Installation and Setting-Up Instructions
Spare Parts List

Contents:

DOCUMENTS
Technical Specifications: BPLV700
Installation and Setting-Up Instructions: BPLV700AV

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1. INSTALLATION

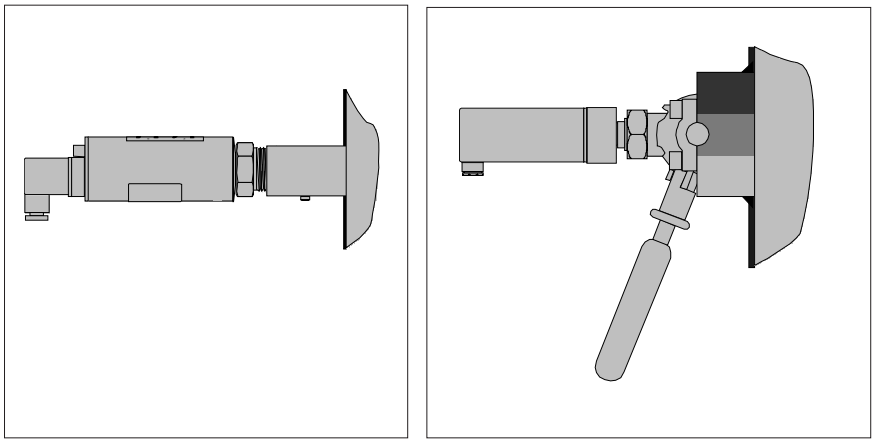
1.1 Mechanical installation

Mounting recommendations: Fig. 1-1

- Process connection direction: horizontal
- Cable entry direction: from below
- Connector coupling direction, calibration direction: horizontal

Other considerations:

- Steam should not be admitted to the transmitter's sensing element.
- In outdoor installations you should make sure that water condensed from e.g. a steam line will not freeze and, by expanding, damage the transmitter's sensor diaphragm. For instance, this can be avoided by installing heat insulation up to the sensor diaphragm.

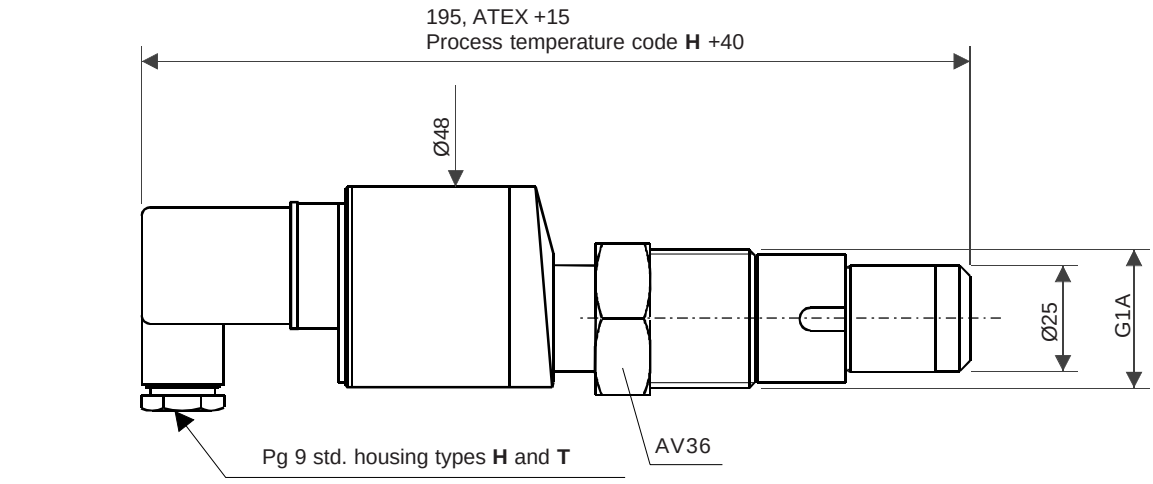


installation with process coupling

installation with PASVE mounting/ service valve

Figure 1-1 Recommended mounting positions

Dimensions (in mm)



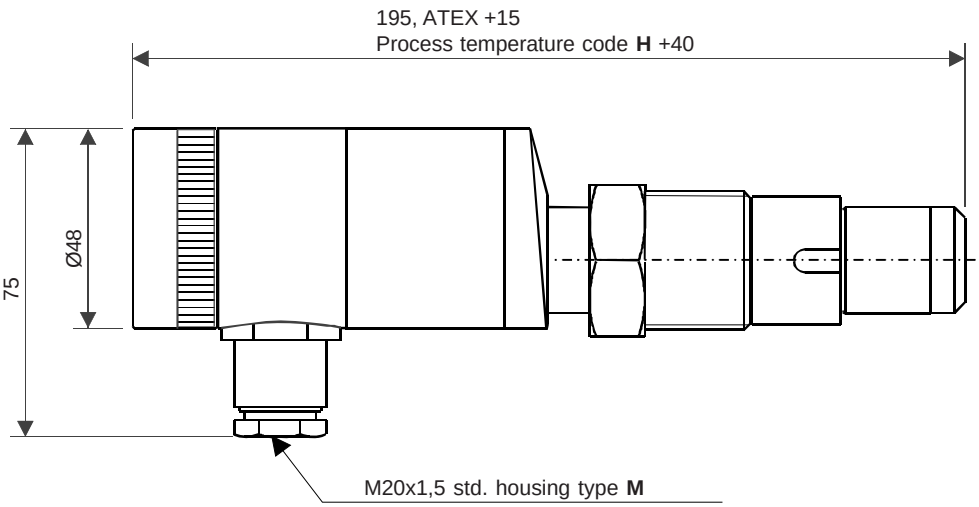


Figure 1-2 Basic mounting dimensions

1300354152

SATRON VG pressure transmitter

Dimensions (in mm)

1300354100

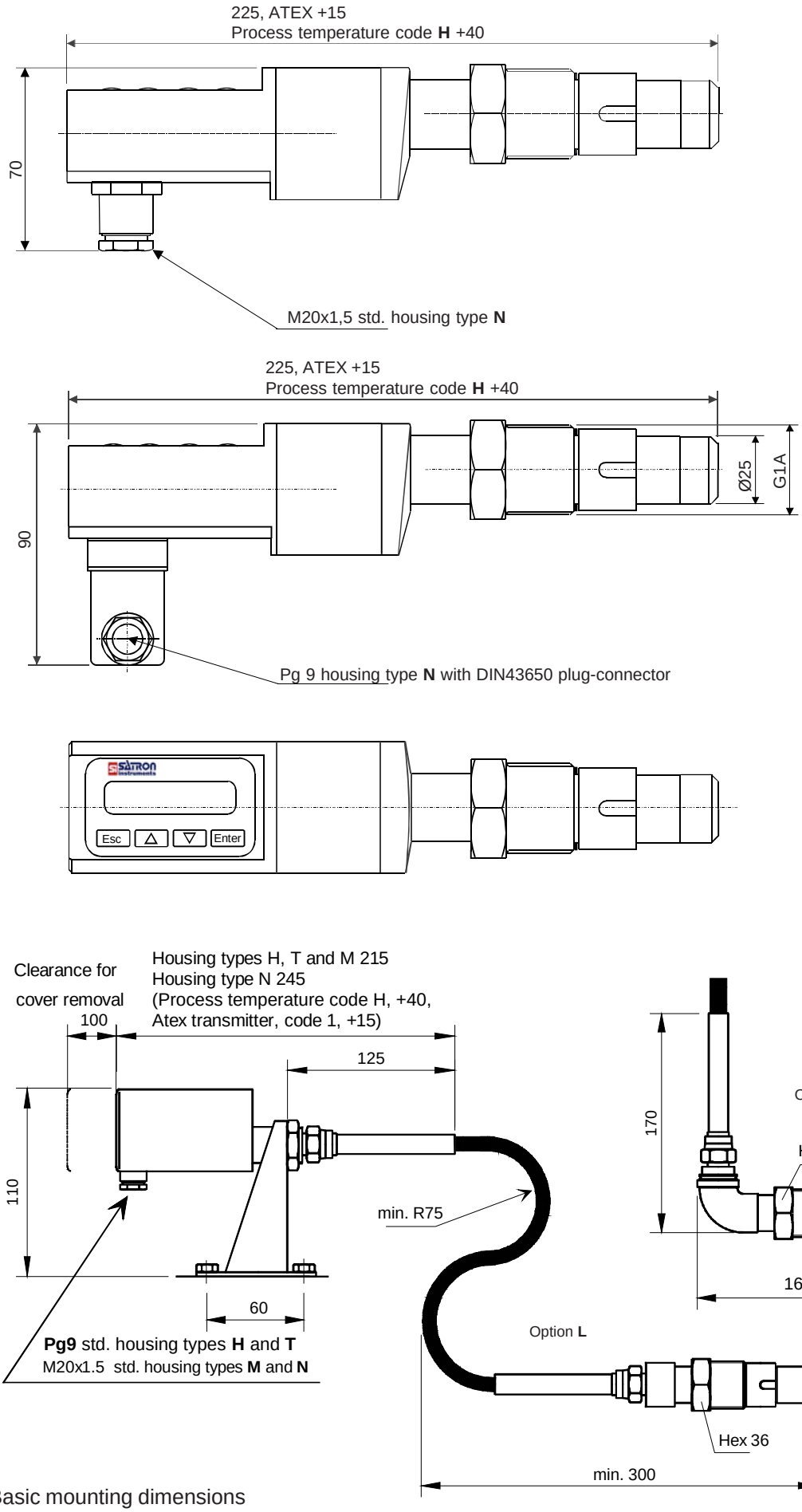


Figure 1-2b Basic mounting dimensions

1.1.1 Installing welded process couplings

Mounting hole for coupling

• Make a Ø 45.5 mm (+0.5/-0.2 mm) hole in the tank wall or pipe, as shown in Figure 1-3.

Welding the coupling

These instructions apply to all welded couplings; welding the G1 standard coupling is described here as an example.

• Place the coupling in the mounting hole as shown in Fig. 1-4. Then weld with several runs so as to prevent the coupling's oval distortion and tightness problems.

• The transmitter must be out of the coupling while the coupling is welded.You can use the shut-off plug shown in Fig. 1-5 to shut the coupling. The plug protects the coupling's sealing face and permits the starting of the process without the transmitter.

• It is always recommendable to use the welding assistant (M1050420) while welding the coupling to prevent any distortions due to heat.

• Do not make weld grounding via any transmitter's body!

1.1.2 Mounting the transmitter on the coupling

Procedure

• Make sure that the coupling's sealing face is clean.

• Remove the orange protective plug from the transmitter's diaphragm.

Do not touch the diaphragm! Figure 1-6.

• Insert the transmitter **in a straight line** into the coupling (Fig. 1-7), so that the guide groove on the transmitter aligns with the stop pin on the coupling. The transmitter settles into position when the groove and pin are aligned, and will be prevented from rotating in the coupling.

When inserting the transmitter, be careful not to damage the edge of the sensor diaphragm on the edges of the coupling or on the end of the stop pin!

• Lock the transmitter in position by screwing the hex nut fully home. Finger tightness is sufficient to tighten the sealing faces. However, we recommend final tightening with a tool to eliminate the effect of vibration and other such factors. Apply 60±20 Nm torque.

Do not use sealing tape etc. on threaded connection!

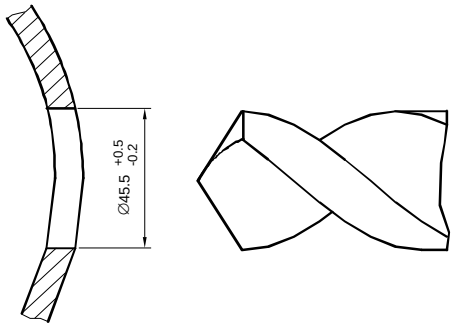


Figure 1-3 Coupling mounting hole

10044110

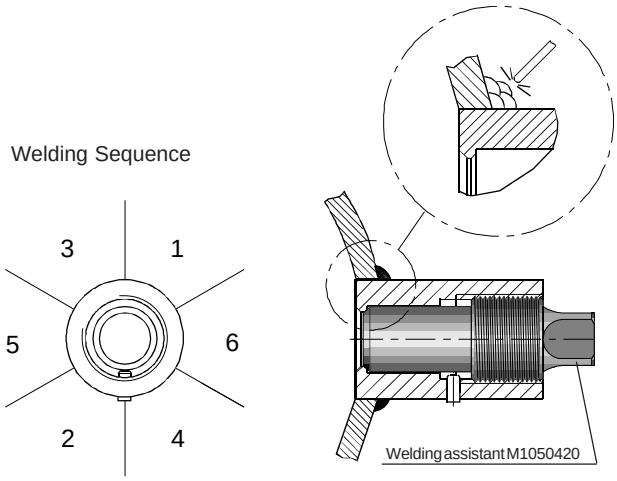
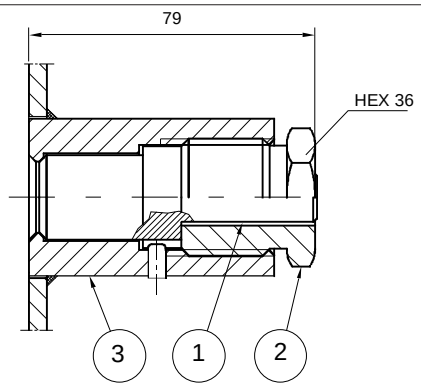


Figure 1-4 Welding the coupling

1050354043



1 Shut-off plug, AISI316 (Order No. M550405)
2 Shut-off screw G1
3 G1 welded process coupling

Figure 1-5 Coupling shut-off plug

10044108

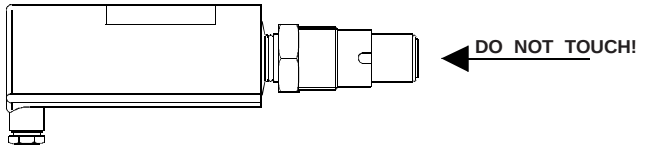


Figure 1-6

10044004

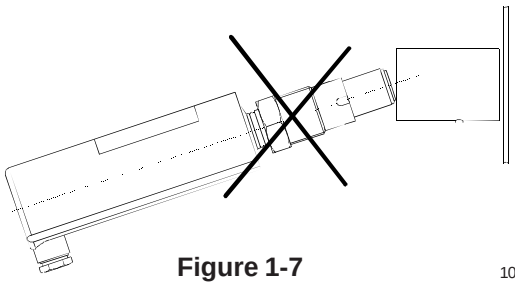
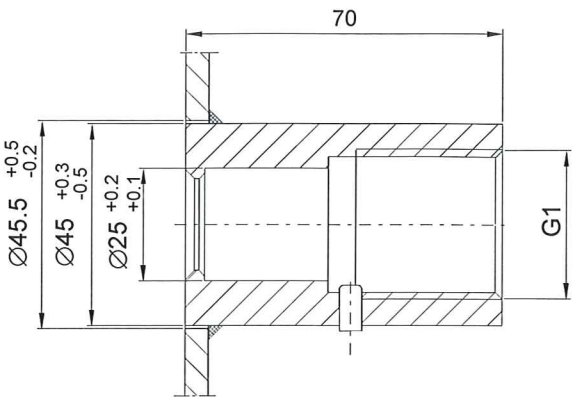


Figure 1-7

10044006

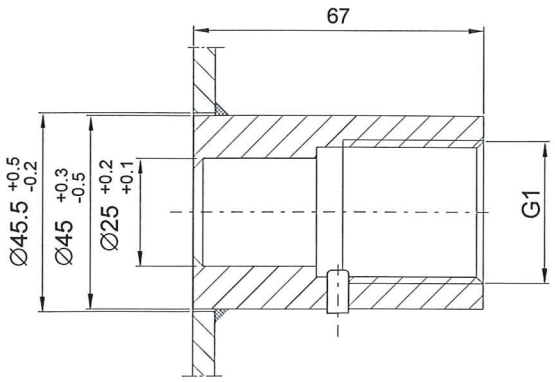
1.1.3 Couplings

a) M546197



Standard coupling
Material: AISI316L or Hastelloy C
10044105

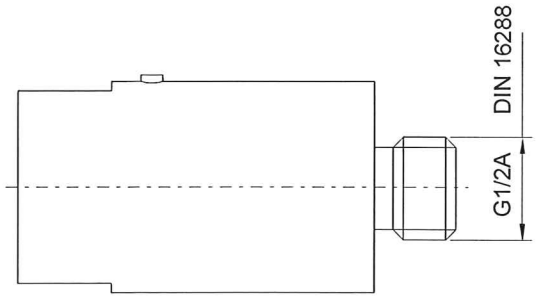
b) M548101



Hygienic coupling
Suitable for food industry.
Material: AISI316L or Hastelloy C
10044107

