Operating Instructions
Process pressure transmitter IPT-11 Vers. 4.0 - ceramic sensor
4 … 20 mA

Document ID: 37301
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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "Product description".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your IPT-11, we offer accessories and replacement parts. The corresponding documentations are:

- Operating instructions manual "External indicating and adjustment unit"
1 About this document

1.1 Function
This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group
This operating instructions manual is directed to trained qualified personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

List
The dot set in front indicates a list with no implied sequence.

Action
This arrow indicates a single action.

Sequence
Numbers set in front indicate successive steps in a procedure.
2 For your safety

2.1 Authorised personnel
Mount and set up the pressure transmitter only if you know the applicable national regulations and have the appropriate qualification. You must be acquainted with the regulations and instructions for hazardous areas, measurement and control technology as well as electrical circuits because the pressure transmitter is "electrical equipment" according to EN 50178. Depending on the application conditions, it is necessary that you have appropriate knowledge, e.g. concerning corrosive products or high pressure.

2.2 Appropriate use
IPT-11 is a pressure transmitter for measurement of gauge pressure, absolute pressure and vacuum.
You can find detailed information on the application range in chapter "Product description".
Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.
For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about misuse
Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions
This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.
The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.
During the entire duration of use, the user is obliged to determine the compliance of the required occupational safety measures with the current valid rules and regulations and also take note of new regulations.
2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, we provide confirmation of successful testing.

2.7 Fulfillment of NAMUR recommendations

The device fulfills the requirements of the applicable NAMUR recommendations.

2.8 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.
3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- IPT-11 pressure transmitter
- Documentation
  - this operating instructions manual
  - Test certificate for pressure transmitters
  - Safety Manual "IPT-1" - 4 … 20 mA/HART two-wire" (optional)
  - Operating instructions manual "Indicating and adjustment module" (optional)
  - Supplementary instructions manual "Plug connector for continuously measuring sensors" (optional)
  - Ex-specific "Safety instructions" (with Ex versions)
  - if necessary, further certificates

Constituents

The IPT-11 consist of the following components:

- Process fitting with measuring cell
- Housing with electronics, optionally available with plug connector
- Housing cover, optionally available with indicating and adjustment module

The components are available in different versions.

![Diagram of IPT-11 with process fitting and housing](image)

**Fig. 1: Example of a IPT-11 with process fitting G1½ A and plastic housing**

1. Housing cover with integrated indicating and adjustment module (optional)
2. Housing with electronics
3. Process fitting with measuring cell

Type label

The type label contains the most important data for identification and use of the instrument:

- Instrument type
- Article and serial number device
- Technical data: Measuring range, process pressure, process temperature, signal output, voltage supply, protection, protection class
- Order number
3.2 Principle of operation

Application area

IPT-11 is a pressure transmitter for use in the paper, food processing and pharmaceutical industries as well as in water/sewage water plants. Depending on the version, it is used for level, gauge, absolute pressure or vacuum measurement. Measured products are gases, vapours and liquids, also those containing abrasive substances.

Functional principle

A measuring cell with front-flush, abrasion-resistant diaphragm is the sensor element. The hydrostatic pressure of the product or the process pressure effects a capacitance change in the measuring cell via the diaphragm. This change is converted into a respective output signal and outputted as measured value.

The ceramic measuring cell is also equipped with a temperature sensor. The temperature value can be displayed via the indicating and adjustment module or processed via the signal output.

Voltage supply

Two-wire electronics 4 … 20 mA for power supply and measured value transmission over the same cable.

The supply voltage range can differ depending on the instrument version. The exact range is stated in chapter "Technical data".

The background lighting of the indicating and adjustment module is powered by the sensor. A certain level of operating voltage is required for this. You can find the exact voltage specifications in chapter "Technical data".

3.3 Operation

IPT-11 can be adjusted with different adjustment media:

- with indicating and adjustment module
- the suitable WIKA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with manufacturer-specific adjustment programs AMS™ or PDM
- With a HART handheld

The entered parameters are generally saved in IPT-11, optionally also in the indicating and adjustment module or in PACTware.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.
The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

**Transport**

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

**Transport inspection**

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

**Storage**

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

**Storage and transport temperature**

- Storage and transport temperature see chapter "Supplement - Technical data - Ambient conditions"
- Relative humidity 20 … 85 %
4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process, in particular the sensor element, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "Technical data" or on the type label.

Mounting position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module in four different positions (each displaced by 90°).

