

# SATRON VVF<sub>e</sub> Pressure Transmitter

**SATRON VVF<sub>e</sub> pressure transmitter** belongs to V-transmitter family.

SATRON VVF<sub>e</sub> is used for 0 - 4 kPa...0-500 kPa ranges. It is a 2-wire transmitter with HART® standard communication.

SATRON VVF<sub>e</sub> pressure transmitter is suitable for liquid level measurements in ground, rock and ships' tanks, drill well and in open channels.

SATRON VVF<sub>e</sub> pressure transmitter can be used to measure contaminating liquids. Possible foam on the surface of the measured liquid does not disturb the measurement.

SATRON VVF<sub>e</sub> does not require compressed air supply.

The transmitter's sensor is piezoresistive.



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

**Enclosure class:** IP66.

### Calibration

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

### 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**:

M20x1.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm<sup>2</sup> wires.

## 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) or HART®275/375 communicator.

### Damping

Time constant is continuously adjustable 0.01 to 60 s.

### Response time

Maximum 100 ms

### Temperature limits

Process: -10 to +80 °C

Ambient: -30 to +80 °C

Shipping and storage: -40 to +80 °C.

Operating temperature of display:

0 to +50°C (does not affect operation of the transmitter).

### Pressure limits

Min. and max. process pressure: See the appended tables.

### Volumetric displacement

< 0.5 mm<sup>3</sup>/max. span

**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: 10-35 VDC.

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

## PERFORMANCE SPECIFICATIONS

Tested in accordance with IEC 60770: Reference conditions, specified span, no range elevation, 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- 50:1:  
 $\pm [0.025 + 0.010 \times (\frac{\text{max. span}}{\text{calibrated span}})]$  % of calibrated span

(incl. nonlinearity, hysteresis and repeatability)

### Long-term stability

±0.1 % of max. span per 12 months

### Temperature effect on compensated temperature ranges -20...+80 °C

Zero and span shift, type VVF<sub>e</sub>5:  
±0.15 % of max. span

Zero and span shift, type VVF<sub>e</sub>4:  
±0,25 % of max. span

### Mounting position effect

Zero error <0.15 kPa, which can be calibrated out.

### Vibration effect (IEC 68-2-6: FC):

±0.1 % of measuring range/  
2 g/10 to 2000 Hz  
4 g/10 to 100 Hz

### Power supply effect

<±0.01 % of calibrated span per volt.

### European Directive Information

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

- Sound Engineering Practice

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

### Insulation test voltage

500 V rms 50 Hz.

## CONSTRUCTION AND CALIBRATION

### Wetted materials

Metal parts: AISI316L (EN 1.4404)

Jacket of cable: PUR

Other materials: AISI303/316

**Fill fluid** Silicone oil or inert oil.

### Housing with PLUG connector, code H

Housing: AISI316/303

Seals: Viton® and NBR

TEST jacks: MS358Sn/PVDF,

protected with silicone rubber shield.

PLUG connector: PA6-GF30 jacket,

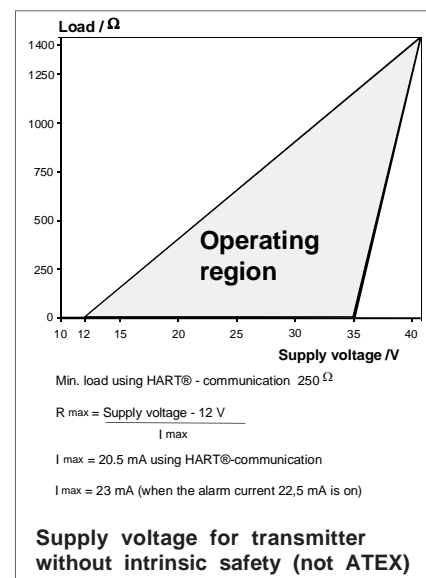
Silicone rubber seal, AISI316 retaining screw.

