1. INSTALLATION AND PUTTING INTO OPERATION

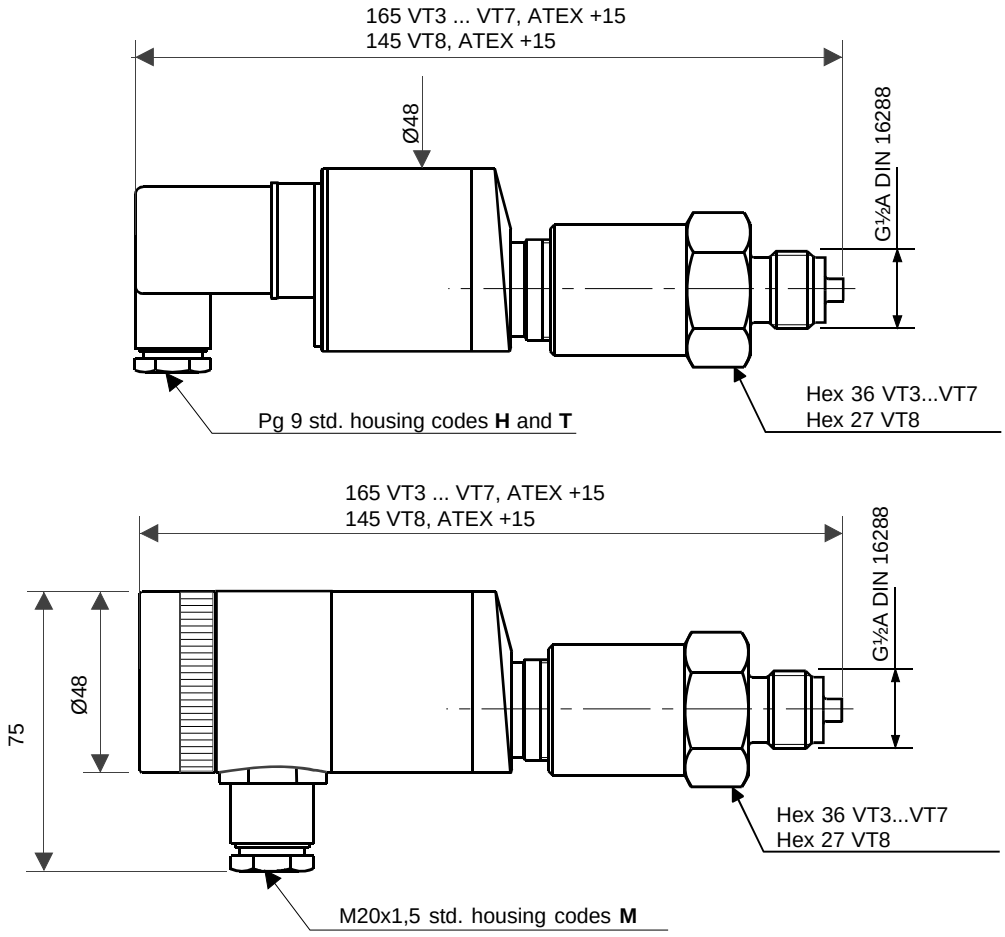
1.1 Mechanical installation

1.1.1 Recommended mounting positions

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

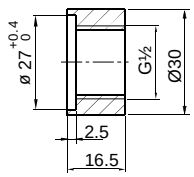
Other considerations:
• In outdoor installations you should make sure that water condensed from e.g. a steam line will not freeze and, by expanding, damage the transmitter's sensor diaphragm. For instance, this can be avoided by installing heat insulation up to the sensor diaphragm.

NOTE
Dimensions are in millimeters



Housing codes H, T and M 195
Housing code N 225

Hex 27



VT5, **VT6** and **VT7** Threaded DIN3852 Flush-Mounted Diaphragm

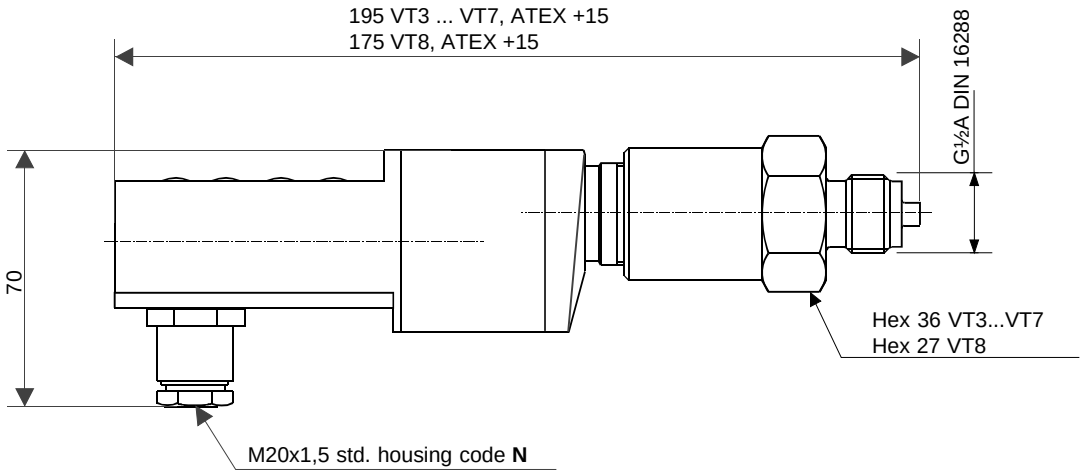
Process coupling DIN 3852-X-G½

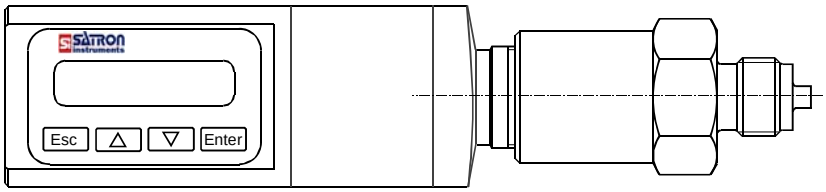
Figure 1-1 Basic mounting dimensions
(cont. on next page)