Moisture

Use the recommended cables (see chapter "Connecting to power supply") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

Fig. 2: Measures against moisture penetration

Ventilation

The ventilation for the electronics housing is realised via a filter element in the vicinity of the cable glands.
Fig. 3: Position of the filter element with single and double chamber housing

1 Filter element for ventilation of the electronics housing
2 Blind stopper

Information:
Make sure that the filter element is always free of buildup during operation. A high-pressure cleaner must not be used for cleaning.

Temperature limits
Higher process temperatures mean often also higher ambient temperatures.

Fig. 4: Temperature ranges

1 Process temperature
2 Ambient temperature

Make sure that the upper temperature limits for the environment of electronics housing and connection cable specified in chapter "Technical data" are not exceeded.

4.2 Mounting steps

Welding the socket
To mount IPT-11, a welded socket is necessary. Use components from the line of WIKA mounting accessories:

→ Note the applicable welding standards (segment welding procedure) when welding the socket.

Sealing/Screwing in hygienic fittings
Use the seal corresponding to the process fitting.
5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions
Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed

Take note of safety instructions for Ex applications
In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Select power supply
Power supply and current signal are transmitted via the same two-wire connection cable. The supply voltage range can differ depending on the instrument version. The exact range is stated in the "Technical data" in the "Supplement".

Provide a reliable separation between the supply circuit and the mains circuits according to DIN VDE 0106 part 101.

Keep in mind the following additional influences on the operating voltage:

- Output voltage of the power supply unit can be lower under nominal load (with a sensor current of 20.5 mA or 22 mA in case of fault message)
- Influence of additional instruments in the circuit (see load values in chapter "Technical data")

Selecting connection cable
The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Cable screening and grounding
If screened cable is necessary, connect the cable screen on both ends to ground potential. In the sensor, the screen must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing side must be made via a ceramic capacitor (e.g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.
Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

5.2 Connection procedure

Proceed as follows:

1. Unscrew the housing cover
2. If an indicating and adjustment module is installed, remove it by turning it slightly to the left.
3. Loosen compression nut of the cable entry
4. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
5. Insert the cable through the cable gland into the sensor
6. Lift the opening levers of the terminals with a screwdriver (see following illustration)
7. Insert the wire ends into the open terminals according to the wiring plan

Fig. 5: Connection steps 6 and 7

8. Press down the opening levers of the terminals, you will hear the terminal spring closing
9 Check the hold of the wires in the terminals by lightly pulling on them
10 Connect the screen to the internal ground terminal, connect the outer ground terminal with potential equalisation
11 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
12 Screw the housing cover on

The electrical connection is finished.

5.3 Single chamber housing

Electronics and connection compartment

Fig. 6: Electronics and connection compartment with single chamber housing

1 Spring-loaded terminals for voltage supply
2 Ground terminal for connection of the cable screen
5.4 Switch on phase

After connecting IPT-11 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Output signal jumps briefly (approx. 10 seconds) to the set fault current

Then the corresponding current is outputted to the cable (the value corresponds to the actual level as well as the settings already carried out, e.g. factory setting).
6 Set up with the indicating and adjustment module

6.1 Short description

Function/Configuration

The indicating and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the IPT-1* instrument family, in the single as well as double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit

Note:
You can find detailed information on adjustment in the operating instructions manual "Indicating and adjustment module".

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating and adjustment module can be inserted and removed at any time. It is not necessary to interrupt the voltage supply.

For installation, proceed as follows:

1. Unscrew the housing cover
2. Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
3. Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.
4. Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating and adjustment module is powered by the sensor, an additional connection is not necessary.
Note:
If you intend to retrofit the instrument with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.
6.3 Adjustment system

![Diagram of indicating and adjustment elements]

**Key functions**

- **[OK]** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value

- **[->]** key to select:
  - Menu change
  - Select list entry
  - Select editing position

- **[+]** key:
  - Change value of the parameter

- **[ESC]** key:
  - Interrupt input
  - Jump to the next higher menu

**Adjustment system**

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with **[OK]** will not be saved.
6.4 Setup procedure

IPT-11 can be used for level as well as for process pressure measurement. Default setting is level measurement. The mode can be changed in the adjustment menu.

Depending on the application only the respective subchapter "Level or process pressure measurement" is of importance. There, you find the individual adjustment steps.

Level measurement

Set up IPT-11 in the following sequence:

1. Selecting adjustment unit/density unit
2. Carry out position correction
3. Carrying out min. adjustment
4. Carrying out max. adjustment

In the menu item "Adjustment unit" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi...

The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.

Information:

The steps 1, 3 and 4 are not necessary for instruments which are already preset according to customer specifications!

You can find the data on the type label on the instrument or in the menu items of the min./max. adjustment.

The indicating and adjustment module enables the adjustment without filling or pressure. Thanks to this, you can carry out your settings already in the factory without the instrument having to be installed.