### Housing with junction box/terminal strip, codes M and N:

### Pressure limits

Maximum process pressure, MPa

Transmitter type	Max. overload pressure	Pressure class	Minimum process pressure		
			T <sub>proc.</sub> °C	Minimum process pressure for different fill fluids (kPa,abs.)	
				DC200 100 cSt	Inert oil
VVF <sub>e</sub> 4	0.3	PN40	20	5	8
VVF <sub>e</sub> 5	1.5	PN40	40	8	10
			80	16	28
			120	21	53



## Weight

Transmitter

- with housing type **H** : 0,9 kg
- with housing type **M** : 1,4 kg
- with housing type **N** : 1,5 kg

## 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 :

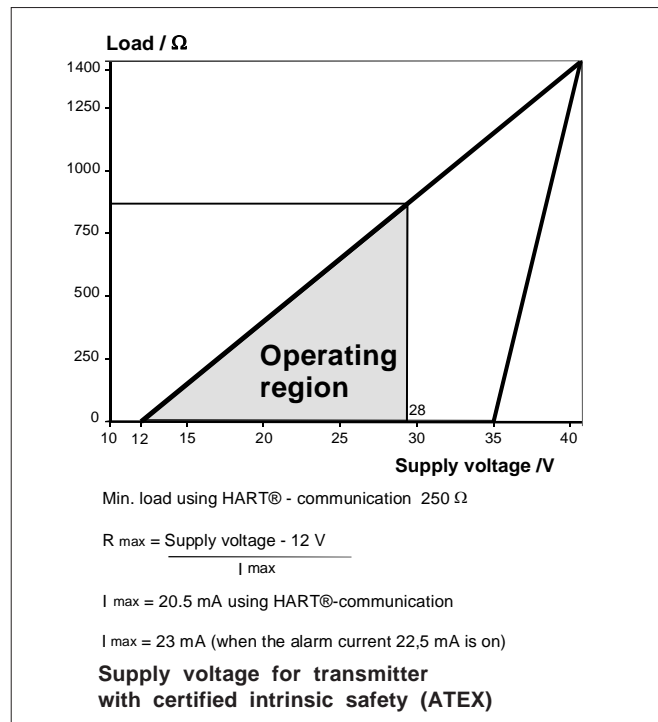
$U_i = 28 \text{ V}$

$I_i = 93 \text{ mA}$

$P_i = 0.651 \text{ W}$

$C_i = 5 \text{ nF}$

$L_i = 0.2 \text{ mH}$



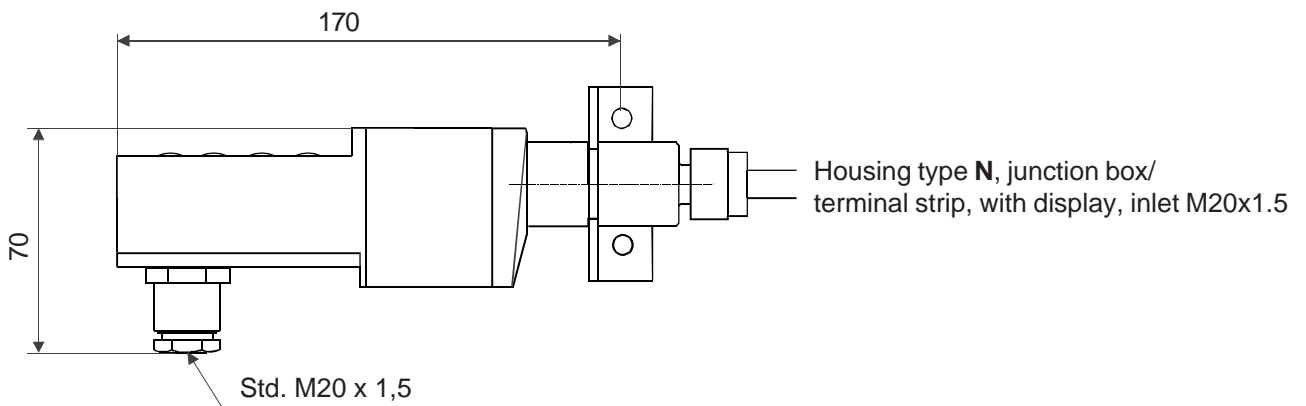
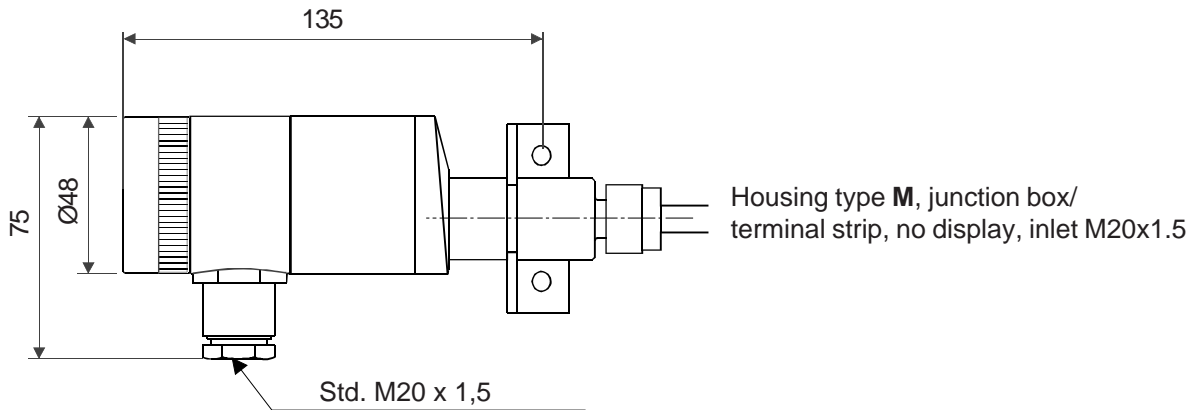
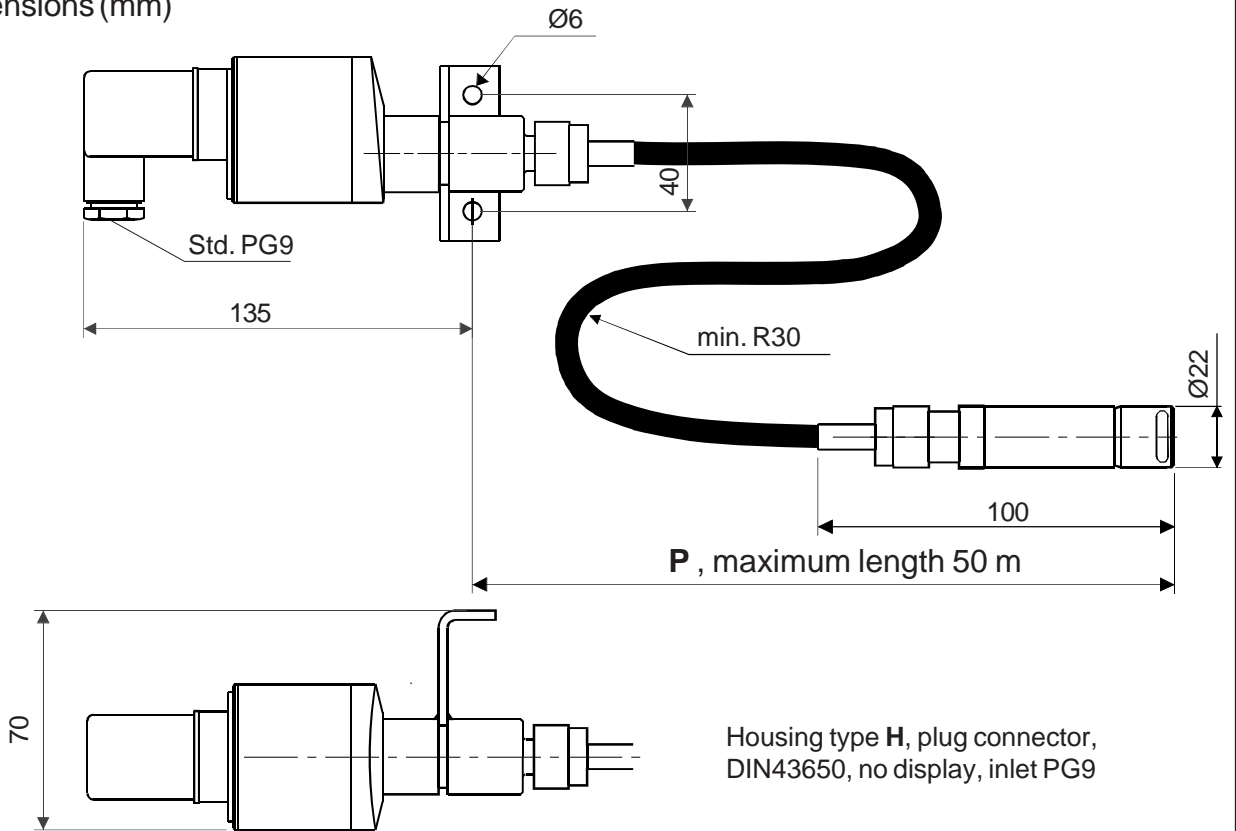
### Special Conditions for Safe Use (X) :