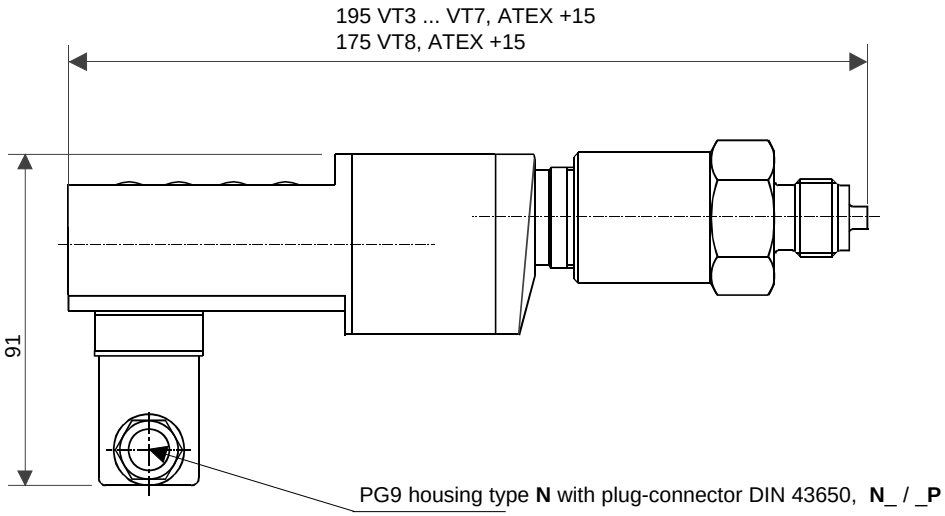
1300354152

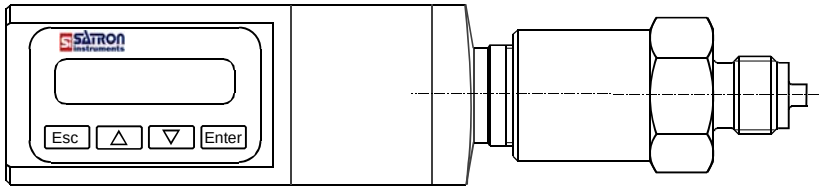
SATRON VT pressure transmitter

NOTE
Dimensions are in millimeters

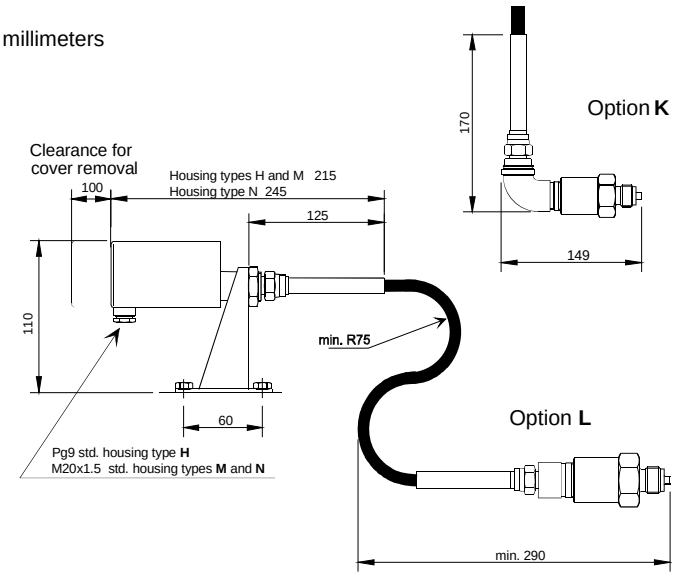








NOTE
Dimensions are in millimeters



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

Figure 1-1 Basic mounting dimensions

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1.1.2 Impulse piping

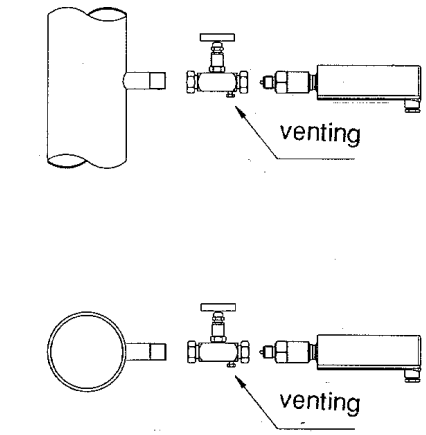
The process medium and the transmitter's position in relation to the process pipe determine the impulse piping line.

• For liquid and steam pressure measurements it is preferable to install the transmitter below orifice plate to prevent the formation of disturbing gas bubbles in the impulse piping.

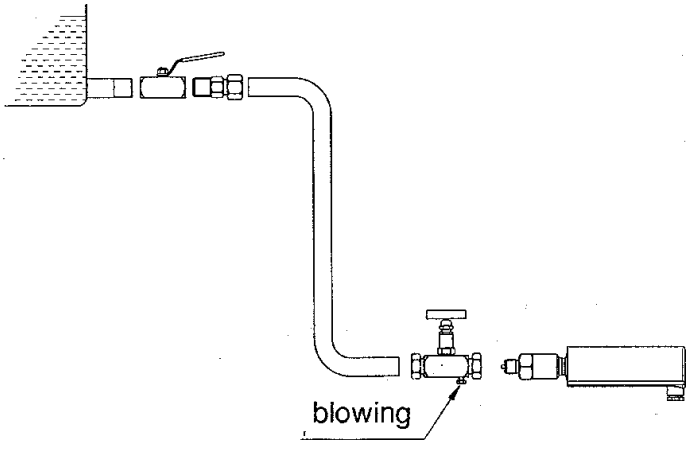
If the transmitter has to be installed above the process pipe for reasons of accessibility or for some other compelling reasons, it is recommendable to provide the piping with a gas seal to avoid disturbance.

• Mounting the transmitter above the process pipe in gas pressure measurement will eliminate disturbances caused by condensing liquid.