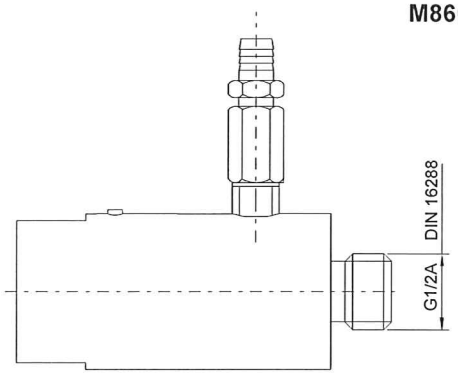
Figure 1-8 Welded couplings

a) M546190



Coupling G1/2A/G1
Material: AISI316L
10044067

b) M860280



Vented coupling G1/2A/G1
Material: AISI316L
10044068

Figure 1-9 Special couplings

Flange and coupling AISI316L

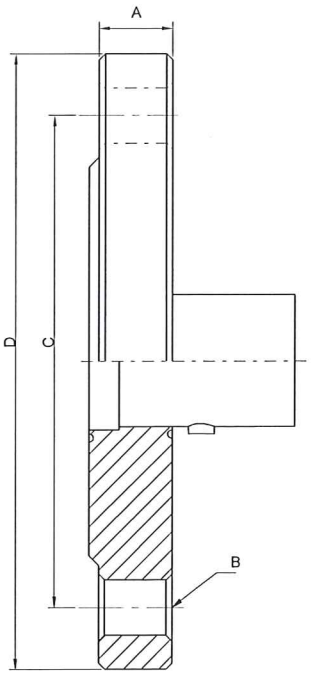


Fig. 1

Fig. 1 dimensions

Dim.	DN25	DN50	DN80
A	18	20	24
B	4x90°Ø14	4x90°Ø18	8x45°Ø18
C	85	125	160
D	115	165	200

Dim.	ANSI 1"	ANSI 2"	ANSI 3"
A	17.5	22.5	29
B	4x90°Ø20	8x45°Ø20	8x45°Ø23
C	88.9	127	168.3
D	124	165	210

G1 Flanged couplings

(DIN Std.)

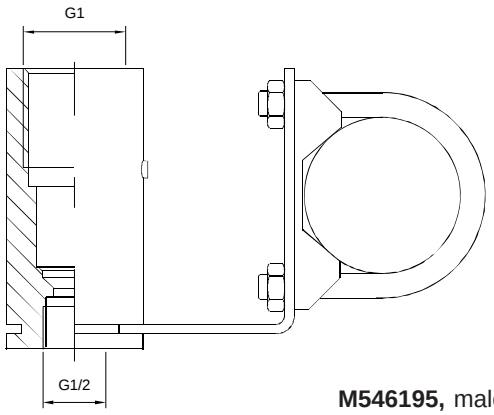
Nominal size	Type	Fig. 1 DIN2527B SFS2166
DN25/G1 PN40	std.	548832
	hygienic	548833
	EExia	548834
DN50/G1 PN40	std.	860282
	hygienic	548830
	EExia	548831
DN80/G1 PN40	std.	860281
	hygienic	548828
	EExia	548829

(ANSI Std.)

Nominal size	Type	Fig. 1 ANSIB16.5
ANSI1"/ G1 300 lbs	std.	548861
	hygienic	548862
	EExia	548863
ANSI2"/ G1 300 lbs	std.	548864
	hygienic	548865
	EExia	548866
ANSI3"/ G1 300 lbs	std.	548867
	hygienic	548868
	EExia	548869

Other flange sizes available to order.

Figure 1-10 Flanged couplings
10044069

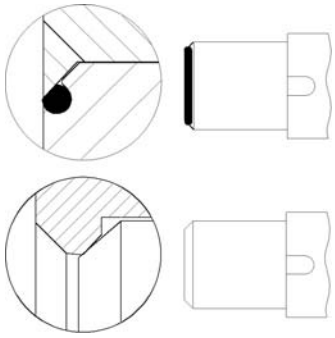


M546195, male G1/2A
M550393, female G1/2

Figure 1-11 G1/2 / G1 couplings

10044070

Three different options are available for the transmitter's process sealing:

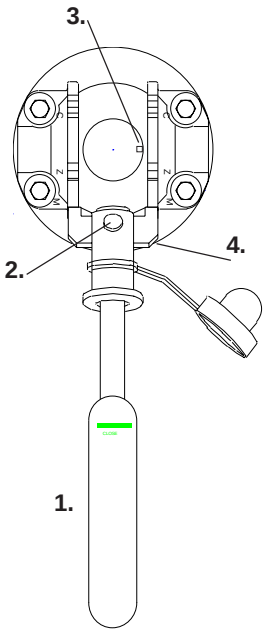


AISI316L, Duplex diaphragm, FPM (Viton) or EPDM O-ring (code **5** or **6**)
EHEDG - certified

AISI316L, CoNi-, Duplex, Hastelloy C276, Tantalum or Titanium diaphragm,
metal/metal taper sealing (diaphragm also on sealing face) (code **4**)

Figure 1-12 Process sealing

1050354040



Operation:
1. Lock (rotate) and select operating position (turn).
2. Release safety catch.
3. Transmitter dowel pin.
4. Reference and calibration pressure connection (M6).

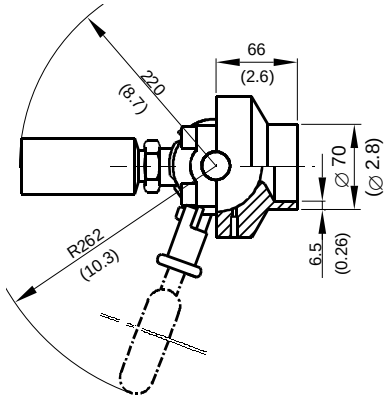
Figure 1-13 Using PASVE®

1.1.4 Installing the transmitter with PASVE® mounting/service valve

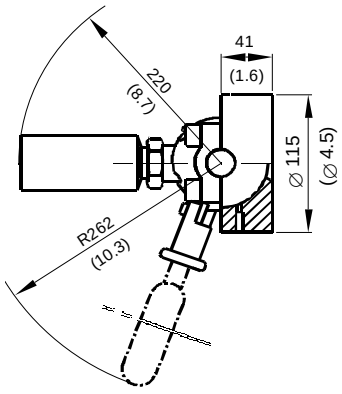
The three-position PASVE® mounting/service valve makes the installation of the transmitter easy. All necessary cleaning, zero adjustment and replacement operations will be easy and fast to perform with PASVE® without stopping the process.

All PASVE® types are also available with pneumatic actuator, flushing and limit switches.

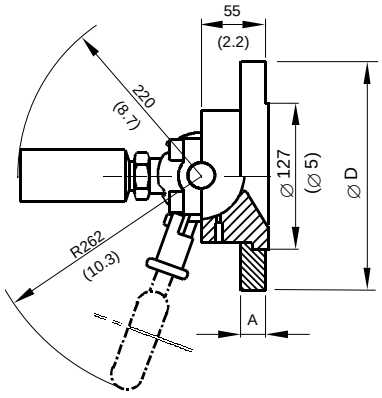
Flange	Dimension D
ANSI 3" 150 lb	191
ANSI 3" 300 lb	210
DN80 PN40	200



PASVE GP
(Welded on pipe)



PASVE GC
(Welded on container)



PASVE GF
(Flange type)

Figure 1-14 Mounting dimensions for different PASVE® types

10044132

1.2 Electrical connections

Supply voltage and load of the transmitter according to the figure 1-16.

We recommend shielded twisted-pair cable as signal cable.

The signal cable should not be installed near high-voltage cables, large motors or frequency converters.

The shield of the cable is grounded at the power supply end or according to the recommendations of the manufacturer of the used control system.

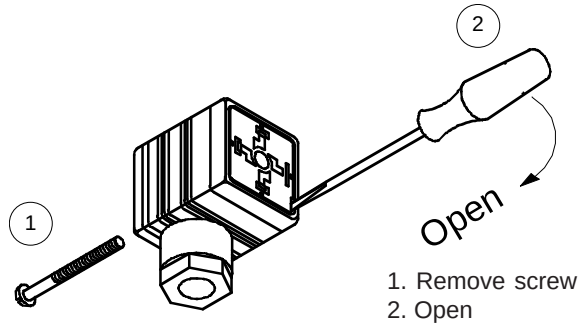
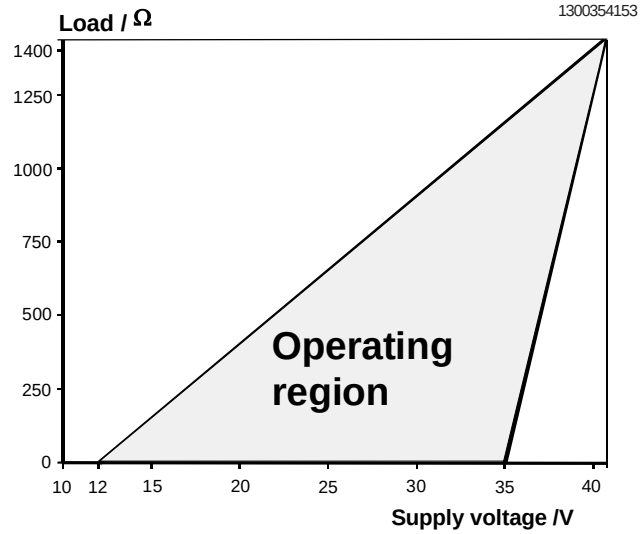


Figure1-15 Removing the PLUG junction box

10044093



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Figure 1-16 Supply voltage and load capacity (no ATEX)

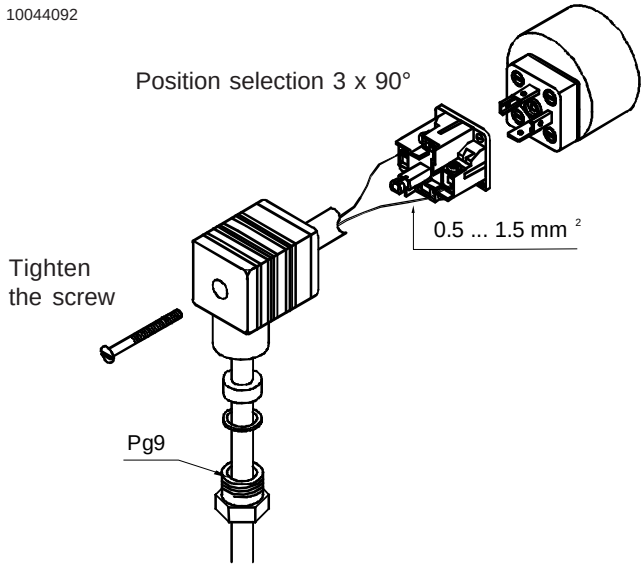


Figure 1-17 Adjusting the junction box position

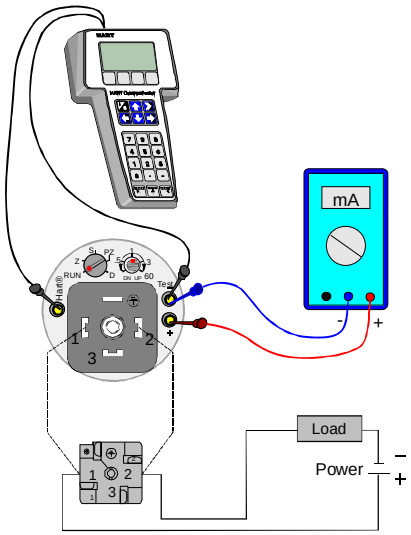


Figure 1-18a, wiring housings H and T 1300354155

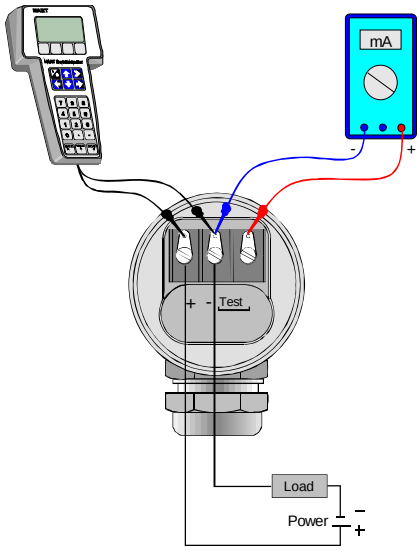


Figure 1-18b, wiring housing M 1300354155

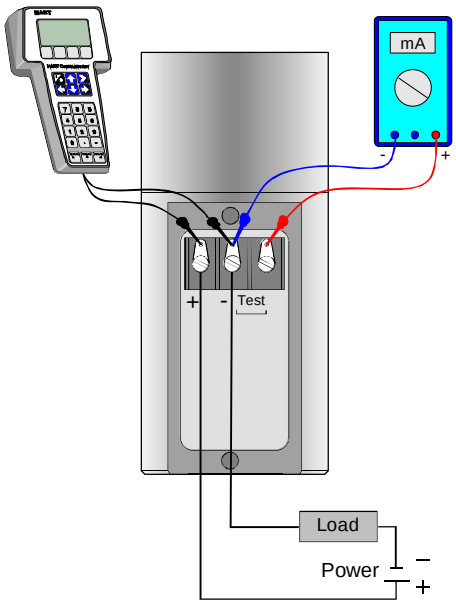
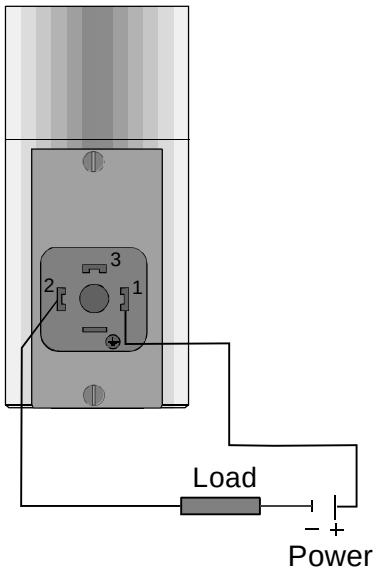


Figure 1-18c, wiring housing N 1300354155



Kuva 1-18d, wiring housing N with plug DIN 43650 (code **N__ / _ P**)

2 SETTING UP

Setting up is dependent on type of user interface and loaded description **VALMET** or **SATRON**.
Also must be noted that when the older **VALMET** description is in use then the transmitter must be configured so that it can operate with the old **VALMET** description.

The change from description to another is made by writing to **MESSAGE**-field either. **VALMET** or **SATRON** (Note, capital letters and dot in front).

After writing the message the new description will be activated by switching transmitter's power **OFF** and **ON** again.

2.1 Using the 275 user interface

Operation keys
The six operation keys are located above the alphanumeric keyboard:

The ON/OFF key (**I/O**) switches the user interface on and off. When you switch the user interface on, it starts looking for a HART® transmitter connected to it. If the transmitter is not found, the message **"No Device Found. Press OK"** will be displayed.
The **ONLINE** menu is displayed when the user interface finds the transmitter.

(^) This key allows you to move upwards in menus and scroll lists forwards.

(v) This key allows you to move downwards in menus and scroll lists backwards.

(<) This two-function key allows you to move the cursor to the left and to go back to a previous menu.

(>) This two-function key allows you to move the cursor to the right and to select a menu option.

(>>>) The quick-selection key will start the user interface and display the quick-selection menu. You can define the desired menu as quick-selection menu.

Function keys
With function keys F1, F2, F3 and F4 you can perform the program functions displayed above each function key. When you move in the software menus, the functions of these keys will change in accordance with the currently selected menu.