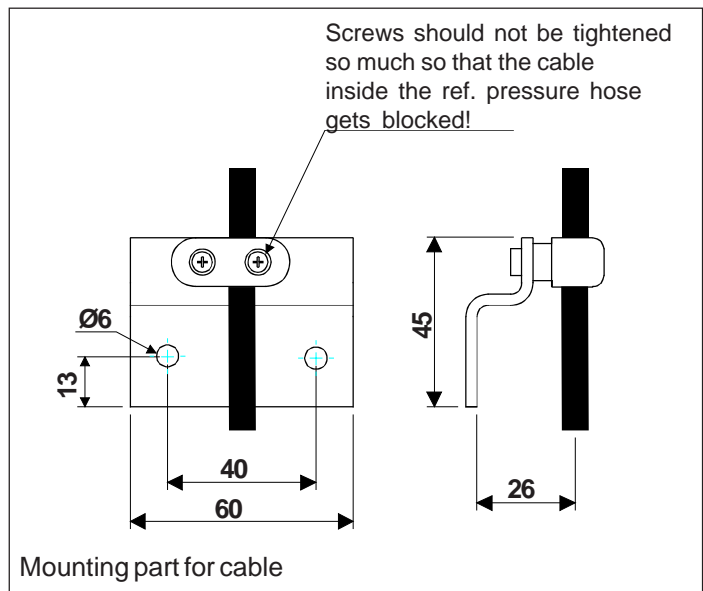
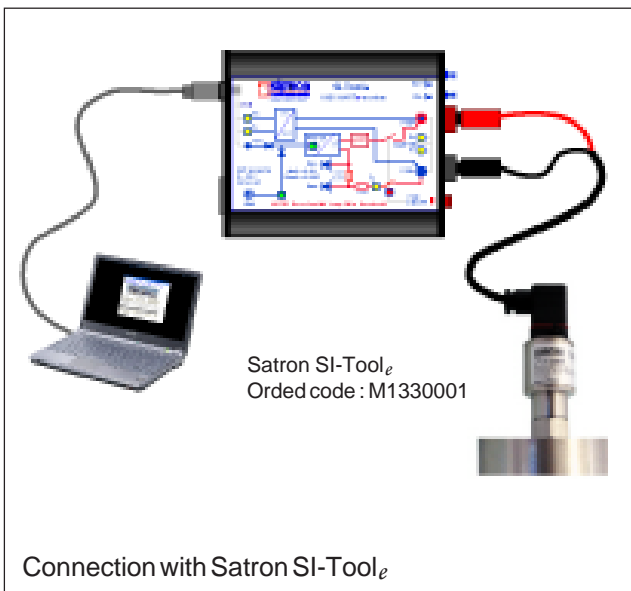
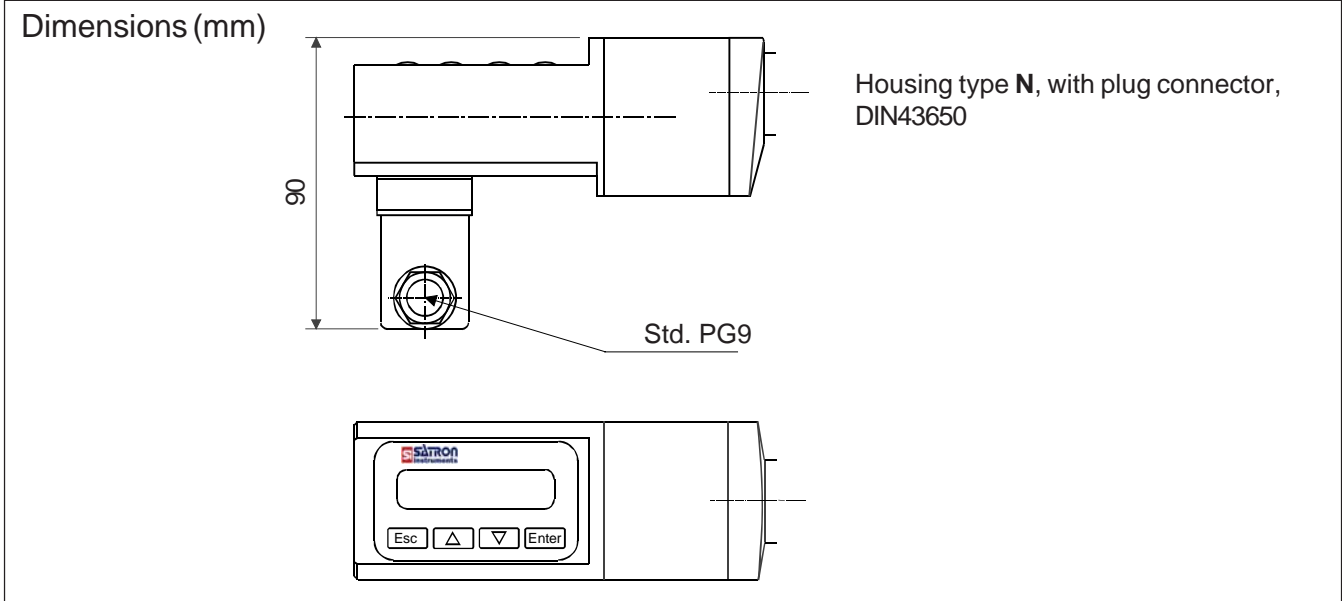
The enclosure with plastic window and the plastic DIN43650 connector must not be installed in potentially explosive atmosphere requiring category 1 apparatus.