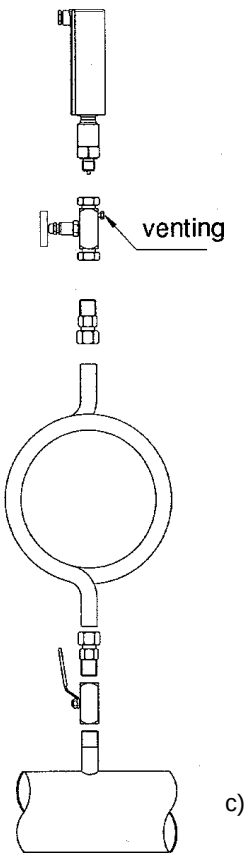
• Steam should not be admitted to the transmitter's sensing element. See installation examples 1-2c and d.



a) - Clean fluids in general
(E.g. waters, oils, etc.)

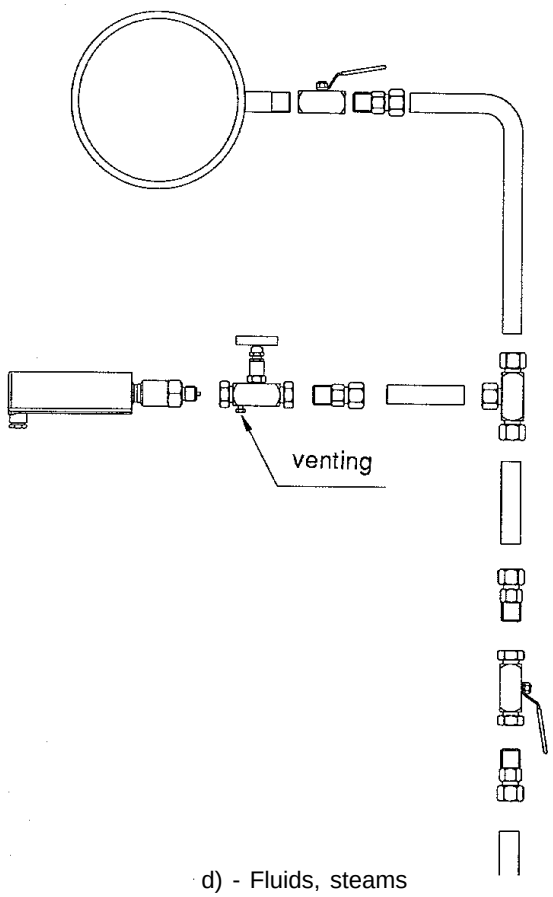


b) - Liquid level in open vessel

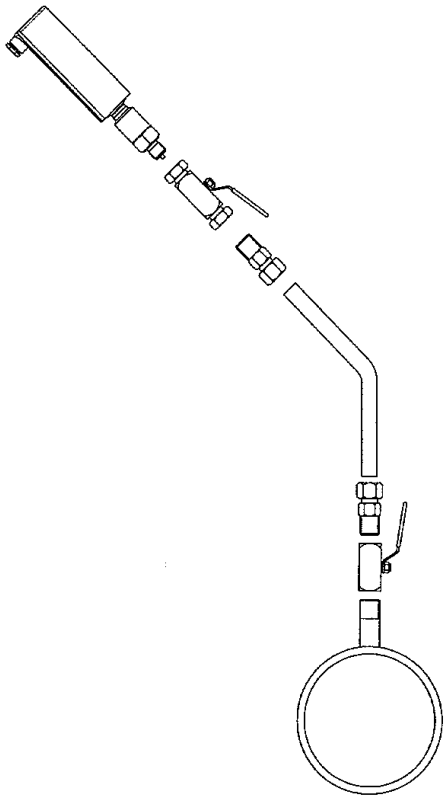


c) - Steams

Figure 1-2 Impulse piping - Installation examples (cont. on next page)



d) - Fluids, steams



e) - Gases

Figure 1-2 Impulse piping
- Installation examples

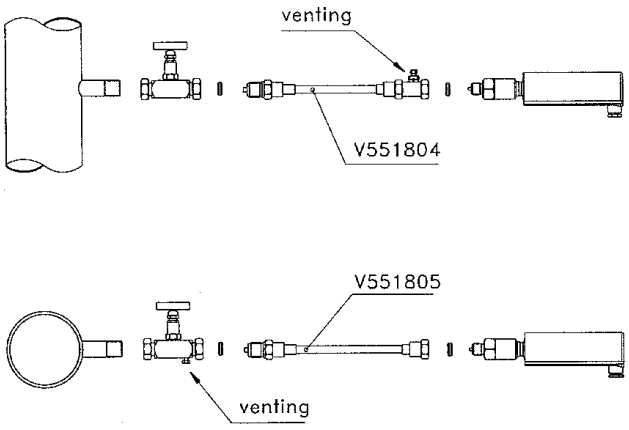


Figure 1-3a Damping hose for protecting the sensor
- Order number T551804, with venting
- Order number T551805, without venting

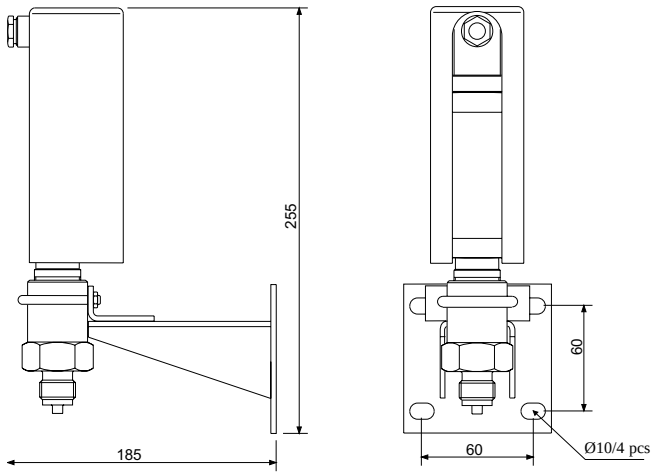


Figure 1-3b Mounting bracket for VT transmitter
- Order number M820289

1.2 Electrical connections

Supply voltage and load of the transmitter according to the figure 1-5.