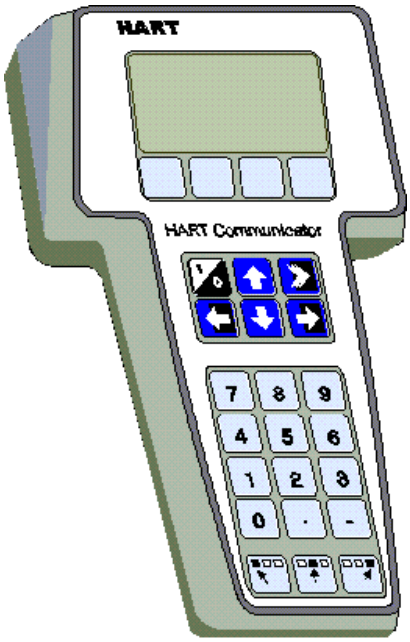


Figure 2-1
275 user interface

2.2 Setting up through HART® 275 user interface

After installing and connecting the transmitter, connect the user interface to the transmitter. The following menu is displayed:

1 Measurement
2 Configuration
3 Information
4 Diagnostics

To change the measuring range, unit damping time constant to output mode (linear/square-root), select **Configuration**.

The following menu is then displayed:

1 Range values
2 Detailed config

To change the measuring range, select **Range values**.

The selection displays the following menu:

1 LRV (lower range value)
2 URV (upper range value)
3 LSL (lower sensor limit)
4 USL (upper sensor limit)
5 Min span (minimum span)
6 Apply values

To change the measurement unit, damping time constant or output mode, select **Detailed config** from the **Configuration** menu.

The selection displays the following menu:

1 Damping
2 Pres. unit
3 Tempr. unit
4 Alarm current
5 Write protect
6 Lin. func
7 Diff El status
8 Burst mode
9 Burst option
Poll addr
Tag
User function
User funct. setup

After these activities or if the transmitter is supplied with the ready configuration you must correct a zero error of the transmitter in a final installation position.

Press **Diagnostics** and **PV Zero calibr.**

The selection displays the following menu: **Give correct value for Zero pressure in ...**

The current zero point will be shown in display and the final zero error correction can be done.

2.3 Using the 375 user interface

Figure 2-2
375 user interface

2.4 Setting up through HART® 375 user interface

After installing and connecting the transmitter, connect the user interface to the transmitter. The following menu is displayed: **Main menu**. To select the **HART Application.**

The following menu is then displayed:

1 Measurement
2 Configuration
3 Information
4 Diagnostics
5 Review

To change the measurement unit, damping time constant or output mod, select **Configuration**.

The following menu is then displayed:

1 Range values
2 Output
3 Tranfer function
4 General setup

To change the measurement unit, select **Range values**.

The following menu is then displayed:

1 LRV
2 URV
3 LSL
4 USL
5 Min span
6 Apply values

To change the damping time constant, select **Output** from the **Configuration** menu.

The following menu is then displayed:

1 Damping
2 Alarm current

To change the output mode, select **Transfer function** from the **Configuration** menu.

The following menu is then displayed:

1 Lin. func
2 User function data

After these activities or if the transmitter is supplied with the ready configuration you must correct a zero error of the transmitter in a final installation position.

The First press **Diagnostics** and then **Sensor trim** and then **Zero trim**

The following text is then displayed : *WARN-Loop be removed from automatic control*

The final zero error correction can be done to select **ABORT** or **OK** on the display .

2.5 Setting-up with Satron-pAdvisor Service Software

When you will have available all the operations of the Smart transmitter, we recommend the use of Satron-pAdvisor Service Software and Satron SI-Tool*e* USB-Hart-modem in setting-up.

Test connections for configuration and pressure/ output current values checking and calibration and for SENSOR TRIM function

Recommended equipment for calibration

Satron-pAdvisor service software for SATRON Smart transmitter (can be loaded free of charge from www.satron.com)

PC: operating system Win-98, Windows 2000 or Windows XP)

DMM: Digital multimeter, basic DCV accuracy better than 0,01 % of reading (for example Fluke 8840A, Keithley 2000)

Cal. pressure generation and measurement device (accuracy better than 0,03 % of reading)

USB-Hart modeemi, Satron SI Tool*e*, tilauskoodi: **M1330001**

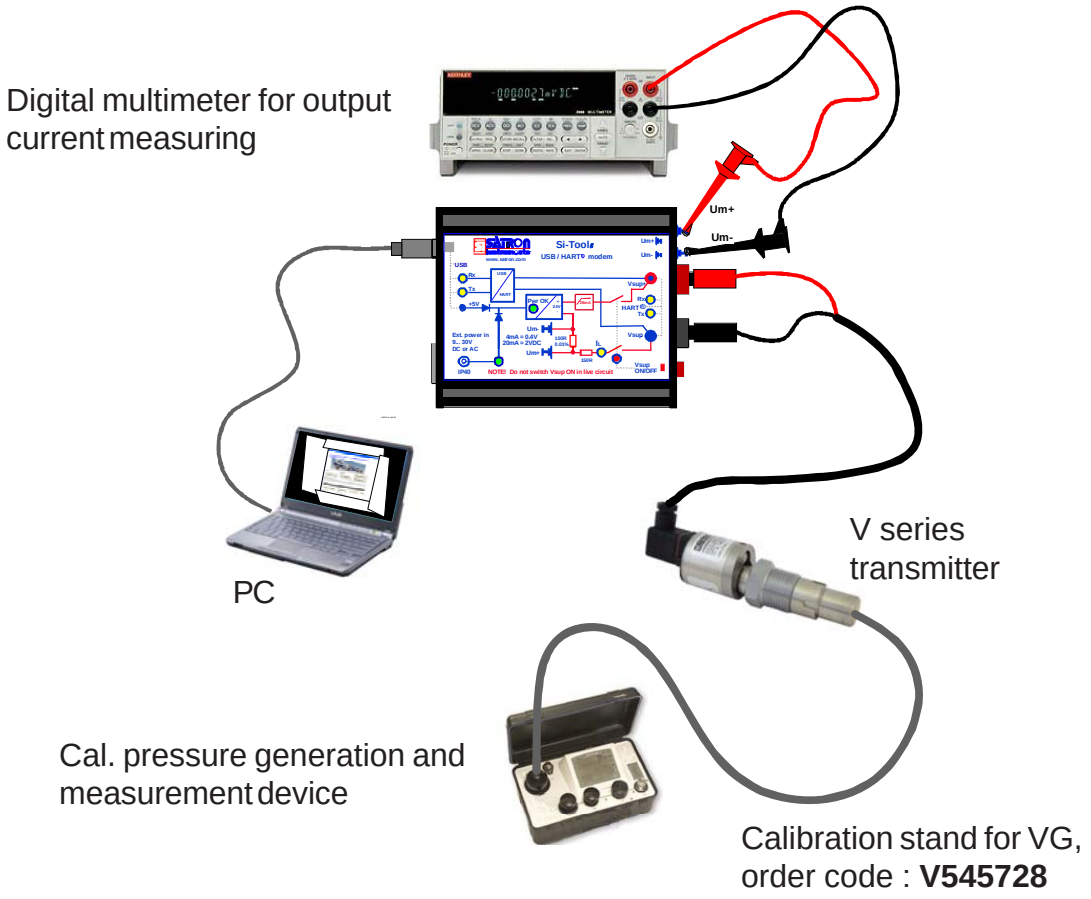


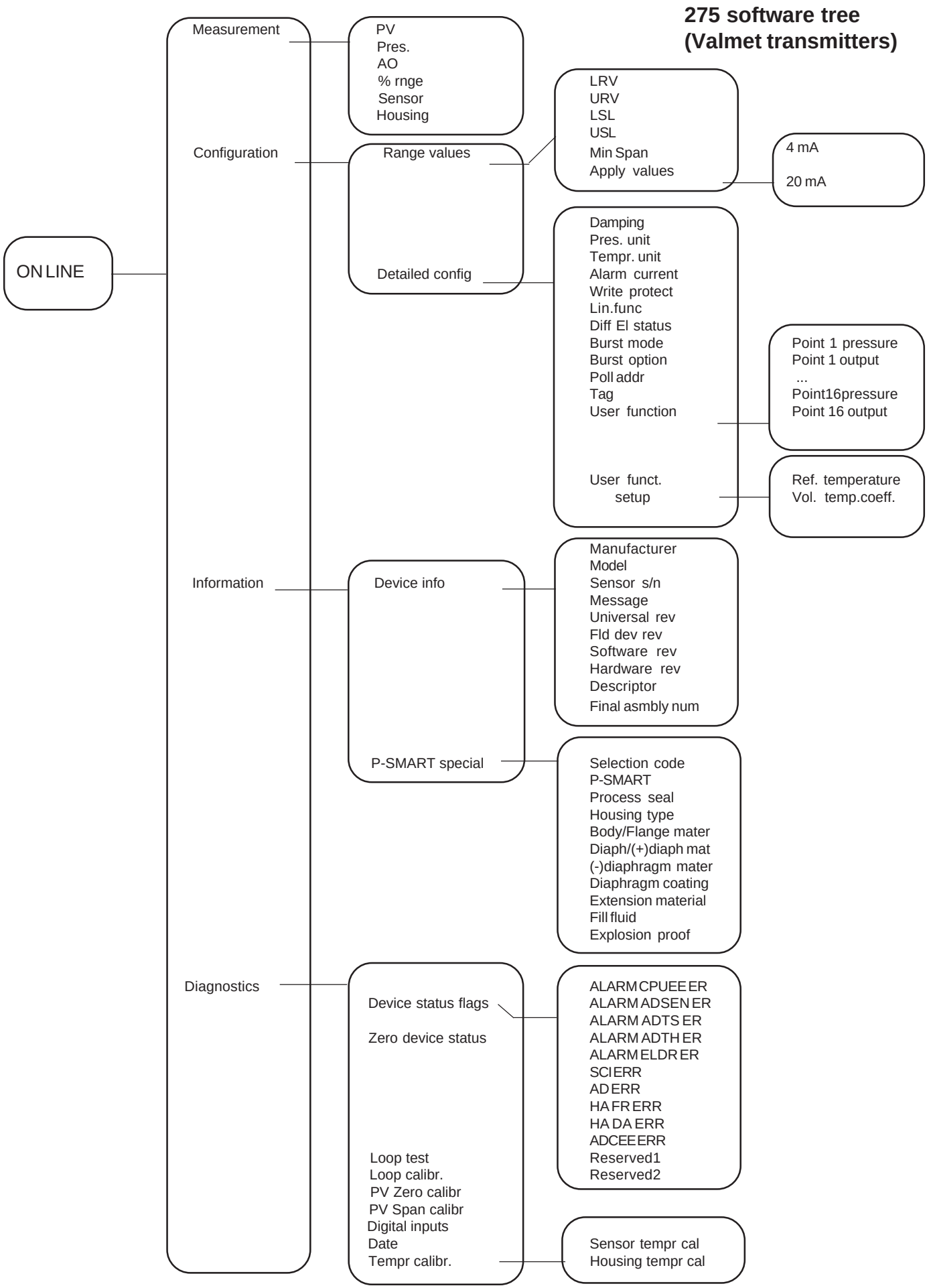
Figure 2-2 Calibration connections window

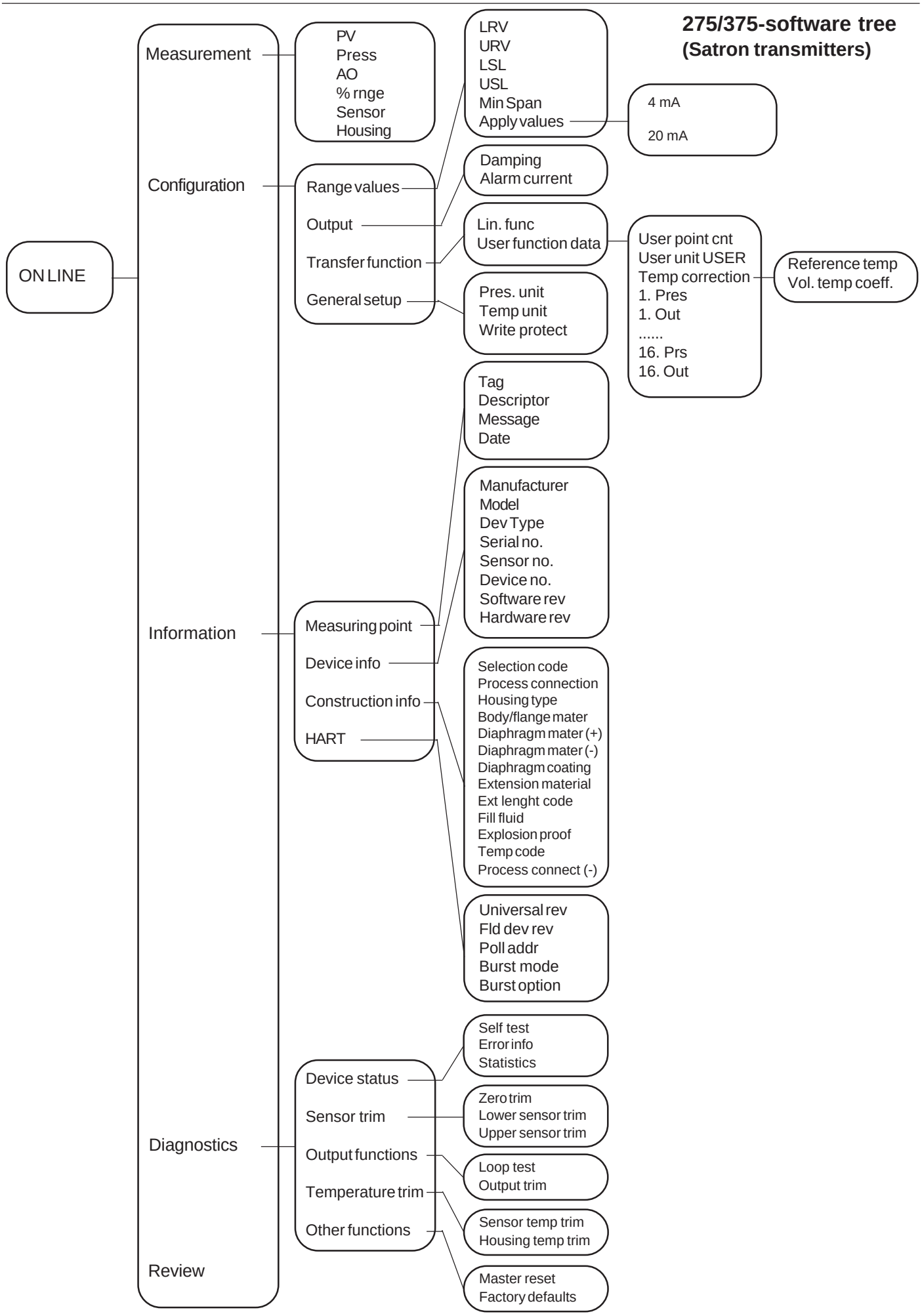
2.6 Setting-up with local switches

The additional instruction of display menus is enclosed to this manual.

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.

