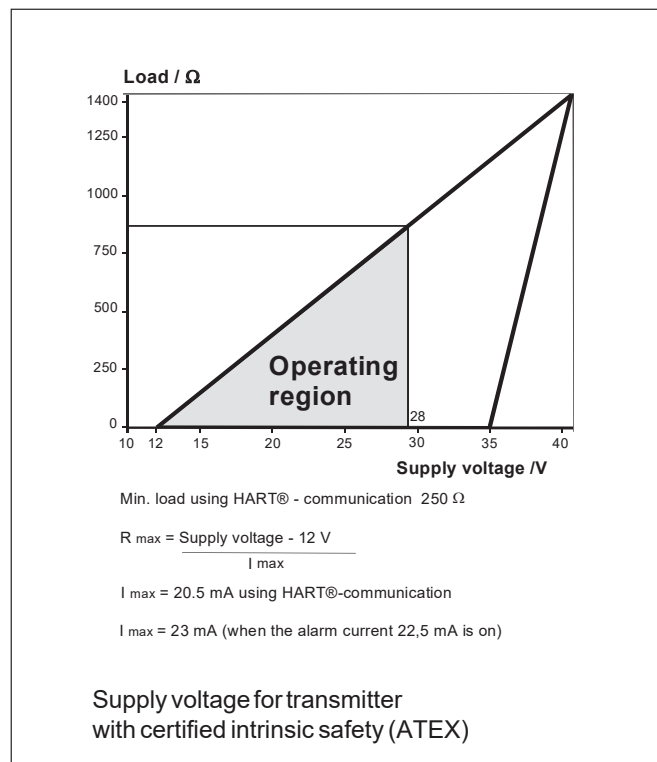
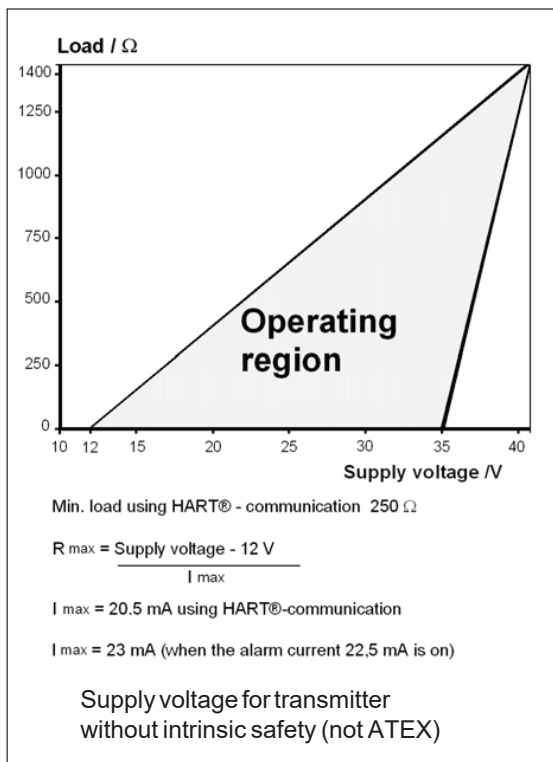
### Pressure limits

#### Pressure capacity

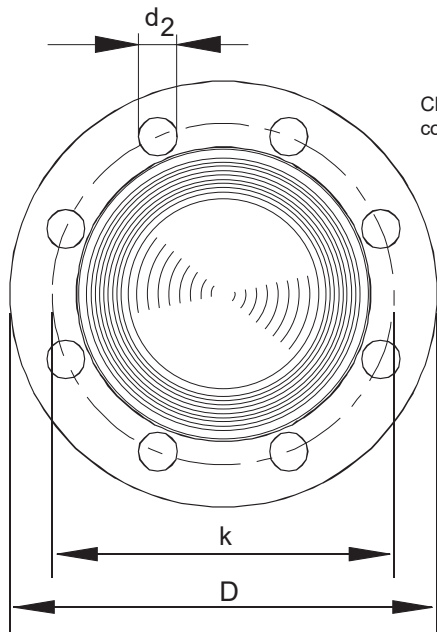
Transmitter type	Max. over-load pressure, MPa	Pressure class, max.
VL3	0.2	PN40
VL4	0.3	PN40
VL5	1.5	PN40
VL6	7.5	PN100
VL7	40.0	PN250