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.

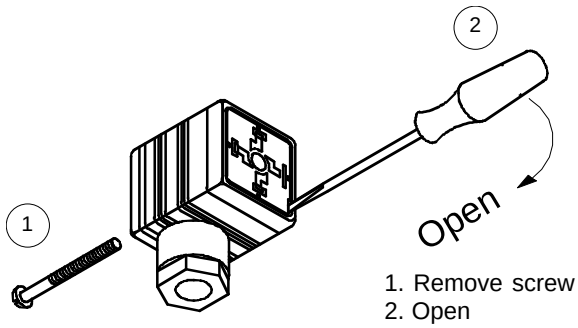
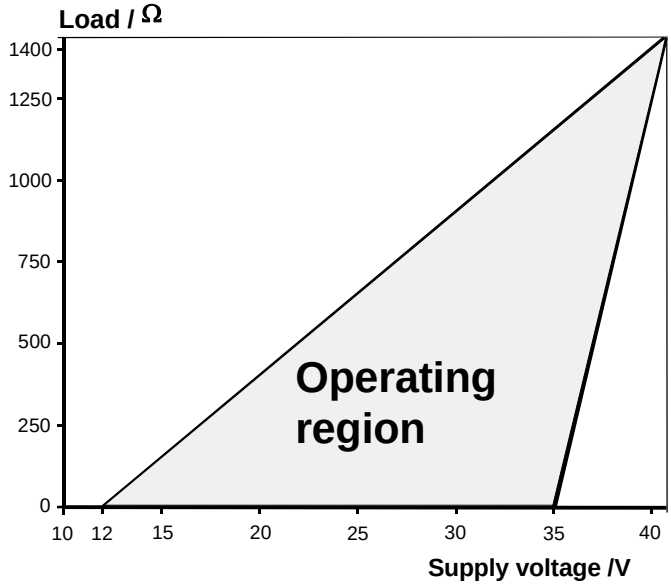


Figure1-4 Removing the PLUG junction box

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 1-5 Supply voltage and load capacity

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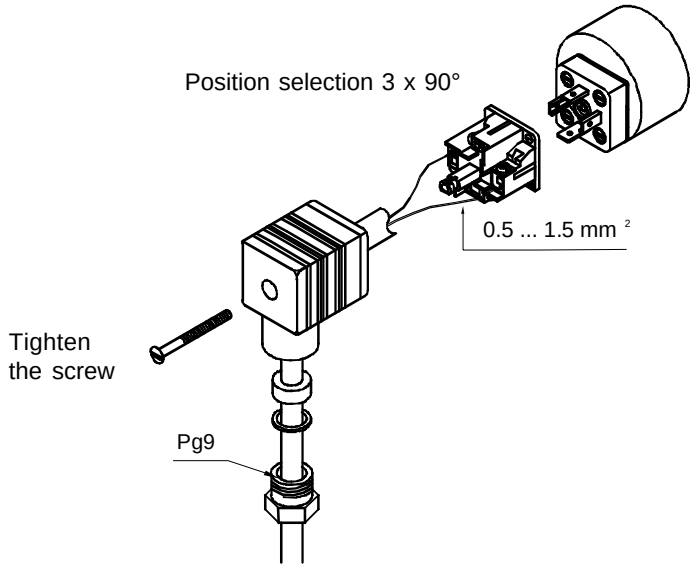

Figure 1-6 Adjusting the junction box position

10044092

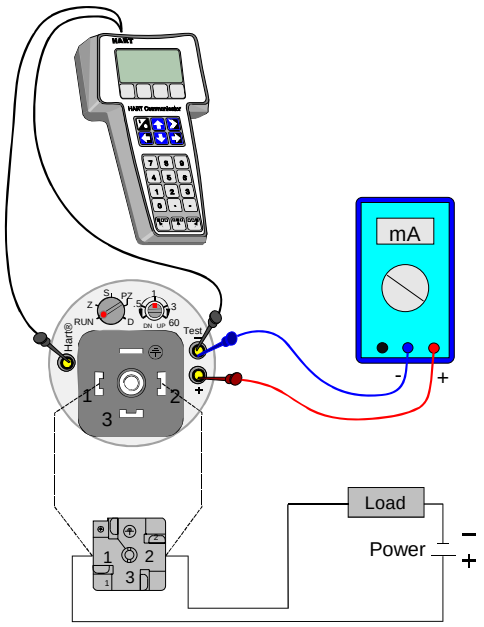

Figure 1-7, wiring housings H and T

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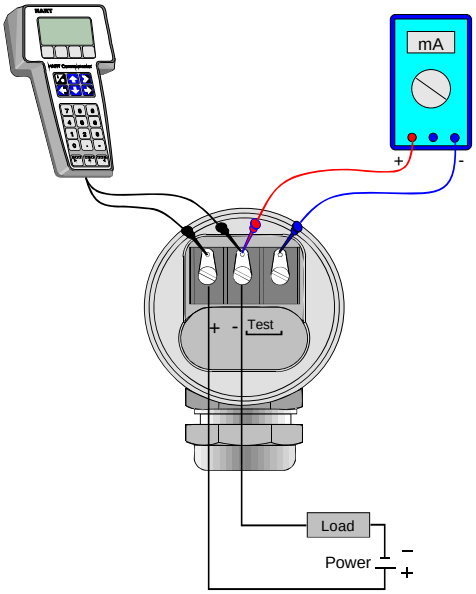