Figure 2-3 VG pressure transmitter with display


275 software tree
(Valmet transmitters)
ON LINE
Measurement
PV
Pres.
AO
% rnge
Sensor
Housing
Configuration
Range values
LRV
URV
LSL
USL
Min Span
Apply values
4 mA
20 mA
Detailed config
Damping
Pres. unit
Tempr. unit
Alarm current
Write protect
Lin.func
Diff El status
Burst mode
Burst option
Poll addr
Tag
User function
Point 1 pressure
Point 1 output
...
Point16pressure
Point 16 output
User funct.
setup
Ref. temperature
Vol. temp.coeff.
Information
Device info
Manufacturer
Model
Sensor s/n
Message
Universal rev
Fld dev rev
Software rev
Hardware rev
Descriptor
Final asmbly num
P-SMART special
Selection code
P-SMART
Process seal
Housing type
Body/Flange mater
Diaph/(+)diaph mat
(-)diaphragm mater
Diaphragm coating
Extension material
Fill fluid
Explosion proof
Diagnostics
Device status flags
Zero device status
ALARM CPUEE ER
ALARM ADSEN ER
ALARM ADTS ER
ALARM ADTH ER
ALARM ELDR ER
SCI ERR
AD ERR
HA FR ERR
HA DA ERR
ADCEE ERR
Reserved1
Reserved2
Loop test
Loop calibr.
PV Zero calibr
PV Span calibr
Digital inputs
Date
Tempr calibr.
Sensor tempr cal
Housing tempr cal

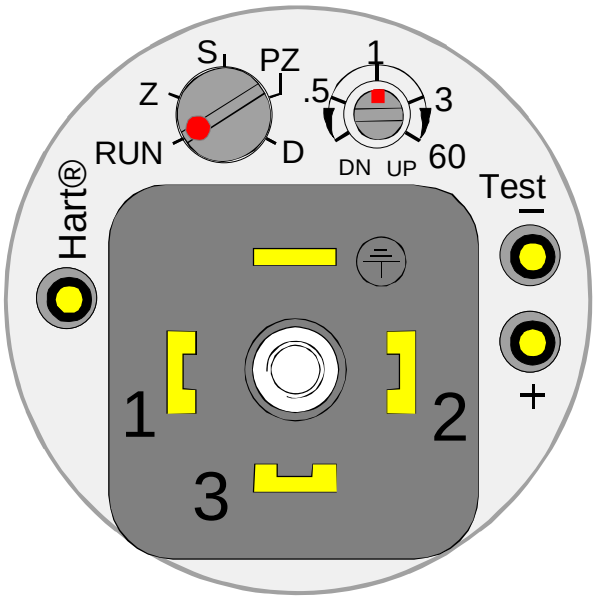

275/375-software tree
(Satron transmitters)
ON LINE
Measurement
PV
Press
AO
% rnge
Sensor
Housing
Configuration
Range values
Output
Transfer function
General setup
LRV
URV
LSL
USL
Min Span
Apply values
4 mA
20 mA
Damping
Alarm current
Lin. func
User function data
Pres. unit
Temp unit
Write protect
User point cnt
User unit USER
Temp correction
1. Pres
1. Out
.....
16. Prs
16. Out
Reference temp
Vol. temp coeff.
Information
Measuring point
Device info
Construction info
HART
Tag
Descriptor
Message
Date
Manufacturer
Model
Dev Type
Serial no.
Sensor no.
Device no.
Software rev
Hardware rev
Selection code
Process connection
Housing type
Body/flange mater
Diaphragm mater (+)
Diaphragm mater (-)
Diaphragm coating
Extension material
Ext lenght code
Fill fluid
Explosion proof
Temp code
Process connect (-)
Universal rev
Fld dev rev
Poll addr
Burst mode
Burst option
Diagnostics
Device status
Sensor trim
Output functions
Temperature trim
Other functions
Self test
Error info
Statistics
Zero trim
Lower sensor trim
Upper sensor trim
Loop test
Output trim
Sensor temp trim
Housing temp trim
Master reset
Factory defaults
Review

2.7 Set-up calibration, housing code T (with manual adjuster)

The transmitter is factory-calibrated, with 1 sec. electrical damping, for the range specified in the order. If range is not specified, the transmitter will be calibrated for the maximum range.

Zero and Span adjusters are at the end of the housing, under protective rubber shield. TEST jacks are also under protective rubber shield. Figure 2-4: housing T with PLUG connector

Checkout procedure
- See that the ripple on the supply voltage does not exceed 2.5 V_{pp} on 0-1000 Hz frequency range.
- Check the nameplate for the factory-calibrated range and zero suppression/elevation.
- If necessay, readjust the zero.



Housing with PLUG-connector, code T

Use of selector switch :

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

1300354154

Figure 2- 4

3 CALIBRATION

3.1 Adjustability

Maximum span is 25 times the minimum span for SATRON VG transmitters
Span adjustment is made from outside the housing, under the protective rubber shield (figure 3-1).

Zero suppression and elevation
Maximum zero suppression is 86 % of max.span, and maximum zero elevation is 100 % of max. span. Zero adjustment is made from outside the housing, under the protective rubber shield (figure 3-2).

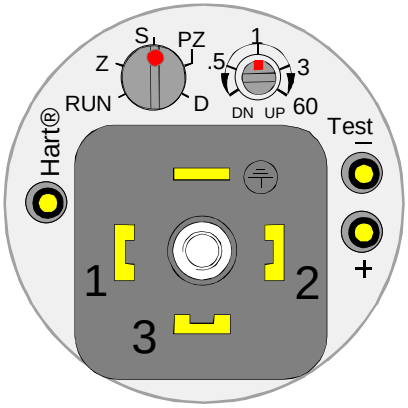


Figure 3-1

1300354154

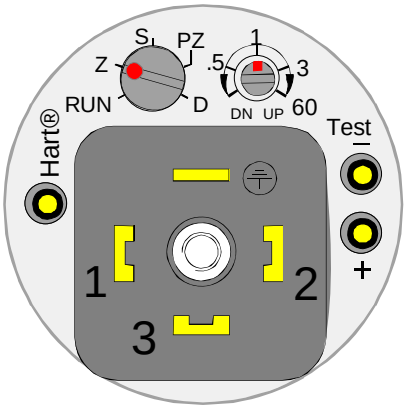


Figure 3-2

1300354154

Measuring range
The lower and upper range-values cannot differ from zero by more than the maximum span.
For example, range 4 transmitter whose measuring range is 0-4/100 kPa cannot be adjusted to measure 100...104 kPa pressure, because maximum span is
100 kPa.
Calibration stand
The calibration stand shown in Fig. 3-3 is available from the manufacturer. The stand is equipped with coupling and pressure connection facility. (Order number: V545728.)

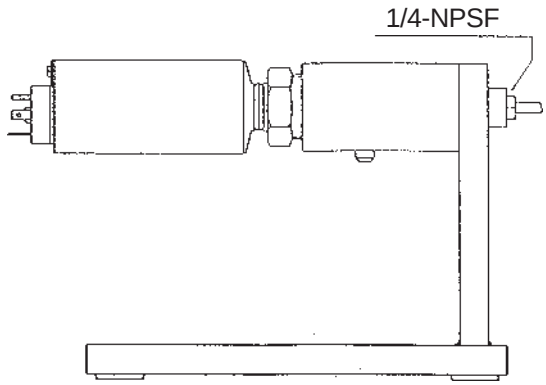


Figure 3 - 3 SATRON VG transmitter's calibration stand

3.2 Damping

If pulsation occurs in the measured pressure, it can be damped with the damping trimmer position D under the protective rubber shiled on the housing.

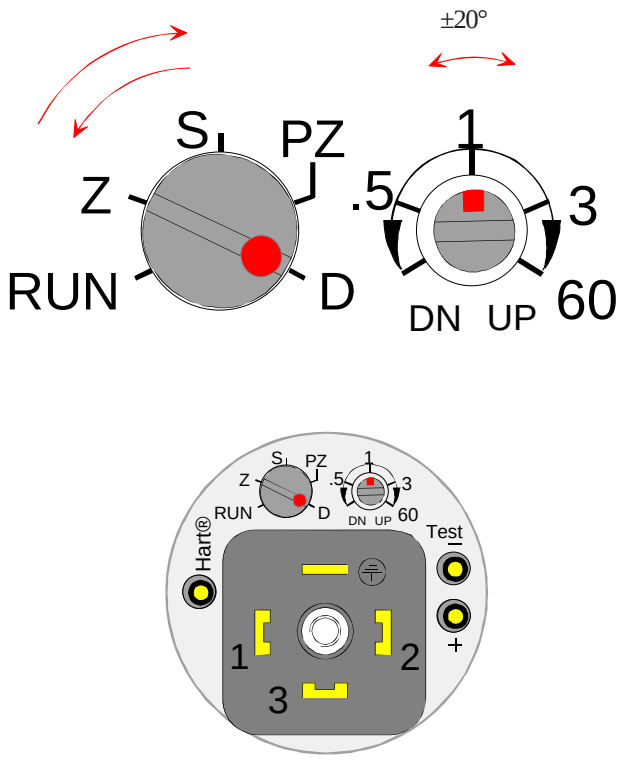


Figure 3-4 Damping adjustment 1300354154

The transmitter is factory-calibrated with minimum electrical damping.
To increase the damping, turn the trimmer clockwise.

Adjusting the damping does not affect the transmitter's other calibration.

Damping adjustment :
1. Turn the selector switch from RUN to position D
2. Turn the regulating switch about ±20° so damping adjustment is activated. Turn the regulating switch to desired value of damping. 0 s on the left side, 60 s in the right side.
3. Turn the selector switch from position D to position RUN.

3.3 Calibration examples

The calibration stand shown in Fig. 3-3 or a similar arrangement is used to calibrate the transmitter.

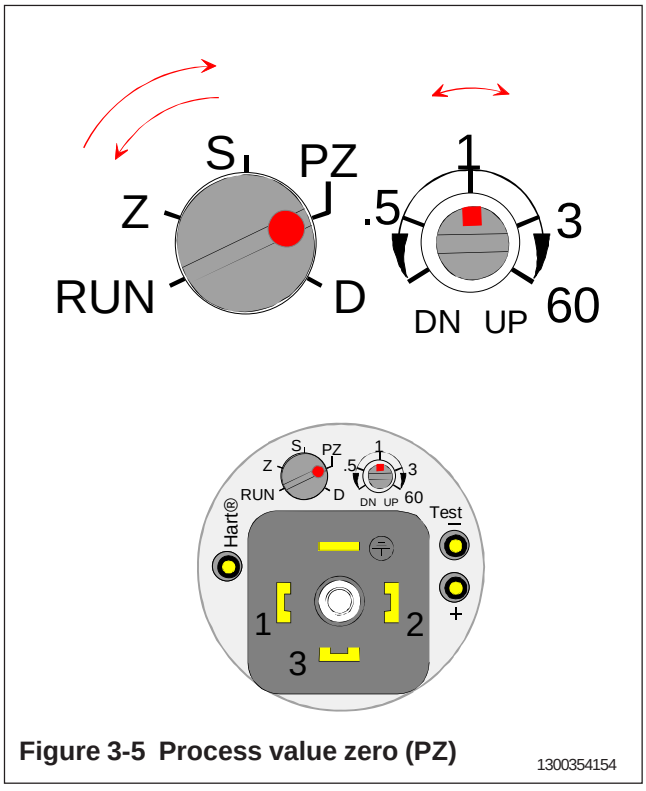


Figure 3-5 Process value zero (PZ) 1300354154

First step is process value zero :
1. Turn the selector switch from position RUN to position PZ.
2. PV ZERO is done when the damping trimmer is turned once to both edges at least for 1 sec.
3. Turn the selector switch from position PZ to position RUN.

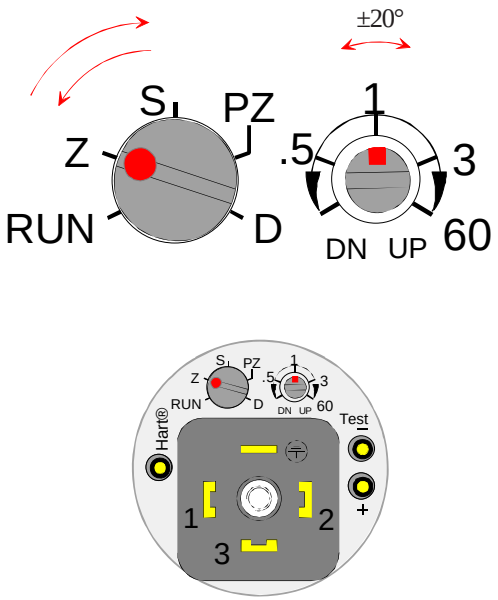


Figure 3-6 Set the lower range-value

1300354154

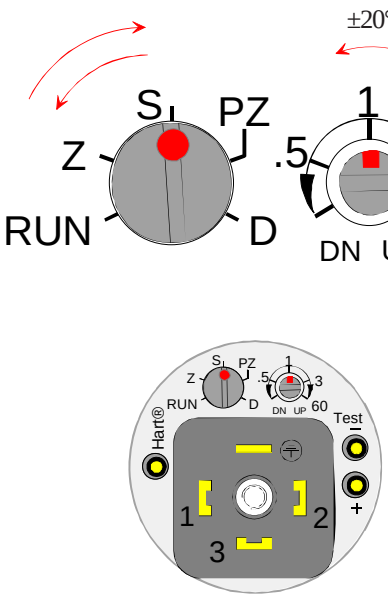


Figure 3-7 Set the upper range-value

1300354154

Measuring range: 0...300 kPa (range 5 transmitter).
Span: 300 kPa

Procedure

- Apply zero pressure.

1. Turn the selector switch from position RUN to position Z.
2. Turn the regulating switch about ±20° so adjustment is activated.
3. Turn the regulating switch to a point where output is closest to 4 mA. (adjustment range on fine adjustment range is ±0.75% of span and speed of adjustment is ±2.5% of span / s)
4. Turn the selector switch from position Z to position RUN.

- Apply full-span pressure.

1. Turn the selector switch from position RUN to position S.
2. Turn the regulating switch about ±20° so adjustment is activated.
3. Turn the regulating switch to a point where output is closest to 20 mA. (adjustment range on fine adjustment range is ±0.75% of span and speed of adjustment is ±2.5% of span / s)
4. Turn the selector switch from position S to position RUN.

- Apply zero pressure.
- Repeat the adjustments to achieve the desired accuracy.

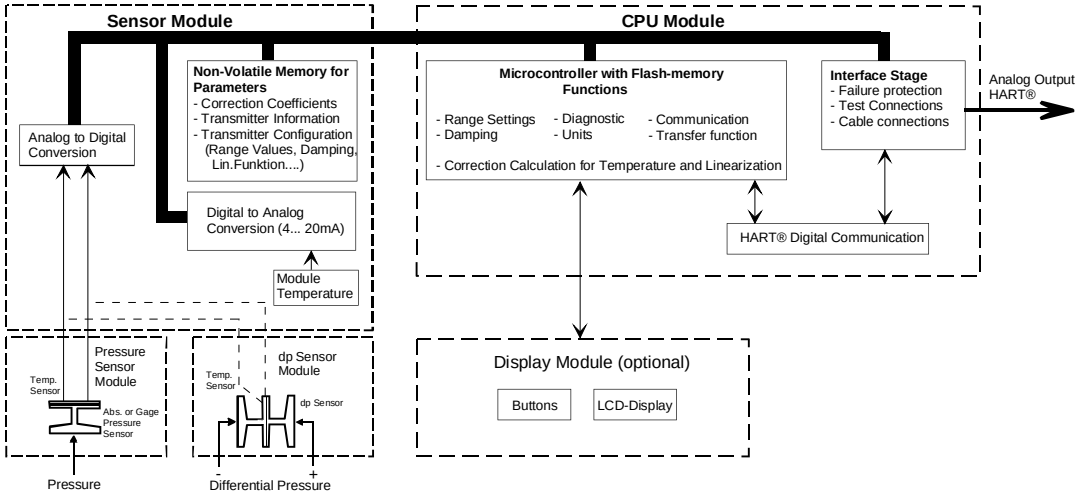


Figure 4-1 Functional construction of the SATRON VG pressure transmitter

1300354156

4. CONSTRUCTION AND OPERATION

4.1 Smart transmitter

Sensor Module

The piezoresistive sensor, which has a silicone oil fill, is isolated from the process with a diaphragm. Sensor pressure and temperature are measured with a 24-bit AD converter. Linearity and temperature effects are digitally corrected with an internal microprocessor connected to the sensor module.

The **sensor** converts pressure to electrical signal. The conversion is carried out through a Wheatstone bridge supplied with direct current. The elastic displacement produced in the bridge by the pressure causes bridge unbalance which is measured as a DC voltage signal.

Compensation includes temperature compensation and linearization. Each sensor is calibrated individually through a resistance network connection. The temperature information required by compensation is derived from a temperature measuring element located by the Wheatstone bridge.

Electronics Module

The electronics module converts the process pressure signal from the sensor module to 4-20 mA output signal. The conversion can be made in linear, square root or inverted mode, or it can be done through user-selectable pressure/output point pairs (2-16 points).

Transmitters provided with own display (code **N**) is equipped with operating keys that allow you to define the transmitter's all functions.