#### Minimum process pressure:

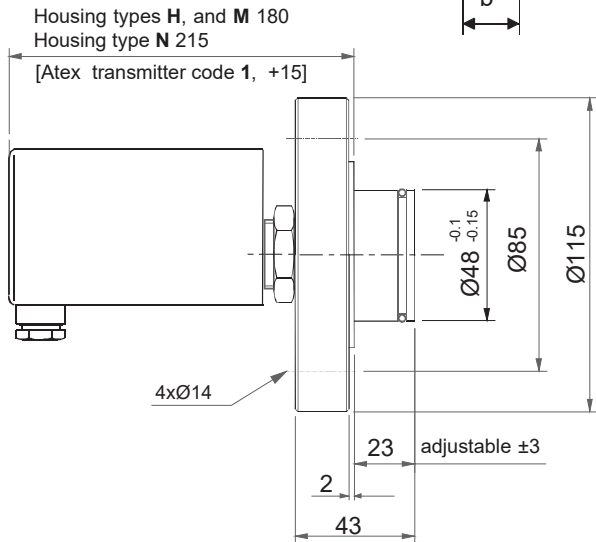
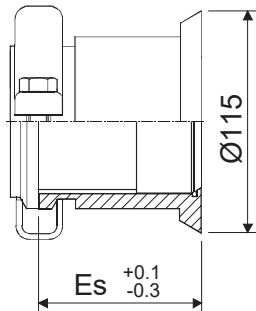
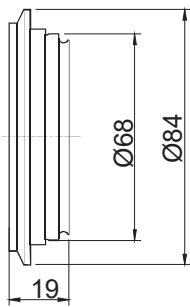
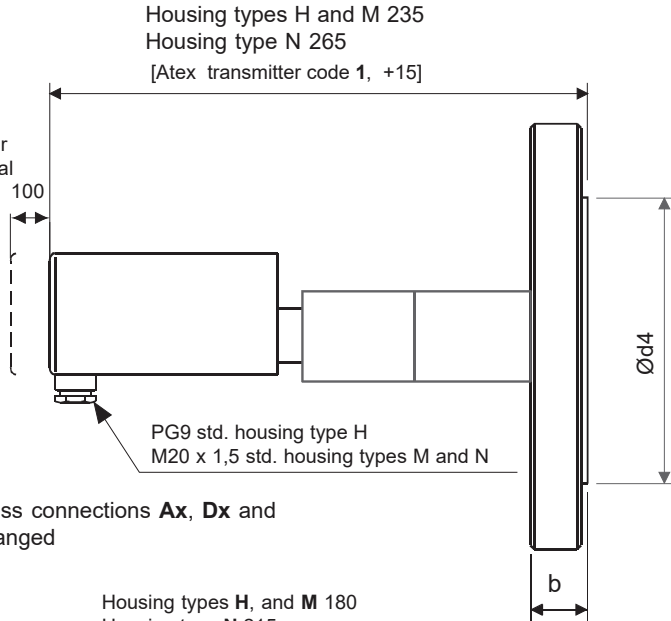
T <sub>proc.</sub> °C	Min. pressure for different fill fluids (kPa, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	10	28
120	15	53
160	25	90
200	40	-



Dimensional drawings (dimensions in mm)



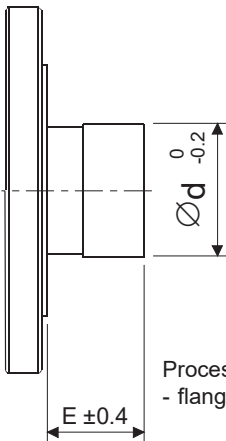
Clearance for cover removal



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

Process connection **SA**  
- Sandvik-clamp

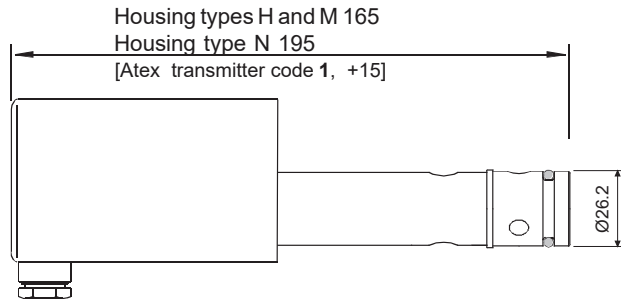
Process connections **DA**, DN25 PN40 flange with extension, process temperature max. +125°C