Figure 1-8, wiring housing M

1300354155

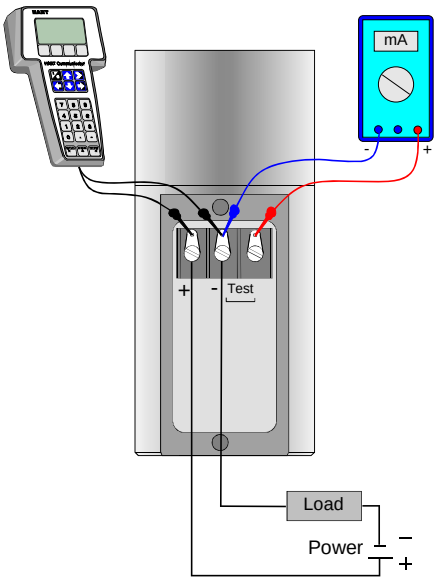


Figure 1-9, wiring housing N

1300354155

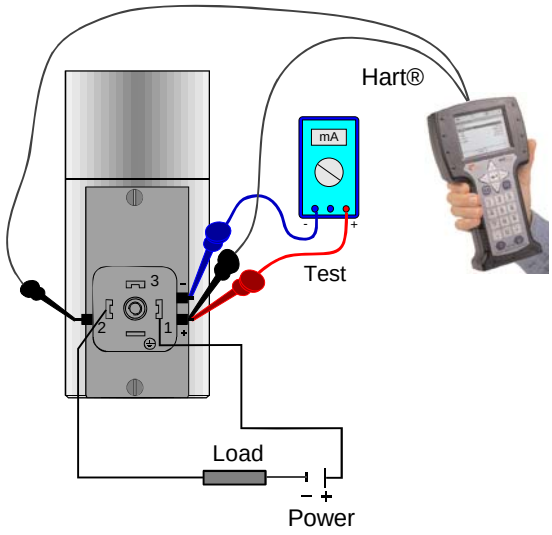


Figure 1-10, wiring housing N with DIN 43650 PLUG-connector, code **N__ / _ P**

1300354155

2 SETTING UP

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.

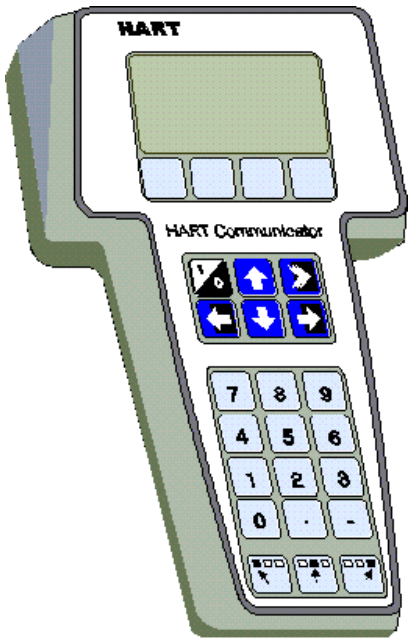


Figure 2-1
275 user interface

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.

Measuring range
The lower and upper range-values cannot differ from zero by more than the maximum span.
For example, range 5 transmitter whose measuring range is 0-26,5/500 kPa cannot be adjusted to measure 500...526,5 kPa pressure, because maximum span is 500 kPa.

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.
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.

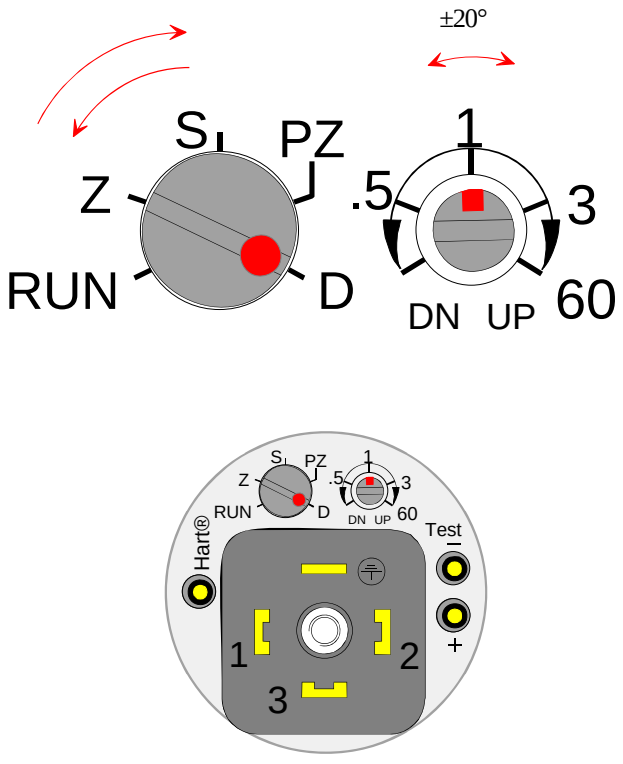


Figure 3-3 Damping adjustment 1300354154

3.3 Calibration examples

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.