The active functions required for **signal shaping** are in a customized IC which is divided into two sub-blocks: amplifier block and standard-signal shaping block. The standard-signal shaping block also includes zero, span and damping adjustments.

The **interface stage** includes failure protections to ensure the transmitter's operation and nonfailure in possible failure conditions. This stage also includes the TEST and cable connections

5. PARTS LIST

When ordering spares, please quote this document's number BPLH700AV and date 15.2.2013, the name and order number of the required part, and the transmitter's serial number. Parts indicated with asterisk (*) as well as screws, nuts and seals (packings) are spare parts.

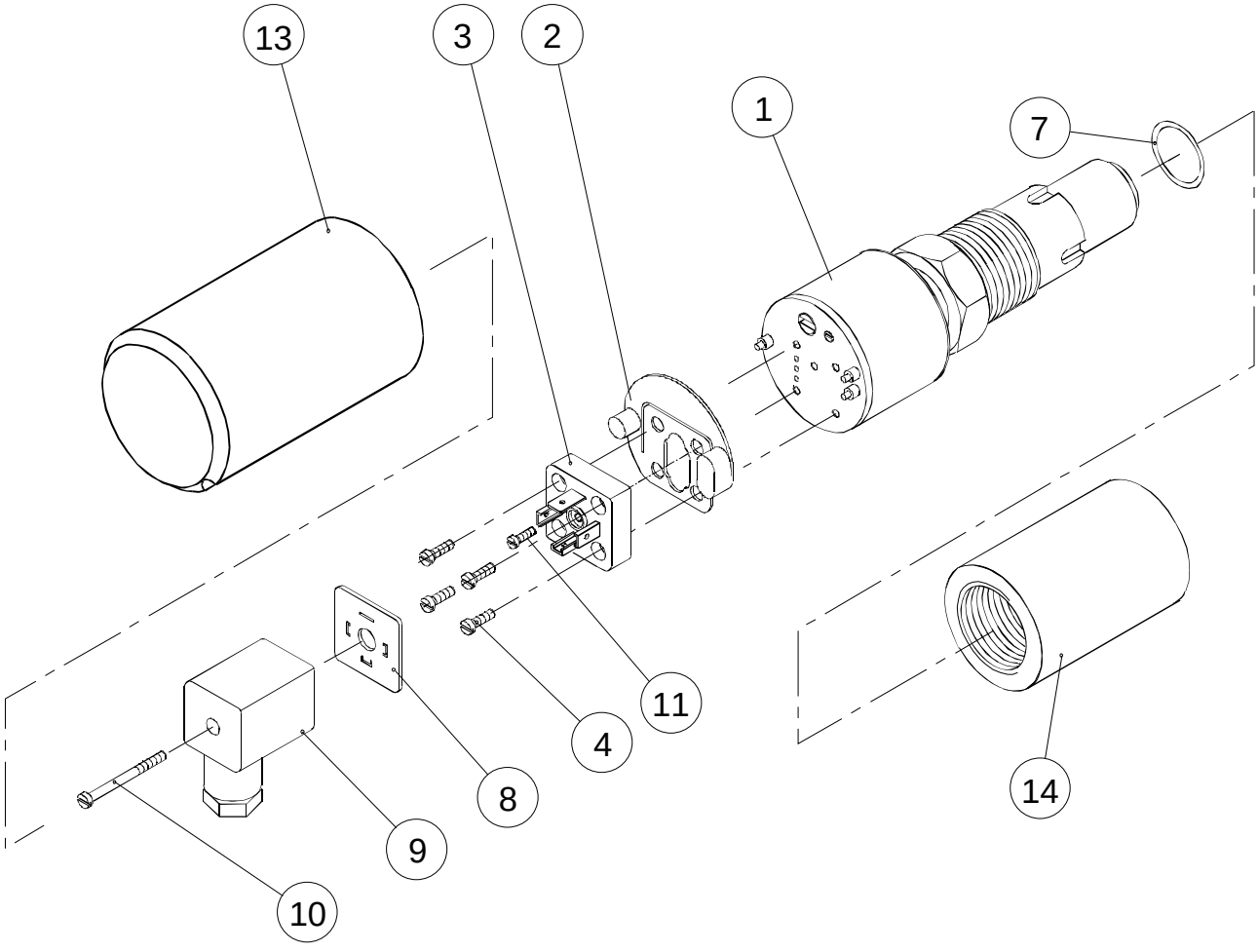


Figure 5-1 Parts list: Enclosure **H** and **T**, housing with PLUG connector

1300354160

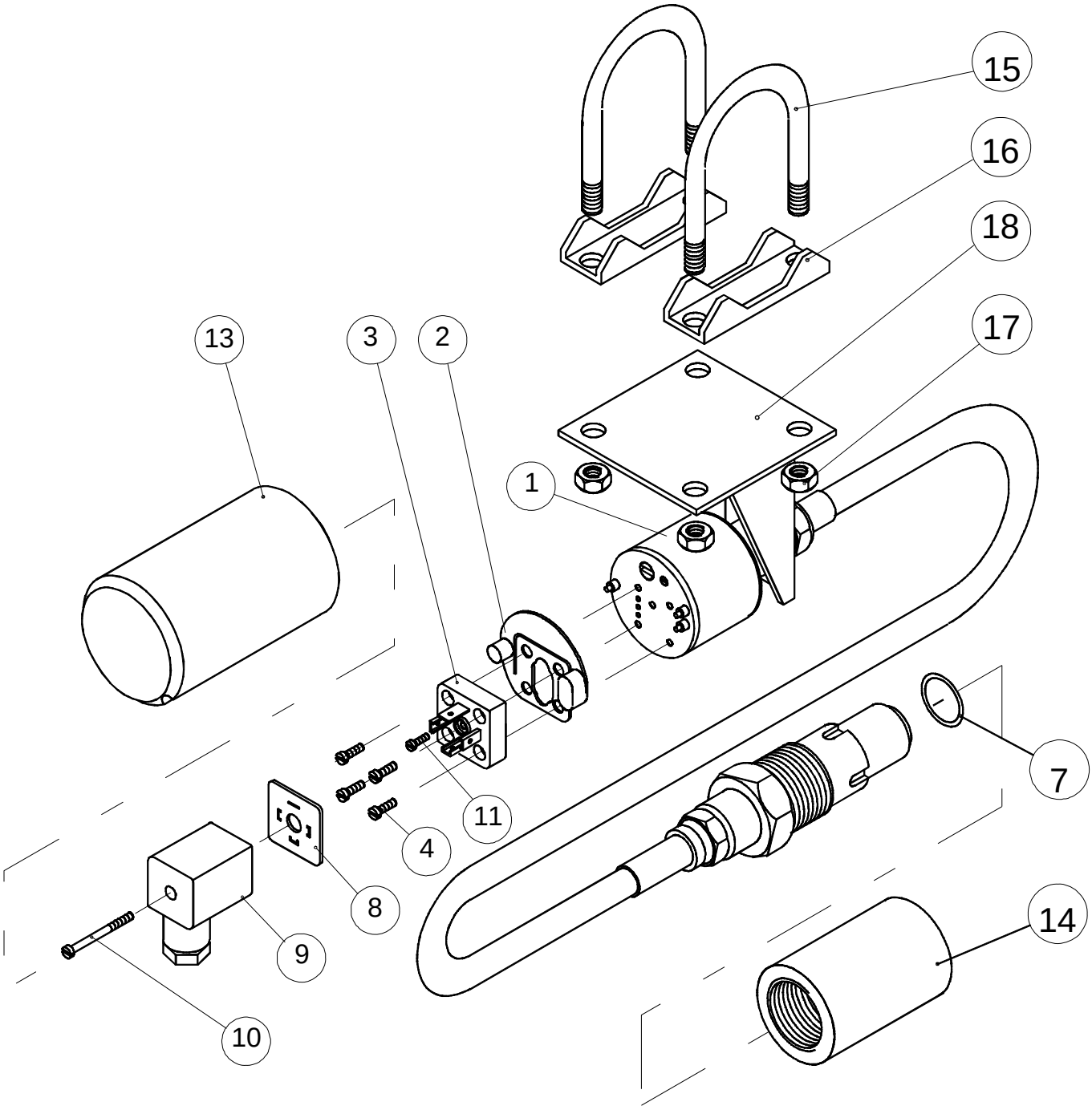
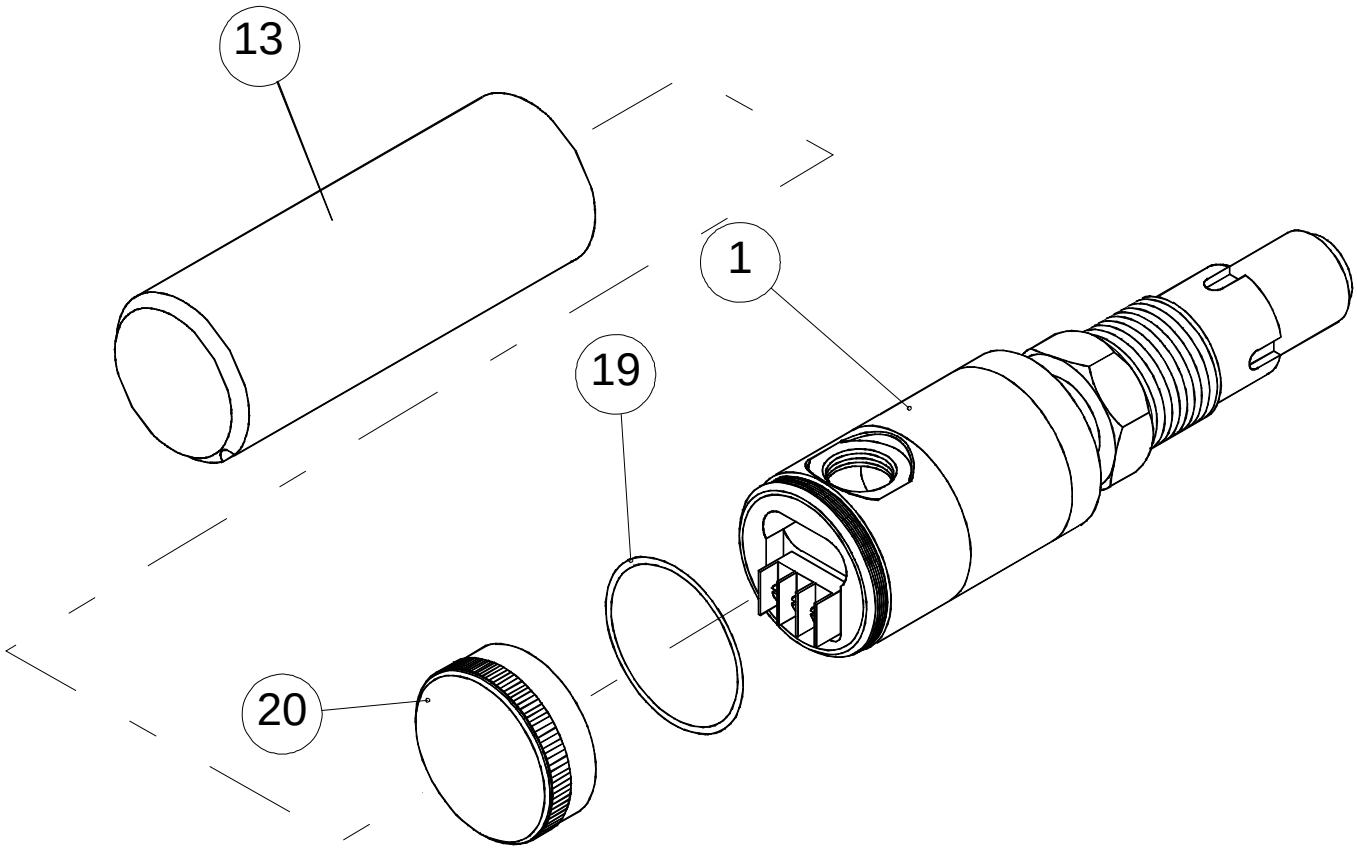


Figure 5-2 Parts list:Enclosure with remote electronics

1300354163



1300354161

Figure 5-3 Parts list:
Enclosure **M, housing with terminal board**

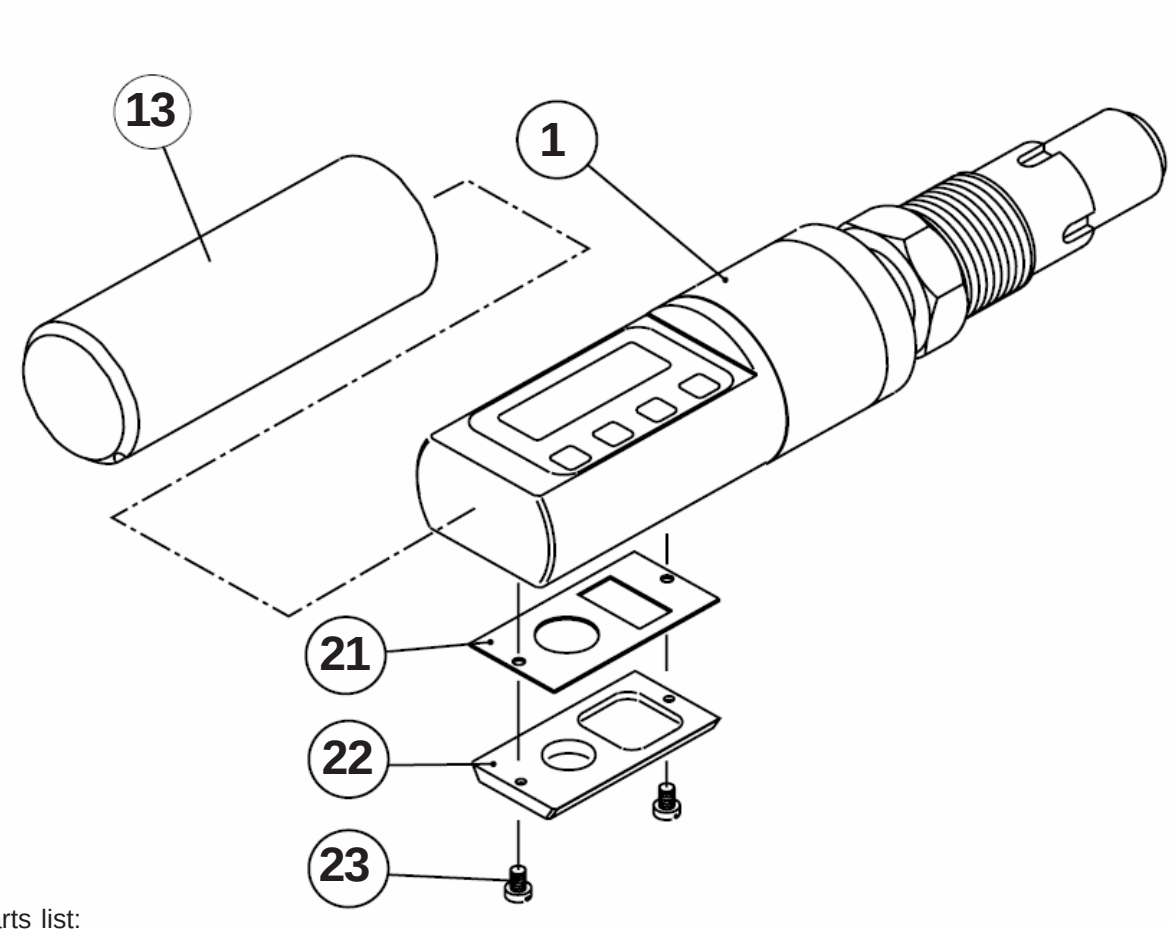


Figure 5-4 Parts list:
Enclosure **N, housing with display**

1300354162

Number	Name	Order number
1	Sensing element	
2	Seal	T1300207
* 3	Device plug DIN43650	72900114
4	Cylinder-head screw M3 x 10 SFS2179 Zne	51603021
7	O-ring 17 x 2, Viton®	80031720
	O-ring 17 x 2, EPDM	80011720
8	Seal GDM3-17,silicone	72900116
* 9	Wiring box GDM3009, DIN43650	72900111
10	Cylinder-head screw S M3 x 35 SFS2179 A4	51723053
11	Cylinder-head screw S M3 x 4 VSM 13302 Zne	51613009

Number	Name	Order number
* 13	Protection cup, housing H, M and T	T1300295
* 13	Protection cup, housing N	T1300296
* 14	Coupling	see chapter 1.1.3
* 15	Mounting clamp	V544953
* 16	Support plate	V543223
17	Hex nut M8 SFS2067 A4	56022800
* 18	Mounting bracket S	T1050009
19	O-ring, 42x2 FPM (Viton®)	80013800
* 20	Cover M	T1300256
21	Seal, Silicone rubber	T1300387
* 22	Back plate V	T1300391
23	Fastening screw M4	T1325347

Notes

SATRON VG Flush Mount Pressure Transmitter

SATRON VG pressure transmitter belongs to the series V transmitters which will have both analog and smart properties. SATRON VG is used for 0-1.4 kPa...0-25 MPa ranges. It is a 2-wire transmitter with HART® standard communication.
In pressure measuring applications SATRON VG 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 VG6 - VG7.