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.

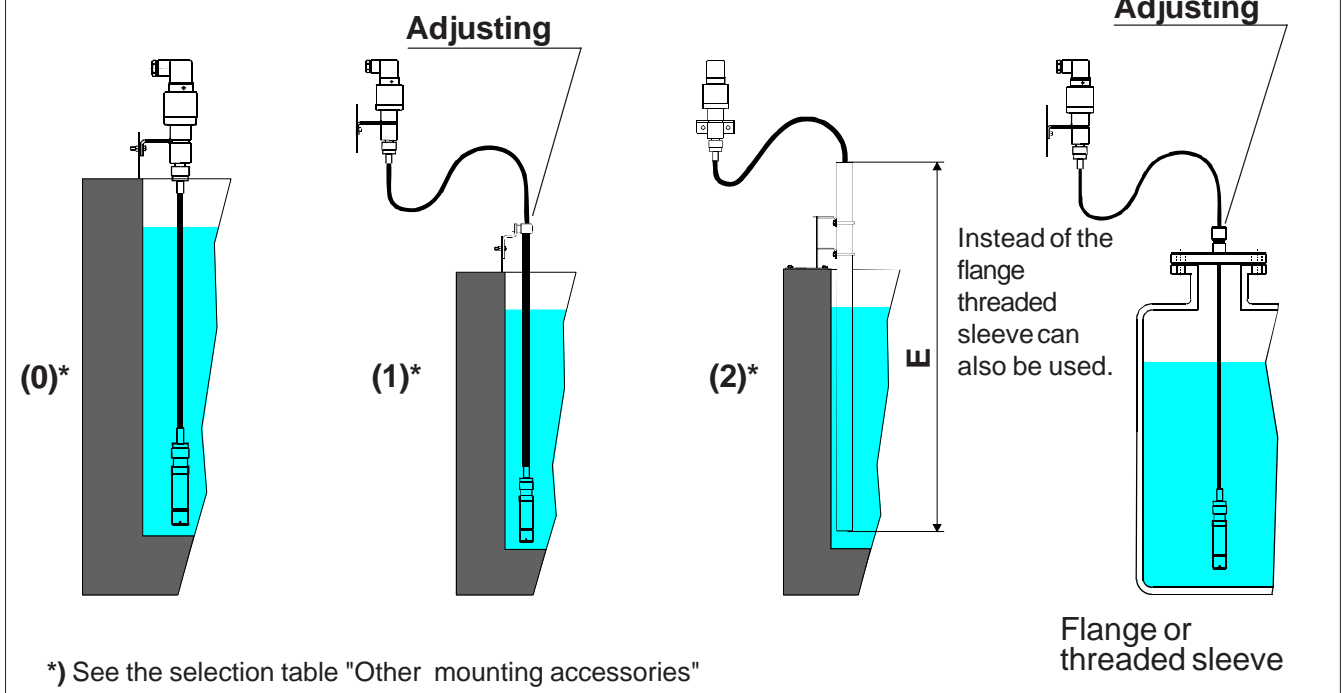
The equipment shall be installed and connected according to the manufacturers instructions.