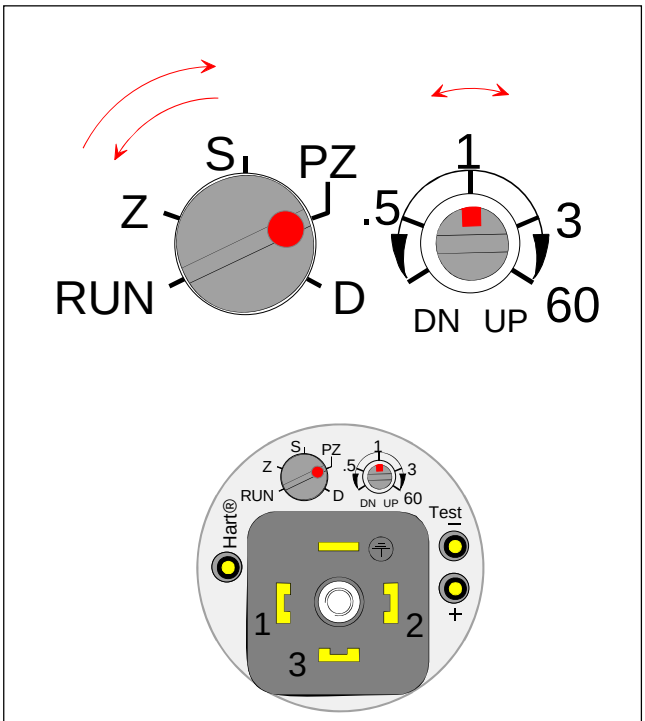


Figure 3-4 Process value zero (PZ) 1300354154

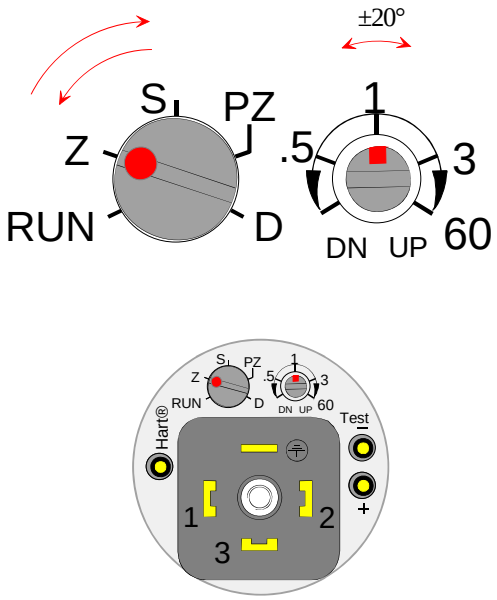


Figure 3-4 Set the lower range-value

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.

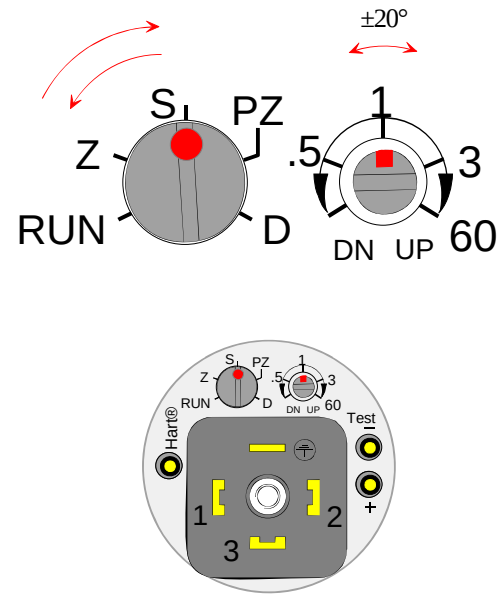


Figure 3-5 Set the upper range-value

1300354154

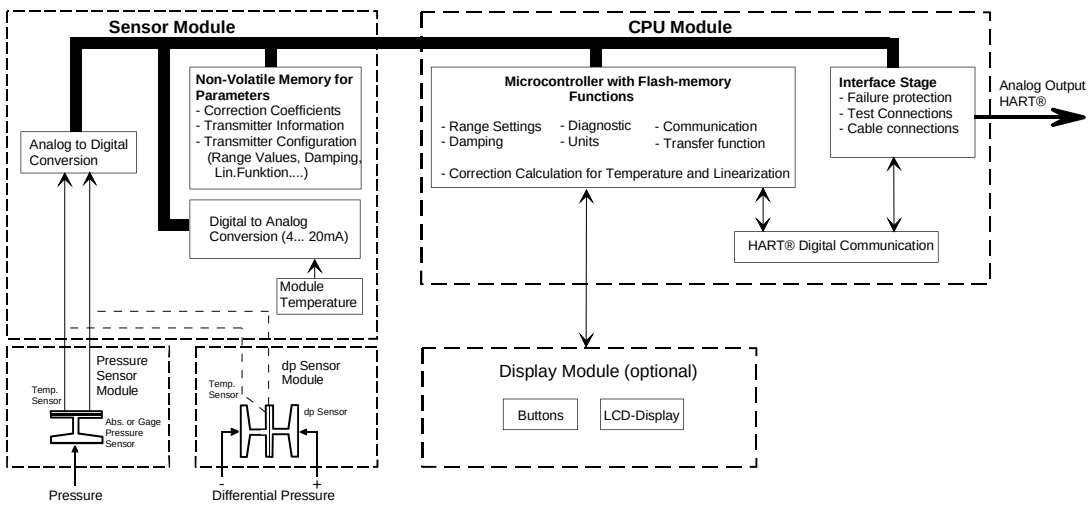


Figure 4-1 Functional construction of the SATRON VT pressure transmitter

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 BPH710AV 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.