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, keyboard (display option) or HART®275/375 communicator.

Damping
- Time constant is continuously adjustable 0.01 to 60 s.

Temperature limits
Ambient: -30 to +80 °C
Process: -30 to +125 °C
0 to +200 °C (temp. code H)
Shipping and storage: -40 to +80 °C.
Operating temperature of display:
0 to +50ºC *(does not affect operation of the transmitter)*

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

Volumetric displacement
< 0.5 mm^3 /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: 12 - 35 VDC.

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

PERFORMANCE SPECIFICATIONS
Tested in accordance with IEC60770: Reference conditions, specified span, no range elevation, horizontal mounting; O-ring seals, AISI316L diaphragm, silicone oil fill.

Accuracy
±0.05 % of calibrated span
(span 1:1-5:1 /max.range).
On the measuring ranges 5:1-100 :1:

$$\pm[0.025+0.01 \times \left(\frac{\text{max.span}}{\text{calibrated span}}\right)]\%$$ of calibrated span

(incl. nonlinearity, hysteresis and repeatability)

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

Temperature effect
- **on -20 to +80 °C range**
(process temperature code **N**)
Zero and span error:
±0.15 % of max. span.
- **on 0 to +200 °C range**
(process temperature code **H**)
Zero and span error:
±1 % of max. span, VG6 - VG8
±2 % of max. span, VG4 - VG5

Mounting position effect
Zero error < 0.32 kPa, which can be calibrated out.

Vibration effect (IEC 68-2-6: FC):
±0.1 % of measuring range/
2g/10 to 2000 Hz
4g/10 to 100 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), Duplex (EN 1.4462), Hast. 276 (EN 2.4819), CoNi-alloy, Titanium Gr2 (EN 3.7035) or Tantalum.
Coupling [1]: AISI316L (EN 1.4404), Duplex (EN 1.4462), Hast.C276 (EN 2.4819) or Titanium Gr2 (EN 3.7035).
Other sensing element materials: AISI316, SIS 2343.

Filling fluid: Silicone oil, food industry oil or inert oil

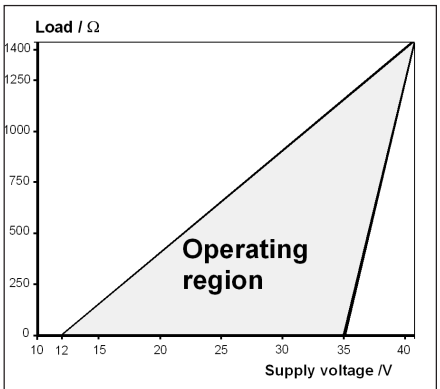
Enclosure class IP66

[1] Parts in contact with process medium

Housing with PLUG connector, housing type codes **H** and **T**
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

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



Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

Supply voltage for transmitter without intrinsic safety (not ATEX)

Pressure limits

Maximum process pressure, MPa

Trans-mitter type	Max. overload pressure	Pressure class
VG3	0.2	PN40
VG4	0.3	PN40
VG5	1.5	PN40
VG6	7.5	PN100
VG7	40.0	PN250
VG8	100.0	PN250

Minimum process pressure

$T_{proc.}$ ℃	Minimum pressure for different fill fluids (kPa, abs.)	
	DC200 100 cSt	Inert oil
20	5	8
40	8	10
80	16	28
120	21	53

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

SATRON VG Flush Mount Pressure Transmitter

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

Housing with junction box/terminal strip**, M** and **N :**
M20x1.5, 1/2-NPT inlet; screw terminals for 0.5 to 2.5 mm^2 wires

Process connections
G1 connecting thread
Process couplings: See Selection Chart and installation instructions or technical specification: Couplings for Transmitters **G150**.

Weight
Transmitter
- with housing type **H** and **T**: 0.7 kg
- with housing type **M** ja **N**: 1.2 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

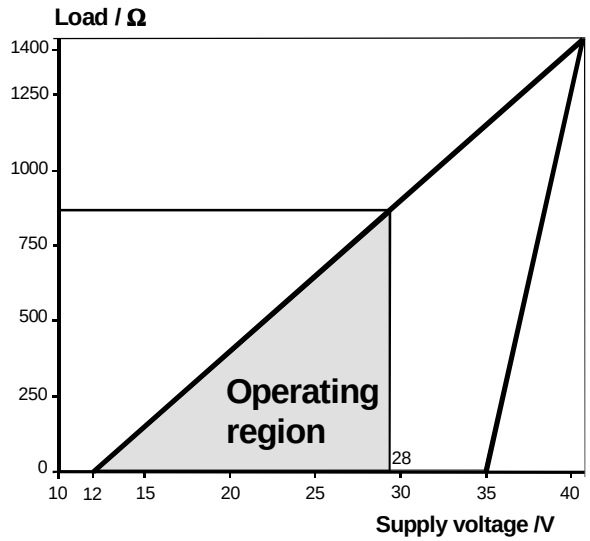
European Certifications
ATEX Intrinsic Safety

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

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



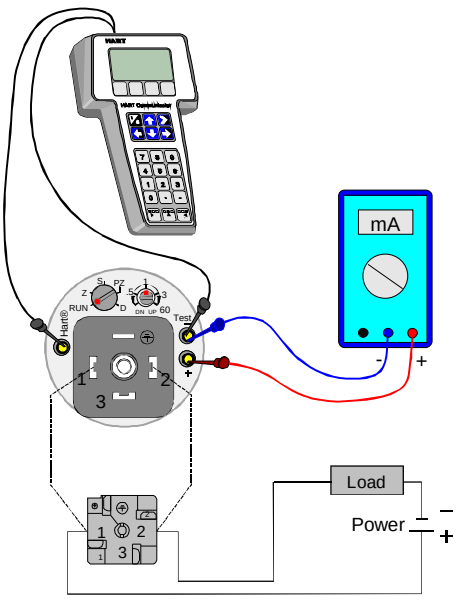
Min. load using HART® - communication 250 Ω

$R_{max} = \frac{\text{Supply voltage - 12 V}}{I_{max}}$

I_{max} = 20.5 mA using HART®-communication

I_{max} = 23 mA (when the alarm current 22,5 mA is on)

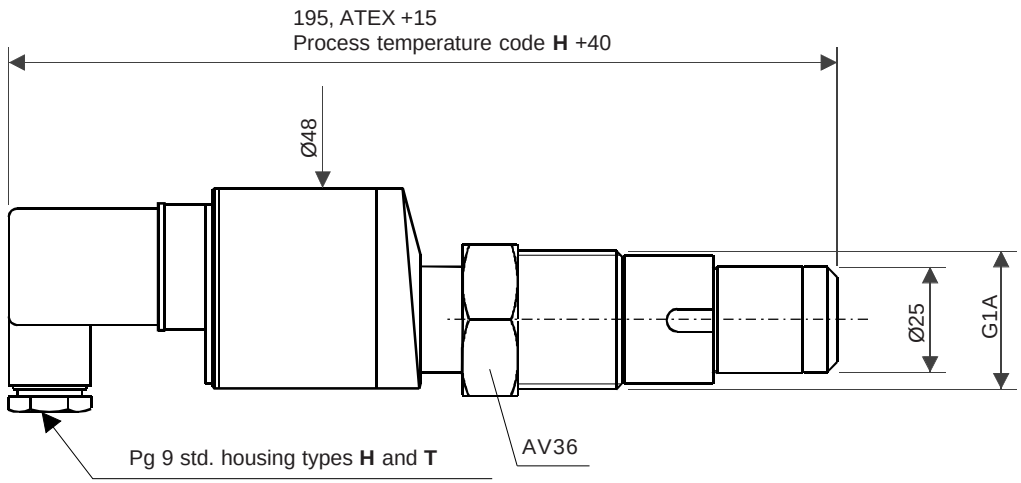
Supply voltage for transmitter with certified intrinsic safety (ATEX)

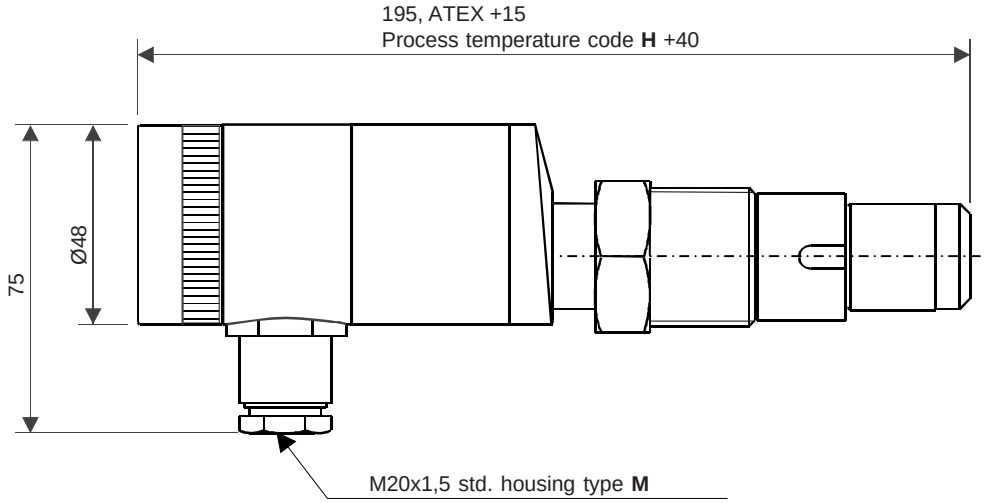


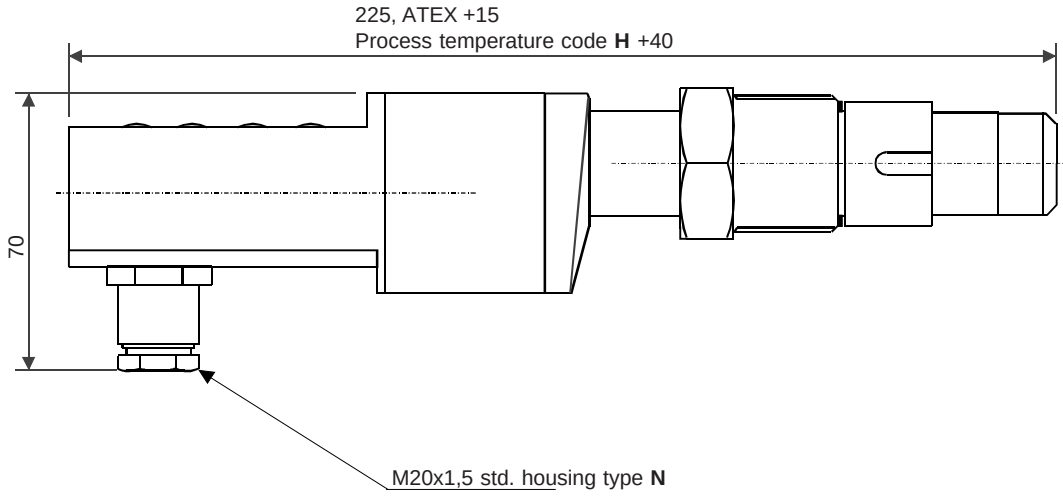
Wiring
Housing with PLUG connector, codes **H** and **T**

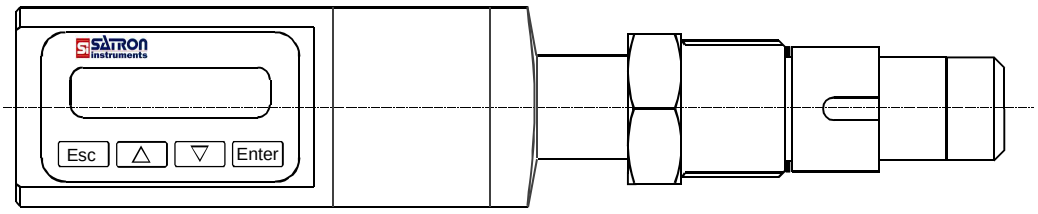
SATRON VG Flush Mount Pressure Transmitter

Dimensions (in mm)









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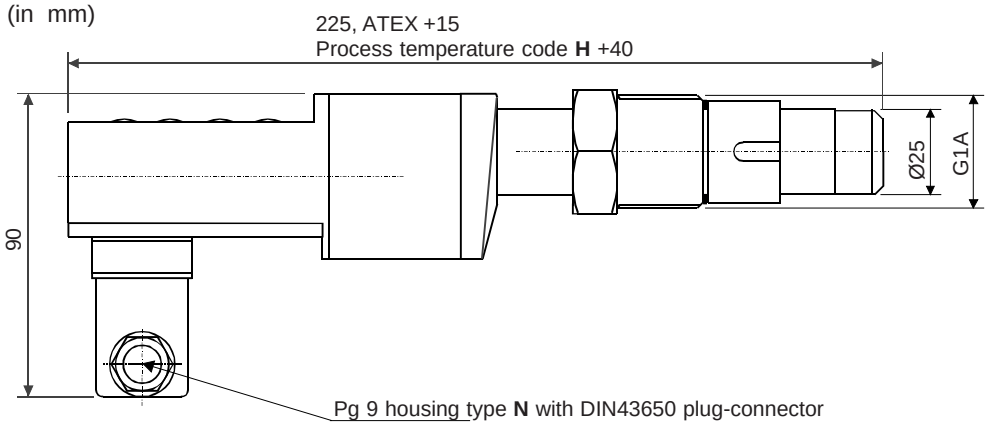
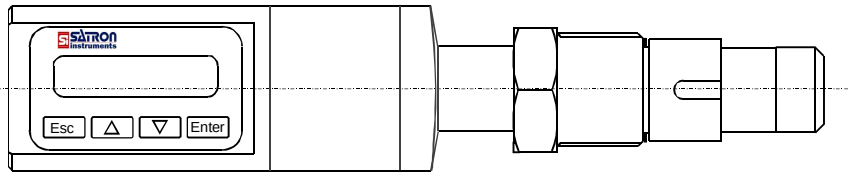
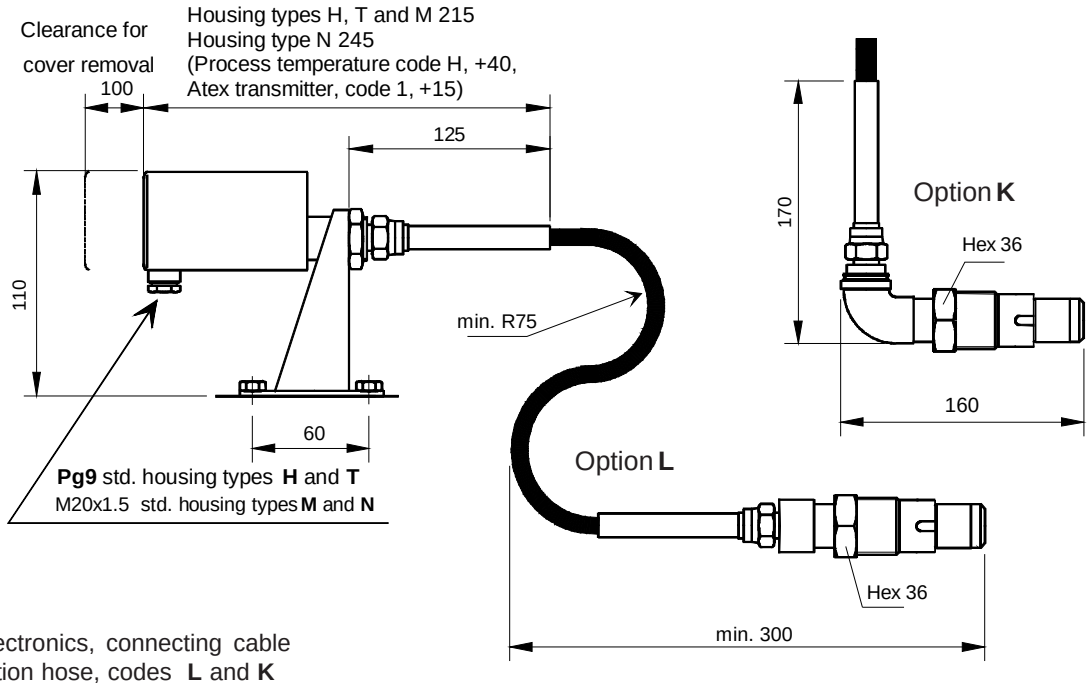
SATRON VG Flush Mount Pressure Transmitter