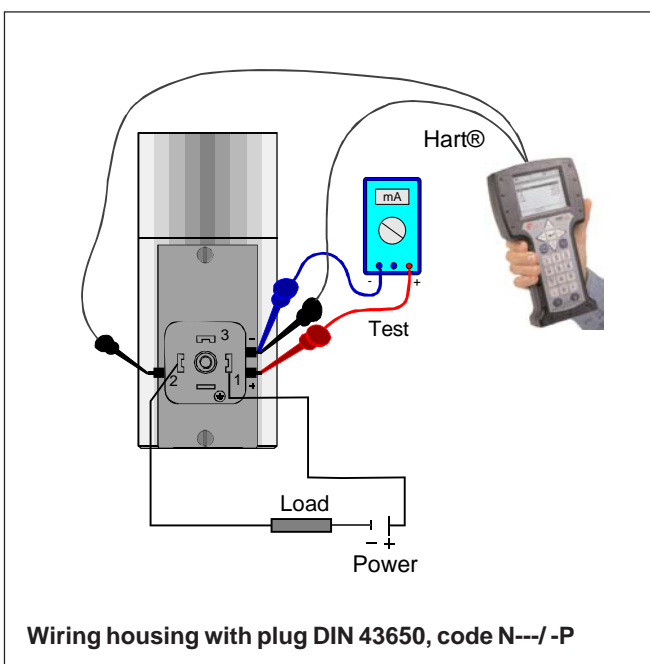
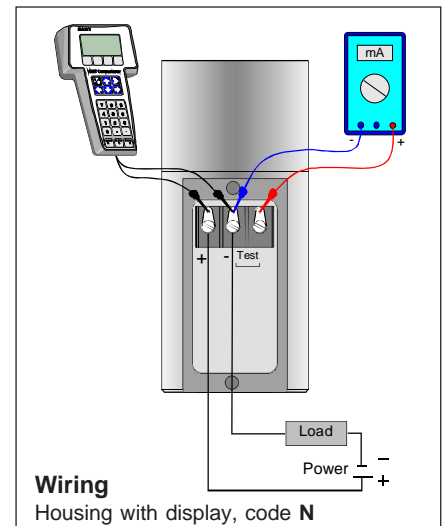
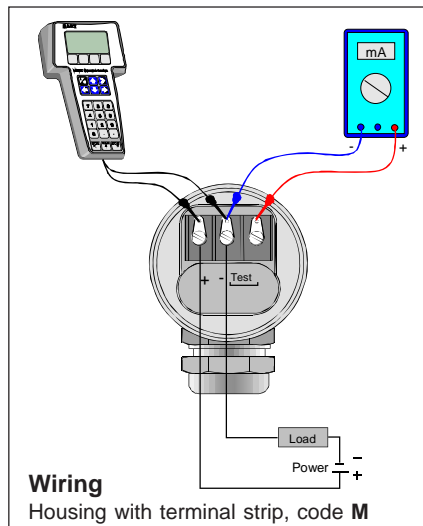
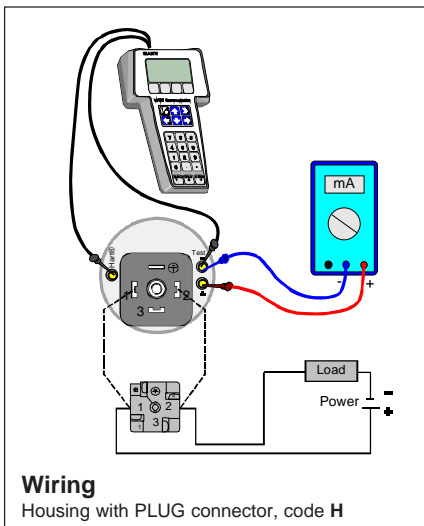
Dimensions (mm)