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

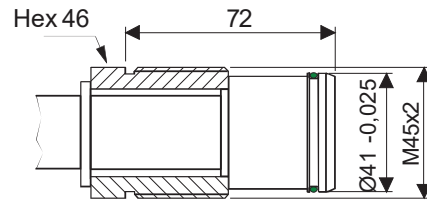
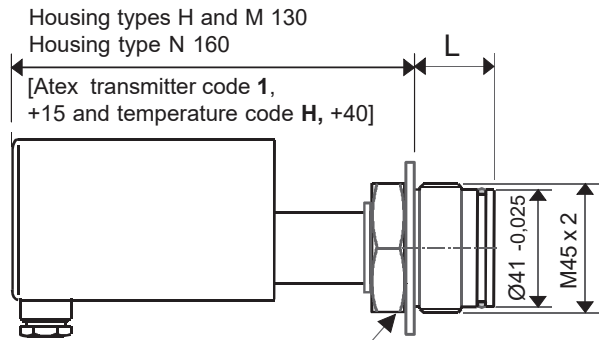
FLANGE SIZE	Flange dimens.			Holes			Exten.
	b	D	$\text{Ø}d_4$	Kpl	$d_2$	k	
ISO DN25 PN40	18	115	68	4	14	85	48
ISO DN50 PN40	20	165	102	4	18	125	51
ISO DN80 PN40	24	200	138	8	18	160	73
ISO DN100 PN40	24	235	162	8	22	190	73
ANSI 1" 150 lbs	15	108	51	4	16	79.4	-
ANSI 1" 300 lbs	18	124	51	4	20	88.9	-
ANSI 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)

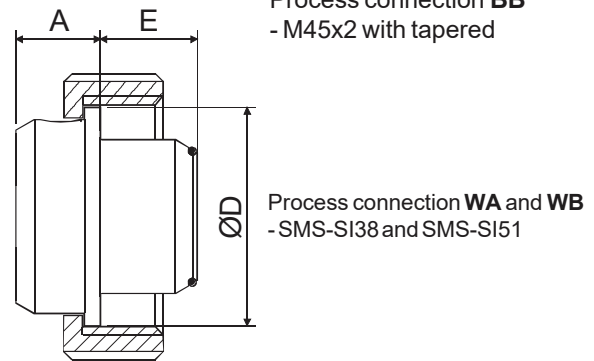
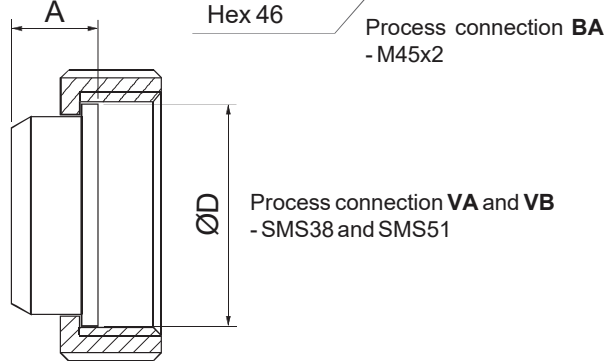


Process connection **PA**  
- PMC 1"