Dimensions (in mm)

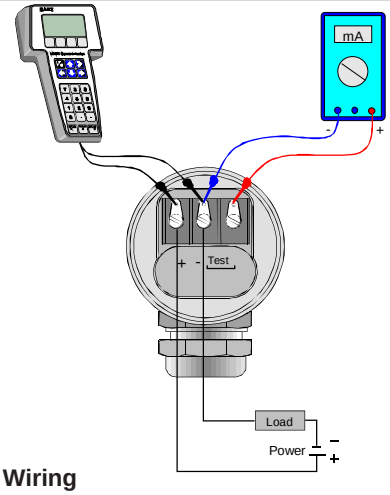
1300354100



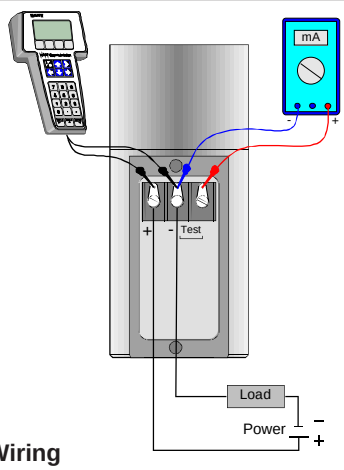




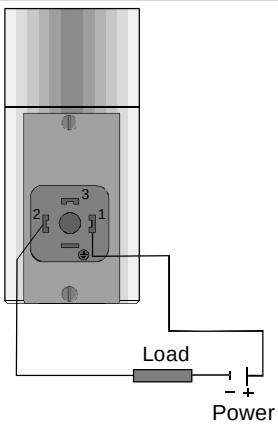
Remote electronics, connecting cable with protection hose, codes **L** and **K**



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



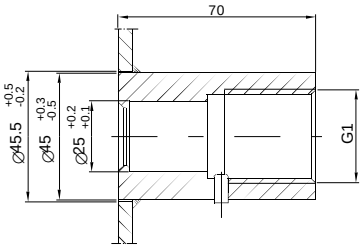
Wiring
Housing with terminal strip and display, code **N**



Wiring
Housing with terminal strip and display with DIN 43650 plug-connector, code **N__ / P**

SATRON VG Flush Mount Pressure Transmitter

Couplings

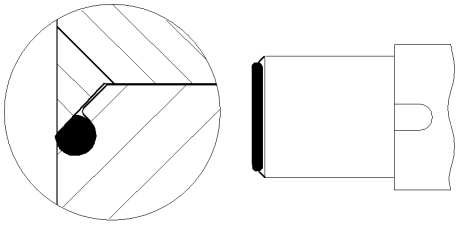


Standard coupling
Material: AISI316 L or Hastelloy C

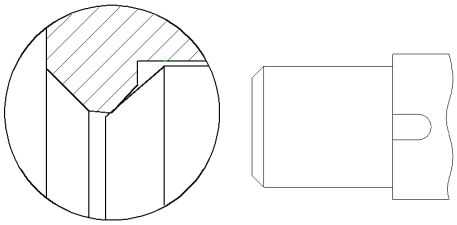
Special couplings:
G1 hygienic coupling , M548101
G1/2A/G1 coupling, M546190
G1/2A/G1 coupling with venting, M860280
G1/2A/ G1 couplings with bracket:
- G1/2A male, M546195
- G1/2 female, M550393

Transmitter's process sealing

Three different options are available for the transmitter's process sealing:



AISI316L, AISI317L or Duplex diaphragm,
FPM (Viton) or EPDM O-ring (code **5** or **6**)
EHEDG - certified



AISI316L, CoNi-, Duplex, Hastelloy C276, Tantalum or Titanium diaphragm,
metal/metal taper sealing (diaphragm also on sealing face)
(code **4**)

Flanges:
Dimensions of flanged couplings, see the installation and setting-up instructions

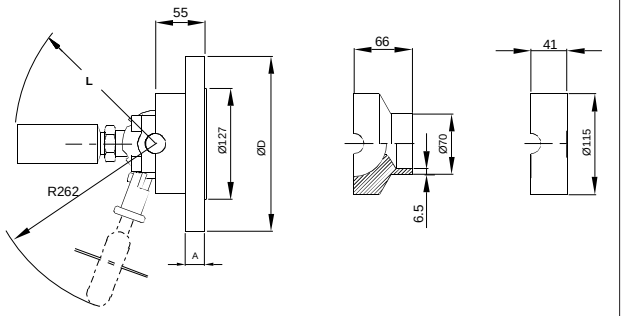
PASVE® mounting & service valve

All PASVE® types are also available with pneumatic actuator, flushing and limit switches.

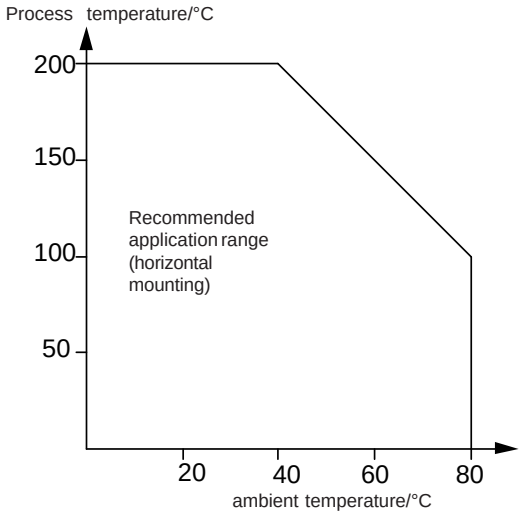
PASVE GF (NF)
(Flange type)

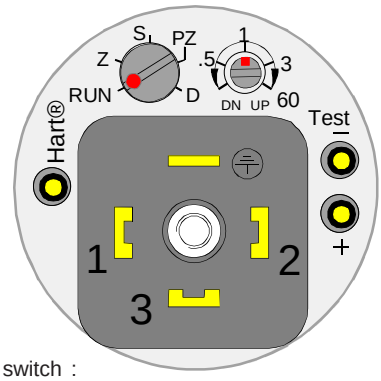
GP (NP)
(Welded on pipe)

GC (NC)
(Welded on container)



Process temperature limits, code **H**





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, housing code T

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, housing code N

SATRON VG Flush Mount Pressure Transmitter

BPLV700
01.01.2014

Selection Chart

Adjustability	Span, min	Span, max	Measuring range
VG3	1.4 kPa (14 mbar)	35 kPa (350 mbar)	- 35...+35 kPa (-350...350 mbar)
VG4	4 kPa (40 mbar)	100 kPa (1000 mbar)	-100...+100 kPa (-1000...1000 mbar)
VG5	10 kPa (100 mbar)	500 kPa (5000 mbar)	-100...+500 kPa (-1000...5000 mbar)
VGA5	10 kPa (100 mbar)	500 kPa (5000 mbar)	0...+500 kPa (0...5000 mbar), abs.
VG6	0.03 MPa (0.3 bar)	3 MPa (30 bar)	-0.1...+3 MPa (-1...30 bar)
VGA6	0.03 MPa (0.3 bar)	3 MPa (30 bar)	0...+3 MPa (0...30 bar), abs.
VG7	0.15 MPa (1.5 bar)	15 MPa (150 bar)	0...+15 MPa (0...150 bar), abs.
VG8	1 MPa (10 bar)	25 MPa (250 bar)	-0,1...+25 MPa (-1...250 bar)

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

Process seal **4** metal/metal taper **5** O-ring FPM (Viton®) (1) **6** O-ring EPDM (1)

Wetted materials

Code	Material	Code	Material
2	AISI316L (EN 1.4435)	**6**	Titanium Gr2 (*) (**) (****)
3	Hast. C 276 (*) (**)	**7**	CoNi-alloy (*) (not ranges 3-4)
5	Tantalum (*) (**)	**8**	Duplex (EN 1.4462) (*) (**)

Diaphragm coating

Code	Material
9	gold/Rhodium
Y	diamond (specify only when coated)

Fill fluid **S** Silicon oil **G** Inert oil **A** Food and beverage special oil (Neobee M20)

Housing type

H Housing with PLUG-connector, DIN43650, no display, inlet PG9
T Housing with PLUG-connector and with manual adjust, DIN43650, no display, inlet PG9, (no ATEX)
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** Atex Intrinsic Safety, Ex II 1 GD T135°C (***)

Process temperature limits **N** -30 ... +125 °C **H** 0 ... +200 °C (*) (**)

Process coupling
0 No coupling **E** Hygienic coupling
G Standard coupling

Material
2 AISI316L
3 Hast.C276
6 Titanium Gr2
8 Duplex

PASVE® mounting valve, specify separately in the order
Specify special couplings separately in the order

Special size of electrical inlet
N 1/2 NPT **G** Pg13.5 **P** Plug connector DIN 43650

Special features

Remote electronics (specify only if housing connected with cable 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°

Length of connection cable between sensing element and housing
2 2 m cable **3** 3 m cable etc. (max. 10 m)

Mounting parts for remote electronics for Ø 51 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 material certificate without appendices, 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

We reserve the right for technical modifications without prior notice.

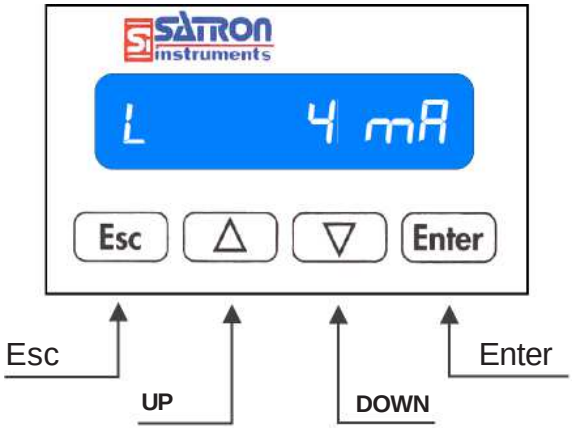
(*) = only process seal code 4
(**) = not for range 3
(***) = Housing H and N : Ex II 2 GD T135°C ATEX transmitters with display are the model without membrane key.
(****) = Min. process temperature limits 0 °C

(1) = EHEDG - certified

SATRON instruments

OPERATIONS

The user interface for the series V transmitters, housing option **N**, consists of display and operating keys. Among other things, the user interface allows you to set process variables in the desired units on the display and to configure the transmitter e.g. by setting the lower and upper range-values (**LRV**, **URV**) and the process variable's unit and tag code. In addition, you can perform diagnostic routines and view device information through the user interface.



The 8-character liquid crystal display (LCD) allows you to display information with letters and numbers.

OPERATING KEYS:
With the **UP/DOWN[↑↓]** arrow keys and **ENTER** and **ESC** you can move in the menus. The functions of the keys:

ENTER[↵]:
Press ENTER to move to a lower level in a menu or to accept a command or parameter value.

UP [↑]:
Use the UP arrow key to move up on the current menu level or to increase the selected parameter value.

DOWN [↓]:
Use the DOWN arrow key to move down on the current menu level or to decrease the selected parameter value.

ESC [X]:
Press ESC to move back towards the top of the main menu.

The main menu has 4 submenus: Measurement, Configuration, Info and Diagnostics menus. When the transmitter is powered up it will go to the Measurement menu's main display, i.e. Process Value.

1. MEASUREMENT MODE MENU: MEASURE

When the transmitter is powered up, it immediately shows the **MEASURE** menu's main display, **PROCESS VALUE**. Use the **UP/DOWN[↑↓]** keys to move in the menu. The menu does not have any variables adjustable by the user. Use the **ESC** key to exit the **MEASURE** menu to the main menu.

1.1 PROCESS VALUE (PV):

L 12.34

This shows the PV (process value/primary variable) which may be pressure, volume, differential pressure, etc. The letter at the left of the display specifies the linearization function in use. The available options are as follows:

L	Linear
Z	Zero-based linear
I	Inverted linear
S	Square root
U	User 16 points

Define the linearization function by selecting **LIN FUNC** from the **CONFIGUR** menu.

1.2 UNITS

BAR

With the **[↓]** key you can display the process value's unit. Define the unit by selecting **UNITS** from the **CONFIGUR** menu. If user-defined has been selected as linearization function, the text USER (default value) is shown as unit .

1.3 PRESSURE VALUE

P 12.34

The pressure detected by the sensor.

1.4 PRESSURE UNIT

BAR

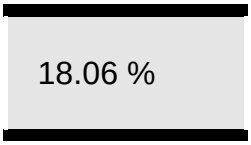
The unit of the pressure detected by the sensor.

1.5 MA, CURRENT LOOP

6.89 mA

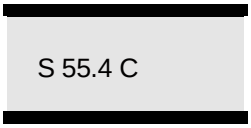
Current signal's value in milliamps.

1.6 %, PER CENT



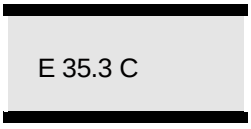
Current signal's value in per cents of full-range value.

1.7 S F/C, SENSOR TEMP



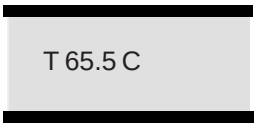
Sensor temperature in °C or °F. Select the unit from the **CONFIGUR** submenu.

1.8 E F/C, ELECTRONICS TEMP



The temperature of the transmitter's electronics, either °C or °F. Select the unit from the **CONFIGUR** submenu.

1.9 T F/C, PROCESS TEMP



The temperature of the process, either °C or °F. Select the unit from the **CONFIGUR** submenu.

2. CONFIGURATION MENU: CONFIGUR

Select Configuration mode from the main menu level with the **UP/DOWN[↑↓]** keys. Then press **ENTER** to access the **CONFIGUR** menu. In this submenu you can define the upper and lower range-values (**URV, LRV**), device identification code, linearization function, etc.

2.1. MANUFCTR

Manufacturer's name. Cannot be changed.

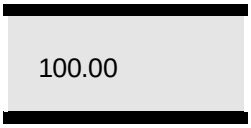
2.2. DEV TYPE

Product type code. Cannot be changed.

2.3. TAG

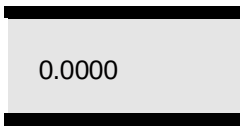
Tag code. You can enter free-format text one character at a time. When you select this option with **ENTER** the cursor will be at the left. Select characters with **ENTER** (to the right) and **ESC** (to the left). You can view the selectable characters one character at a time with the **UP/DOWN[↑↓]** keys until the desired character is found. When the cursor is at the right edge you can go back to the **CONFIGUR** menu either by accepting the new tag code with **ENTER** or by exiting without changing the tag code by pressing **ESC**. You can go back to edit mode by pressing the **ESC** key when asked to accept your entry. Apostrophe indicates the cursor position; at point, however, the cursor will disappear. A great deal of special characters are available besides letters and numbers.

2.4 PV URV, UPPER RANGE-VALUE



This is the process variable's upper range-value corresponding to 20 mA. Set the value in the selected units, which are displayed first. The numerical value is shown in the next screen where you can also edit the value. The procedure is similar to **TAG**, except that you first set the position of the decimal point with the **UP/DOWN[↑↓]** keys. After accepting that with **ENTER** you can edit each digit in the value in the same way as the characters in **TAG**. If the defined upper range-value is invalid, the display will blink and you go back to re-edit the value.