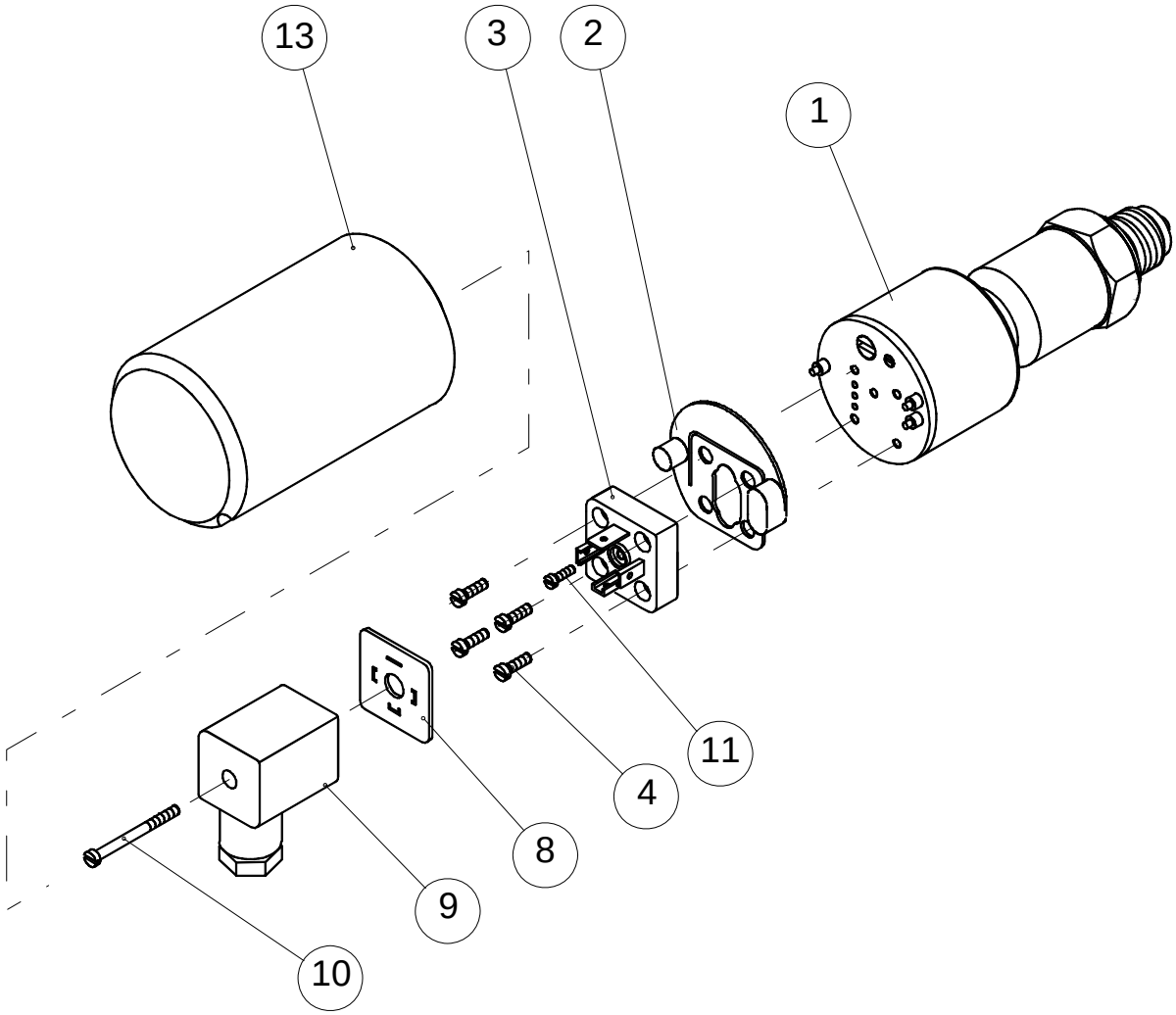
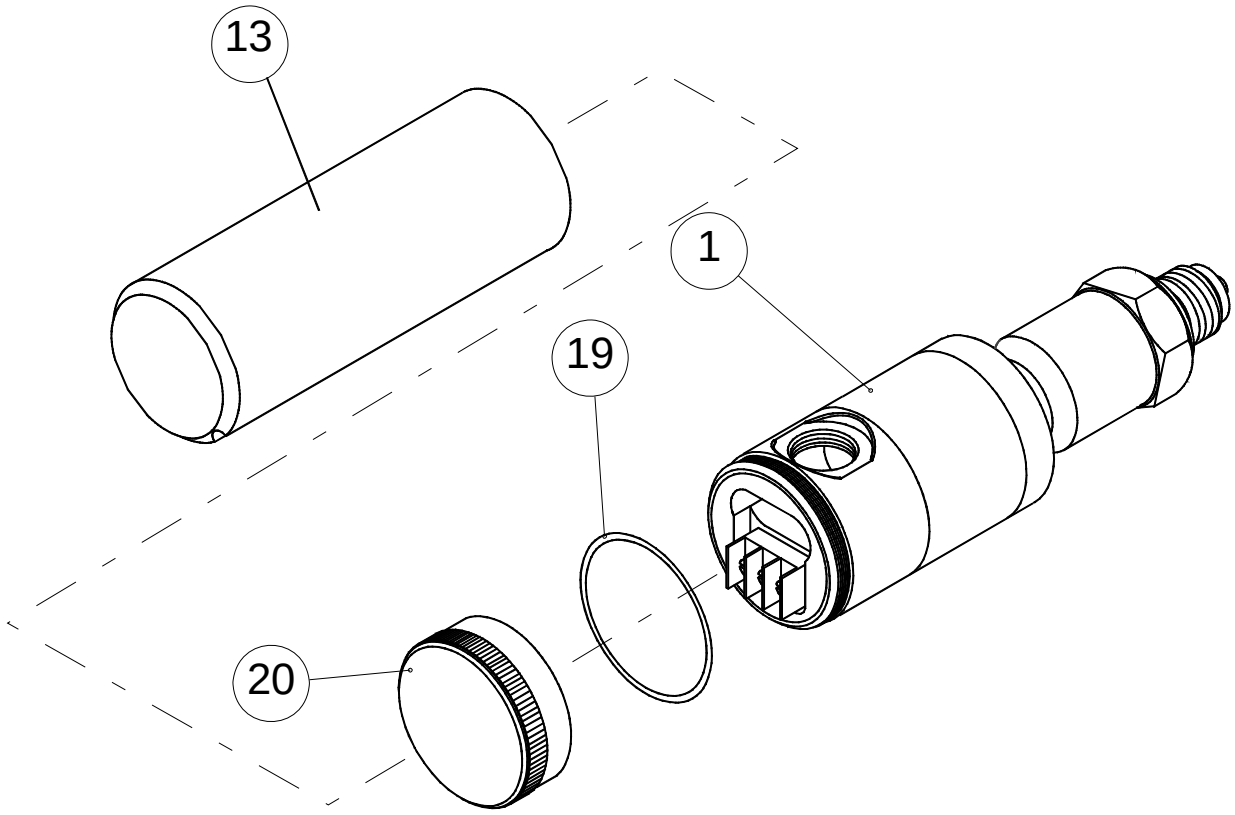