BA - extension code	L
0	28,5
2	51
3	72
4	102

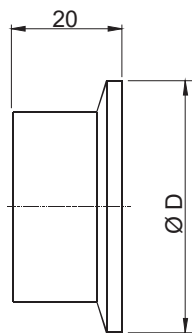


Process connection **BB**  
- M45x2 with tapered



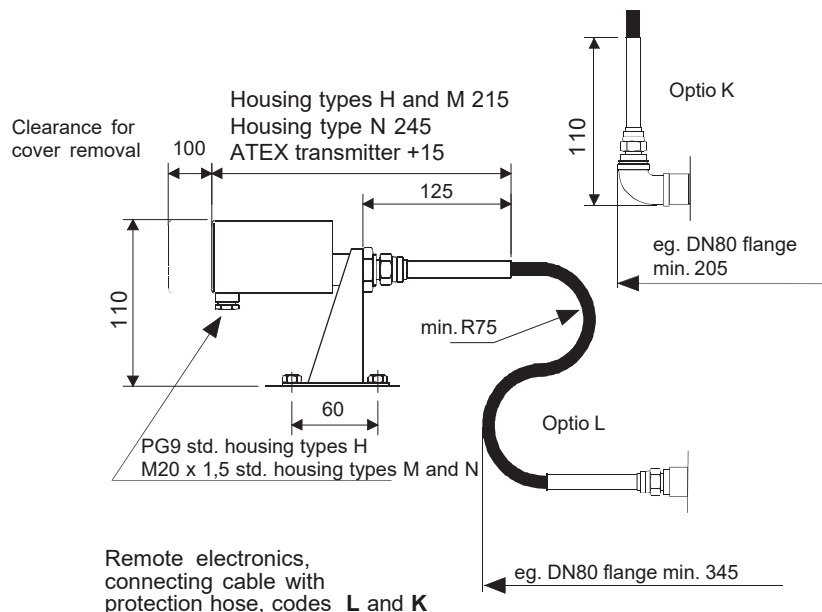
Size	Dimensions		Thread
	ØD	A	
38	54	21	Rd 60 x 1/6
51	64	23	Rd 70 x 1/6

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

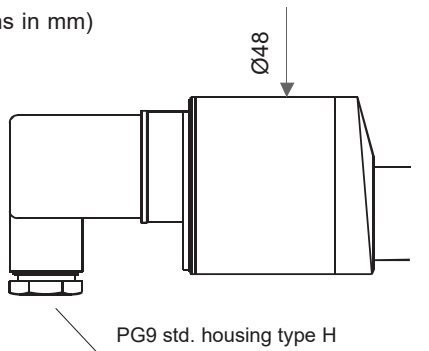


Process connection **TA, TB and TC**  
- Tri-clamp DN38 ... 63.5

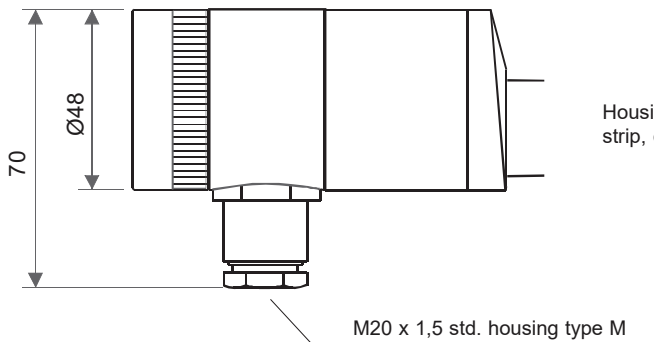
DN	ØD
38	50,5
51	64
63,5	77,5



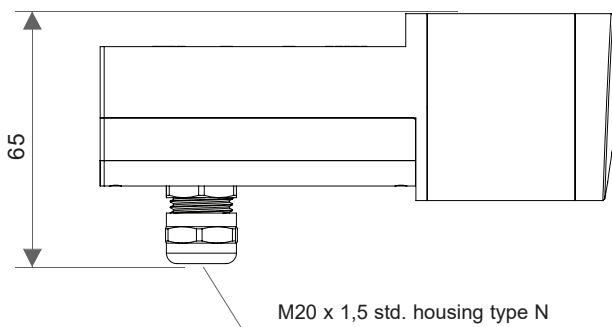
Dimensional drawings (dimensions in mm)



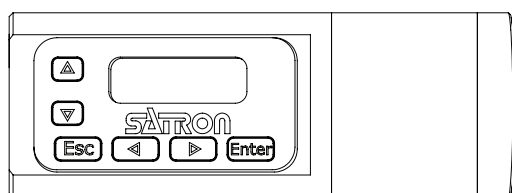
Housing with plug-connector  
DIN 43650, code **H**



Housing with junction box/terminal  
strip, code **M**



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



**SMS-SI couplings :**

for pipe                      for vessel

Size	Dimensions				Thread
	L1	Ød	L2	ØD	
38	27	38,5	24	60	Rd 60 x 1/6
51	30	51	25	70	Rd 70 x 1/6

**Coupling M45x2 with adjust, for process connection BA, order code M1050459**

Example code: **VL4SBA082SMOS**  
Most used in headbox outlet application.