2.5 PV LRV, LOWER RANGE-VALUE

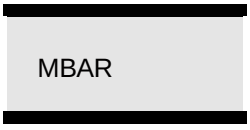


Here you set the process variable's lower range-value corresponding to 4 mA. The procedure is the same as for upper range-value.

2.6 PV DAMP, DAMPING

Time constant, in seconds, for output damping. The range is 0.025s to 60s. Set the value with the **UP/DOWN[↑↓]** keys and accept it with **ENTER**, or press **ESC** if you do not want to change the value.

2.7 UNITS



Here you can display or change the applied unit of measure. Press **ESC** to exit without making a change. Press **ENTER** to accept new value. Use the **UP/DOWN[↑↓]** keys to view the units. The selectable units include **KPA, TORR, ATM, MPa, INH2O, INHG, FTH2O, MMH2O, MMHG, PSI, BAR, MBAR, G SQCM, KG SQCM, PA.**

2.8 T UNITS

Select the temperature unit from this menu. The unit can be °C or °F. Proceed as described above to make the selection.

2.9 LANGUAGE

ENGLISH

From this menu you can select the desired language (**SUOMI, SVENSKA, ENGLISH, DEUTSCH or FRANCAIS**). Use the **UP/DOWN[↑↓]**keys to select the language, press **ENTER** to save the selection, or press **ESC** to exit without saving.

2.10 PASSWORD

12

From this menu you can set a password (0…999) for the transmitter. If a password has been specified, you cannot set any parameters or make any other settings on the transmitter unless you enter the correct ID number in this menu. Password is not in use when **PASSWORD** is 000 after reset. You enter the **PASSWORD** in the same way as **TAG**. **PASSWORD** will be on when you define a value between 1 and 999. If you forget password get on to Satron Instruments Inc.

2.11 LRV=PV

0.000000

Here you set the current process pressure as lower range-value (**LRV**). Accept the setting with **ENTER** when asked to confirm the value (**SAVE?**). Press **ESC** to exit if you do not want to change the value. Compare this function to **LRV**. Blinking value indicates an error, i.e., measured pressure is lower than the sensor's lower range-value or the difference between upper and lower range-values is not on the specified range.

2.12 URV=PV

90.00000

Here you set the current process pressure as upper range-value (**URV**). Accept the setting with **ENTER** when asked to confirm the value. Press **ESC** to exit if you do not want to change the value. Compare this function to **URV**. Blinking value indicates an error, i.e., measured pressure is higher than the sensor's upper range-value or the difference between upper and lower range-values is not on the specified range.

2.13 LIN FUNC

LIN

In this menu you select the output transfer function for current loop connection. The selection is done with the **UP/DOWN[↑↓]** keys, and the options are as follows:

LIN: Linear 4mA to 20mA [process value's zero point = current pressure value (value measured by sensor)].
LIN ZERO: Process value's zero point is the same as the lower range-value.
INV LIN: Inversely linear 20mA to 4mA.
SQR: Square root 4mA to 20mA.
USER LIN: User-defined 16-point interpolated transfer function for output. Enter the points through the **USER FUNCTION** option or through **HART** user interface.
USER SPL: The same as **USER LIN**, but this generates a smoother transfer function for the output.

2.14 HART® COMMUNICATION LINK SETTINGS

HART

Select this function with the **UP/DOWN[↑↓]**keys. In menus 1-3 you select the content of the burst message. You can view the available selections with the **UP/DOWN[↑↓]** keys. Available options:

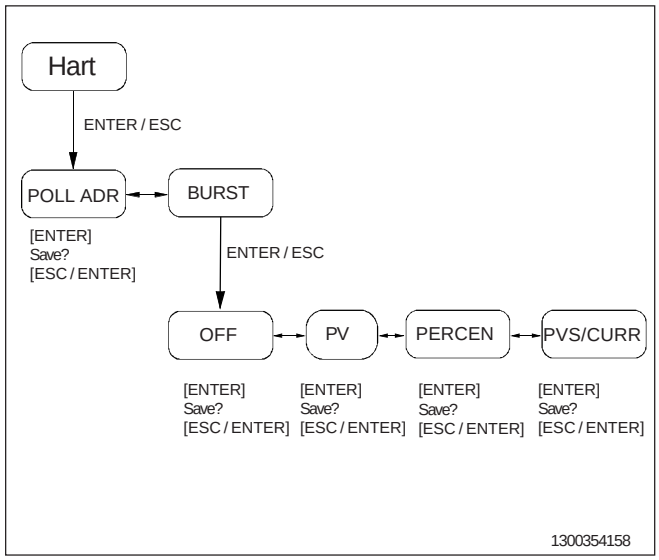
In menu 1 (PV): Transmitter sends process value PV to system.

In menu 2 (PERCEN%): Transmitter sends process variable's value in per cent of specified measuring range to master.

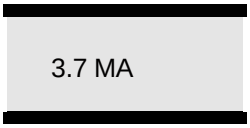
In menu 3 (PVS/CURR): Transmitter sends all process variables and current signal's value.

In menu 5 (POLL ADR): Select the transmitter's Hart® address. The address can be set between 0 and 15. Address 0 defines current loop, in which case the transmitter will operate in two-wire system. The procedure is the same as described above.

In menu 6 (BURST ON/OFF): Select the Burst mode. First define the process variable sent by the transmitter from menus 1-3. The procedure is the same as described above.



2.15 ALRM TYP



Current signal will settle at either 3.7 mA or 22.5 mA to indicate transmitter fault to an external device. Use the **UP/ DOWN[↑↓]**keys to select the current value from the menu. The default is 3.7 mA.

2.16 DATE

The date consists of a single field. For instance, 15022004 specifies 15 February 2004. You can edit the date in form ddmmyy. The calendar year can be selected from between 1900 and 2155. This date can be example date of calibration.

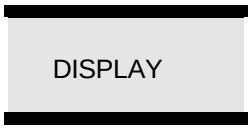
2.17 USER FUNC

In this menu you define the points for a user-defined function. You enter the pressure and corresponding output point by point. The number of points is at least 2 and at most 16. In this connection you can also define the corresponding reference temperature **T REF** and volume's temperature coefficient **V T COF**. Select and accept the numerical values as described above. Set the pressure and the corresponding output. Make the settings one character at a time in the same way as when defining **TAG**. Press **ESC** to return to the **CONFIGUR** menu. Press **ENTER** to edit the selected variable. Use the arrow keys to select the desired variable. The selectable variables include the following:

POINTS	volume of couple of points (2...16)
UNITS	unit (max. 8 markers)
PRES 0	1st reference pressure
OUT 0	Output corresponding to 1st reference pressure at reference temperature
PRES 1	2nd reference pressure
OUT 1	Output corresponding to 2nd reference pressure at referencetemperature
.	
.	
.	
PRES 15	16th reference pressure
OUT 15	Output corresponding to 16th reference pressure at reference temperature
TREF	Reference temperature
V T COF	Volume's temperature coefficient

You can change the variables in the same way as **TAG**.

2.18 DISPLAY



In this menu you can select the direction in which the display will be read:

NORMAL: From left to right. Transmitter mounted horizontally with process connection directed to the right.
ROTATED: Rotates the text 180 degrees from NORMAL.

2.19 BACKLGHT

In this menu you select the backlight on / off. The selection is done with the **UP/DOWN[↑↓]** keys, and the options are as follows:

MODE:

OFF	Backlight off
DELAYED	Backlight on 5 ... 75 s after the start, the default value is 60 s. Value is changed Satron pAdvisor program.
BUTTON	Backlight on 5 ... 75 s for the last button is pressed, the default value is 60 s. Value is changed Satron pAdvisor program.

BLINK:

OFF	Backlight blink off
ALARMS	Blacklight blinking (1/6 Hz) if the transmitter is in the alarm current.
WARNINGS	Blacklight blinking (1/6 Hz) if the text on the display is blinking.

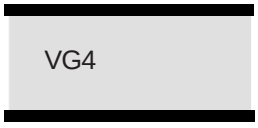
3. DEVICE INFORMATION MENU: INFO

You can select the device information menu from the Main Menu level with the **ENTER** key. In this submenu you can view the upper and lower range-values (**URV, LRV**), device ID number, sensor's upper and lower scale-limits (**USL, LSL**), etc. Use the **UP/DOWN[↑↓]**keys to view these items. Press **ESC** to return to the Main Menu level. You cannot change the data displayed in this menu.

3.1 MANUFCTR:

The manufacturer of the transmitter.

3.2 DEV TYPE



Product type code.

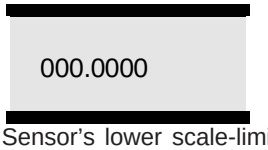
3.3 TAG

Tag code.

3.4 PV USL

Sensor's upper scale-limit in the selected units. Press **ENTER** to select this item. The configured unit will be displayed when you press **ENTER** a second time.

3.5 PV LSL

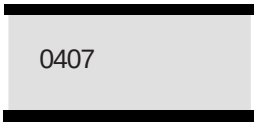


Sensor's lower scale-limit in the selected units. The procedure is the same as for **USL**.

3.6 MIN SPAN

Minimum span. Press **ENTER** to select this item. Press **ENTER** a second time to display the unit. Press **ESC** to exit.

3.7 ASSM NUM



The transmitter's assembly number. Press **ENTER** to select this item. Press **ESC** to exit. For instance, assembly number 0407 shows that the transmitter was made in week 07 of the year 2004.

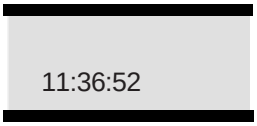
3.8 PV SNSR

The sensor's serial number. Press **ENTER** to select this item. Press **ESC** to exit.

3.9 VERSION

Version numbers of the transmitter's electronics and software. Press **ENTER** to select this item. Press **ESC** to exit. With the **UP/DOWN[↑↓]** keys you can select either **CPU HW, CPU SW, ADC HW, ADC SW** or **MAN REV** (manual revision) revision number or **CPU ID**-number from this submenu.

3.10 OP TIME



The value of the operation time save at 1 hour intervals. When the value of the counter is < 100 hours so value save 1-minute intervals.

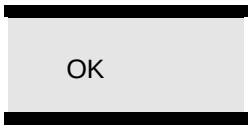
The value of the operation time counter on the display :

HH :MM :SS	when the value of counter is <100 hours
HHHH : MM	when the value of counter is <100000 hours
HHHHHHHH	when the value of counter is ≥100000 hours

4. DIAGNOSTICS MENU: DIAGNOST

Select the **DIAGNOST** menu on the Main Menu level with the **ENTER** key. This submenu allows you to examine the transmitter's internal errors and faults, to set the transmitter to give out a fixed current, and to calibrate the transmitter.

4.1 STATUS

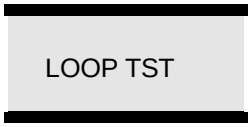


Here you can display and reset accumulated errors one at a time. The text **OK** will be displayed if there are no errors. Possible error messages (alarm means a serious fault/error that also puts the current signal in fault status and makes the display blink):

Table 1.
The content of error word 1
(EW1=0…15)

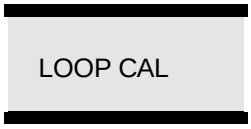
Bit	Error message	Description
0	P ER	Pressure (P) error
1	ST ER	Sensor temperature (ST) error
2	ET ER	Electronics temperature (ET) error
3	RANGE ER	Percentage of output under -10% or over 110% error
4	OUTSA WA	Output current saturated
5	ADCR ER	ADC converter runtime error
6		
7		
8	ADCS ER	ADC converter startup error
9	EEPRR ER	EEPROM checksum error
10	EEPRW ER	EEPROM write error
11	EECAL ER	EEPROM calibration error
12	HART ER	HART communication error
13	INTRN ER	Internal system error
14		
15		

4.2 LOOP TST



The transmitter can be set to give out a fixed current signal for testing the mA output. The first **ENTER** will switch the transmitter off from normal mode (**AUTO OFF**), the second **ENTER** will set it for 4 mA output, and the third **ENTER** for 20 mA output. The next **ENTER** after that will give default value 12 mA, which can be changed as desired with the **UP/DOWN[↑↓]** keys. The last **ENTER** will switch the transmitter back to normal mode (**AUTO ON**). The purpose of this test is to test the accuracy of the transmitter's current output with a reference meter. If any shortcomings are detected, refer to **4.3 LOOP CAL** for calibrating the mA output.

4.3 LOOP CAL



Here you can calibrate the current signal given by the transmitter. The first **ENTER** will switch the transmitter off from normal mode (**AUTO OFF**). The next **ENTER** will make the transmitter give out a signal which it assumes to be 4 mA. Use the **UP/DOWN[↑↓]** keys to change this value in accordance with the reading on the reference meter. Then press **ENTER** for 20 mA output, which you must also set in accordance with the reference meter. Press **ENTER** to accept the new reading. **Note**: Use a sufficiently accurate reference meter.

4.4 SENS.TRIM

Here you can calibrate the pressure values. Pressing **ENTER** will display **LWR.TRIM**, where you give the measured value for the sensor's lower calibration pressure. In the next display, **UPR.TRIM**, you give the measured value for the sensor's upper calibration pressure.

The procedure:

- Apply a pressure corresponding to the desired **LRV** (lower range-value).
- Select **DIAGNOST / SENS.TRIM**. Pressing **ENTER** will now display **LWR.TRIM**, and the next **ENTER** will show the pressure reading.
- Use the **UP/DOWN[↑↓]** keys to adjust the displayed pressure in accordance with the reference meter's pressure reading as described in **2.4 UPV**.
- Press **ENTER** to accept the adjusted reading, or press **ESC** to exit without saving the value.
- Apply a pressure corresponding to the desired **URV** (upper range-value).
- Pressing **ENTER[↵]** will display **UPR.TRIM**. The next **ENTER** will display the measured pressure.
- Use the **UP/DOWN[↑↓]** keys to adjust the displayed pressure in accordance with the reference meter's pressure reading.
- Press **ENTER** to accept the adjusted reading, or press **ESC** to exit without saving the value.

NOTE!
The difference between **LWR.TRIM** and **UPR.TRIM** must be at least the transmitter's minimum span.

4.5 PV ZERO

Here you can reset the transmitter. Pressing **ENTER** will display **PV=ZERO?**. Pressing **ENTER** a second time will display **SAVE?** The transmitter will be reset if you press **ENTER** after that.

MAIN MENU

- 1. MEASURE
  - 1.1 PV Process Value
  - 1.2 Unit Process Value
  - 1.3 Pressure Value
  - 1.4 Pressure Unit
  - 1.5 MA Current Loop
  - 1.6 % Percents
  - 1.7 S F/C Sensor Temp
  - 1.8 E F/C Electronics Temp
  - 1.9 T F/C Procss Temp
- 2. CONFIGUR
  - 2.1 MANUFCTR
  - 2.2 DEV TYPE
  - 2.3 TAG
  - 2.4 PV URV
  - 2.5 PV LRV
  - 2.6 PV DAMP
  - 2.7 UNITS
  - 2.8 T_UNITS
  - 2.9 LANGUAGE
  - 2.10 PASSWORD
  - 2.11 LRV=PV
  - 2.12 URV=PV
  - 2.13 LIN FUNC
  - 2.14 HART
  - 2.15 ALARM TYP
  - 2.16 DATE
  - 2.17 USER FUNC
  - 2.18 DISPLAY
  - 2.19 BACKLGHT
    - MODE
    - BLINK
- 3. INFO
  - 3.1 MANUFCTR
  - 3.2 DEV TYPE
  - 3.3 TAG
  - 3.4 PV USL
  - 3.5 PV LSL
  - 3.6 MIN SPAN
  - 3.7 ASSM NUM
  - 3.8 PV SNSR
  - 3.9 VERSION
    - CPU HW
    - CPU SW
    - ADC HW
    - ADC SW
    - CPU ID
    - MAN REV
  - 3.10 OP TIME
- 4. DIAGNOST
  - 4.1 STATUS
  - 4.2 LOOP TST
  - 4.3 LOOP CAL
  - 4.4 SENS.TRIM
  - 4.5 PV ZERO

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