Figure 5-1 Parts list: Enclosures **H** and **T**, housing with PLUG connector

1300354160



1300354161

Figure 5-2 Parts list:
Enclosure **M, housing with terminal board**

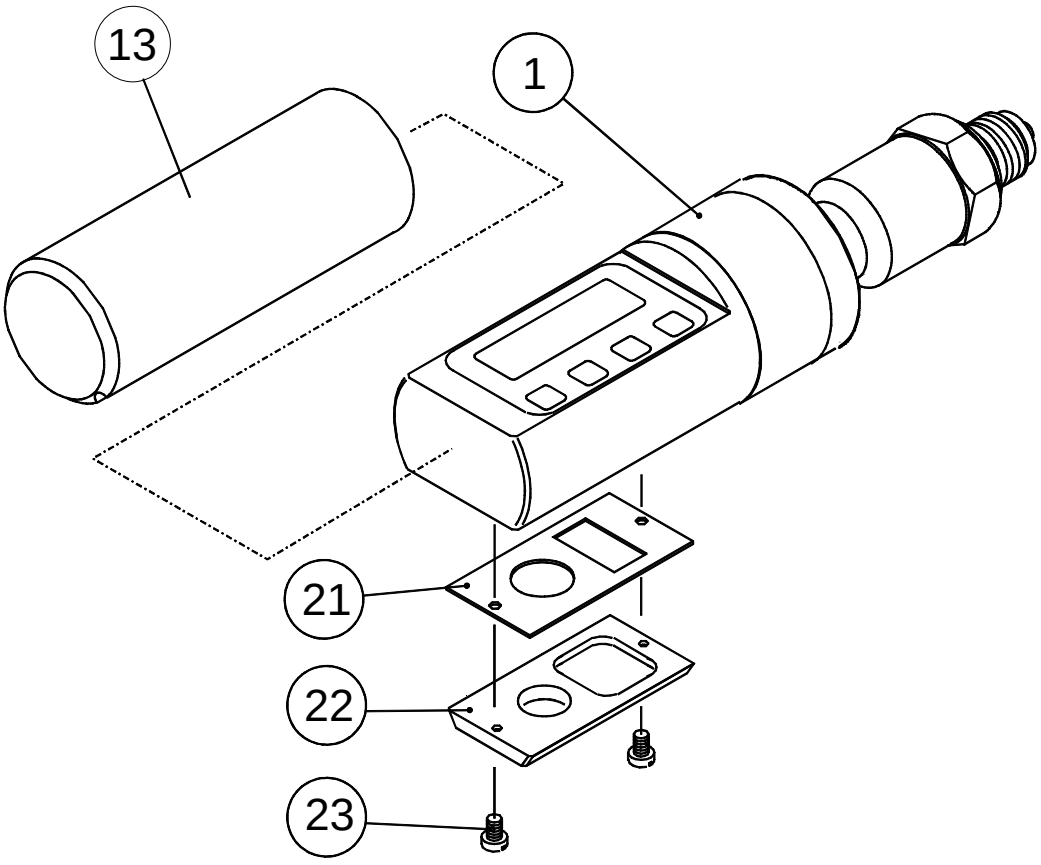


Figure 5-3 Parts list:
Enclosure **N, housing with display**

1300354162

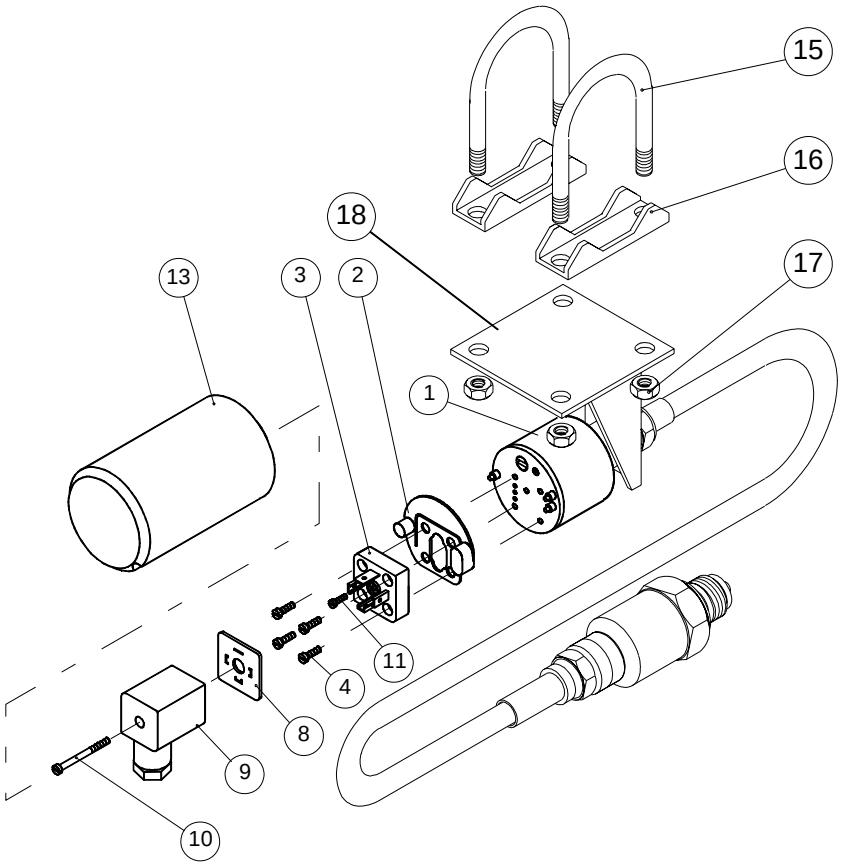


Figure 5-4 Parts list:
Enclosure with remote electronics

Number	Name	Order number	Number	Name	Order number
1	Sensing element		* 15	Mounting clamp	T544953
2	Seal	T1300207	* 16	Support plate	T543223
* 3	Device plug DIN43650	72900114	17	Hex nut M8 SFS2067 A4	56022800
4	Cylinder-head screw M3 x 10 SFS2179 Zne	51603021	* 18	Mounting bracket S	T1050009
8	Seal GDM3-17,silicone	72900116	19	O-ring, 42x2 FPM (Viton®)	80013800
* 9	Wiring box GDM3009, DIN43650	72900111	* 20	Cover M	T1300256
10	Cylinder-head screw S M3 x 35 SFS2179 A4	51723053	21	Seal, Silicone rubber	T1300387
11	Cylinder-head screw S M3 x 4 VSM 13302 Zne	51613009	* 22	Back plate V	T1300391
* 13	Protection cup, housing H, M and T	T1300295	23	Fastening screw M4	T1325347
* 13	Protection cup, housing N	T1300400			

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