Installation methods







**Housing with display, 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.

## Selection Chart

<b>Adjustability</b>	<b>Span, min.</b>	<b>Span, max.</b>	<b>Measuring range</b>					
VVF <sub>e</sub> 4	4kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)					
VVF <sub>e</sub> 5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)					
<b>Output</b> S 4-20mA DC/HART® -protocol								
<b>Flange or thread sleeve</b>	<b>0</b>	no flange or thread	<b>DB</b>	DN50 PN40	<b>DC</b>	DN80 PN40	<b>AC</b>	ANSI 2" 150lbs
	<b>AD</b>	ANSI 2" 300 lbs	<b>AE</b>	ANSI 3" 150 lbs	<b>AF</b>	ANSI 3" 300lbs	<b>GA</b>	G1A, male
	<b>GB</b>	G1½A, male	<b>GC</b>	G2A, male	<b>NA</b>	1½ - NPT, male	<b>NB</b>	2 - NPT, male
<b>Wetted materials</b>	<b>Flange or thread sleeve</b>		<b>Diaphragm</b>		<b>Extension</b>			
	Code	Material	Code	Material	Material			
	2	AISI316L (EN 1.4404)	2	AISI316L (EN 1.4435)	AISI316/PUR			
			3	Hast.C 276 (EN 2.4819)				
<b>Fill fluid</b> S Silicone oil G Inert oil								
<b>Housing type</b>								
<b>H</b> Housing with PLUG-connector, DIN43650, no display, inlet PG9								
<b>M</b> Housing with junction box/terminal strip, no display, inlet M20x1,5								
<b>N</b> Housing with junction box/terminal strip, with display, inlet M20x1,5								
<b>Explosion proof</b> 0 No explosion proof classification 1 Atex Intrinsic Safety,  II 1 GD T135°C (*)								
<b>Length P of PTFE/AISI316 hose between sensing element and housing</b>								
<b>P10</b> 1.0 m hose								
<b>P25</b> 2.5 m hose								
...								
<b>P500</b> 50.0 m hose								
<b>Length E of mounting/protective tube</b>								
<b>E10</b> 1.0 m hose								
<b>E15</b> 1.5 m hose								
...								
<b>E55</b> 5.5 m hose								
								
<b>Other mounting accessories</b>	0 No separate fastening parts							
	1 Separate fastening part for cable, adjustable							
	2 Mounting bracket and protective tube							
<b>Special size of electrical inlet</b>								
<b>N</b>	1/2 NPT	<b>G</b>	Pg13.5	<b>P</b>	Plug DIN 43650			
<b>Documentation</b>								
<b>Calibration Certificate</b>			AE English					
<b>Installation and Operating Instructions</b>			IE English		IF Finnish			
<b>Material Certificates</b>								
<b>0</b> No material certificate								
<b>MC1</b> Raw materials certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard								
<b>MC2</b> Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard								
<b>MC3</b> Raw materials certificate for wetted parts with appendices, in accordance with SFS-EN 10204-3.1B (DIN 50049-3.1B) standard								

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 Viton® is the registered trademark of DuPont Dow Elastomers.

(\*) = Housing H and N :  II 2 GD T135°C