**Pasve BA working position:**

For process connections **BA3** and **BB**

1. Transmitter in measuring
2. Transmitter can be checked, changed, calibrated or the transmitter diaphragm can be flushed

**Coupling BB M45x2, for process connection BB, order code M1050474 (Welding assistant, code M1050473)**

Example code: **VL5SBB088SMOH**  
Specially used in fiber line pressure measurements in combination with **PASVE® BA**.

## Selection Chart

Adjustability	Span, min.	Span, max.	Measuring range
VL3	1.4kPa (14 mbar)	35 kPa (350 mbar)	-35...+35 kPa (-350...350 mbar)
VL4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VL5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VLA5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VL6	0,03 MPa (0,3 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VLA6	0,03 MPa (0,3 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®

#### Process Connections

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

#### Extension length (mm) (Flanged conn.) (Sandvik conn.)

0	0	–	(not proc.conn. SA)
1	23	–	(only proc.conn. DA1, DN25 PN40, max. +125 °C)
2	51	54.5	(not proc. conn. BB, DA, PA, Tx, UA, Vx and Wx)
3	72	–	(only proc. conn. BA, in the Pasve BA mounting)
4	102	105	(not proc. conn. BB, DA, PA, Tx, UA, Vx and Wx)
6	152	156	(not proc. conn. BB, DA, PA, Tx, UA, Vx and Wx)

#### Wetted materials

#### Diaphragm

Code	Material	Code	Material
1	Nickel <sup>1)</sup>	5	Tantalum
2	AISI316L	6	Titanium Gr2 <sup>1)</sup>
3	Hastelloy® 276	8	Duplex <sup>2)</sup>
		A	AISI304

#### Extension or other wetted parts

Code	Material
2	AISI316L
3	Hastelloy® 276
8	Duplex (EN1.4462)


#### Fill fluid

S	Silicone oil	A	Food Industry oil (Neobee M-20)	G	Inert fluid
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#### Housing type

H	Housing with PLUG–connector, 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	1	Atex Intrinsic Safety  xII 1 GD T135°C <sup>3)</sup>
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#### Temperature effect on –30°C to +80°C range, % per max. span

G	±0,5%	E	±0,15%
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#### Temperature effect on +20°C to +70°C range, % per max. span

S	±0.08% (only process connections BA and DA)
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#### Temperature effect on 0°C to +200°C range, % per max. span

H	±1% (not possible process connections DA1, TA, TB and TC)
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### Special features

#### Example code

VL5 S DC 0 2 S H 0 G

#### Special features (specify only if necessary)

##### 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 90°
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##### Length of cable between sensing element and housing (specify only if housing connected with cable to sensing element)

2	2m cable	3	3m cable
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#### Optional items – order separately

##### Special size of electrical inlet, for housing types M or N

T1410026	1/2NPT	T1410024	Plug DIN 43650
T1410027	Pg13.5	T1410025	M12 4–pin

##### Mounting parts for remote electronics

M1050025	for pipe Ø51 mm (2")	M1050025–1	for pipe Ø60 mm (2.25")
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#### Documentation

##### Material certificates

MC1	Raw material certificate without appendixes, in accordance with SFS–EN 10204–2.1 (DIN 50049–2.1) standard
MC2	Raw material certificate for wetted parts, in accordance with SFS–EN 10204–2.2 (DIN 50049–2.2) standard
MC3	Raw material certificate for wetted parts, in accordance with SFS–EN 10204–3.1 B (DIN 50049–3.1 B) standard

<sup>1)</sup> Only with flange

<sup>2)</sup> Not for range 3 with process connection code PA

<sup>3)</sup> Housing H and N:  II 2 GD T135°C

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