The actual measured value is also displayed in the menu items for min./max. adjustment.

Select unit

In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

To select the adjustment unit (in the example switching over from bar to mbar), proceed as follows:¹)

1. Push the [OK] button in the measured value display, the menu overview is displayed.

¹) Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH₂O, mmH₂O.
2 Confirm the menu "Basic adjustment" with [OK], the menu item "Unit" will be displayed.

3 Activate the selection with [OK] and select "Units of measurement" with [-].

4 Activate the selection with [OK] and select the requested unit with [-] (in the example mbar).

5 Confirm with [OK] and move to position correction with [-].

The adjustment unit is thus switched over from bar to mbar.

Information:
When switching over to adjustment in a height unit (in the example from bar to m), the density also has to be entered.

Proceed as follows:
1 Push the [OK] button in the measured value display, the menu overview is displayed.

2 Confirm the menu "Basic adjustment" with [OK], the menu item "Units of measurement" will be displayed.

3 Activate the selection with [OK] and select the requested unit with [-] (in the example m).

4 Confirm with [OK], the submenu "Density unit" appears.

5 Select the requested unit, e.g. kg/dm³ with [-] and confirm with [OK], the submenu "Density" appears.

6 Enter the requested density value with [-] and [+], confirm with [OK] and move to position correction with [-].
The adjustment unit is thus switched over from bar to m.

Proceed as follows to select the temperature unit:  

→ Activate the selection with [OK] and select "Temperature unit with [-→].
→ Activate the selection with [OK] and select the requested unit with [-→] (e.g. °F).
→ Confirm with [OK].

The temperature unit is hence switched over from °C to °F.

**Carry out position correction**

Proceed as follows:

1. Activate in the menu item "Position correction" the selection with [OK].

   ![Position correction](image)

2. Select with [-→], e.g. to accept actual measured value.

   ![Position correction](image)

3. Confirm with [OK] and move to min.(zero) adjustment with [-→].

**Carrying out min. adjustment**

Proceed as follows:

1. Edit the % value in the menu item "Min. adjustment" with [OK].

   ![Min. adjustment](image)

2. Set the requested percentage value with [+] and [-→].
3. Edit the requested mbar value with [OK].
4. Set the requested mbar value with [+] and [-→].
5. Confirm with [+] and move to max. adjustment with [-→].

The min. adjustment is finished.

**Information:**

For an adjustment with filling, simply enter the actual measured value indicated at the bottom of the display.

2) Selection options: °C, °F.
If the adjustment ranges are exceeded, the message "Outside parameter limits" appears. The editing procedure can be aborted with [ESC] or the displayed limit value can be accepted with [OK].

Carrying out max. adjustment

Proceed as follows:

1. Edit the % value in the menu item "Max. adjustment" with [OK].

   Max. adjustment
   +100.0 %
   +1000.0 mbar
   0000.0 mbar

   Information:
   The displayed pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 1 bar = 1000 mbar).

2. Set the requested percentage value with [->] and [OK].
3. Edit the requested mbar value with [OK].
4. Set the requested mbar value with [+] and [->].
5. Confirm with [OK] and move to the menu overview with [ESC].

   The max. adjustment is finished.

   Information:
   For an adjustment with filling, simply enter the actual measured value indicated at the bottom of the display.

   If the adjustment ranges are exceeded, the message "Outside parameter limits" appears. The editing procedure can be aborted with [ESC] or the displayed limit value can be accepted with [OK].

   Parameter adjustment "Process pressure measurement"

   Set up IPT-11 in the following sequence:

   1. Select application "Process pressure measurement"
   2. Select the unit of measurement
   3. Carry out position correction
   4. Carrying out zero adjustment
   5. Carrying out span adjustment

   In the menu item "Adjustment unit" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi...

   The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.
In the menu items "zero" and "span" you determine the span of the sensor, the span corresponds to the end value.

**Information:**
The steps 1, 3 and 4 are not necessary for instruments which are already preset according to customer specifications!

You can find the data on the type label on the instrument or in the menu items of the zero/span adjustment.

The indicating and adjustment module enables the adjustment without filling or pressure. Thanks to this, you can carry out your settings already in the factory without the instrument having to be installed.

The actual measured value is displayed in addition to the menu items for zero/span adjustment.

---

### Select application

**"Process pressure measurement"**

IPT-11 is preset to application "Level measurement". Proceed as follows when switching over to application "Process pressure measurement":

1. Push the [OK] button in the measured value display, the menu overview is displayed.
2. Select the menu "Service" with [->] and confirm with [OK].

![Menu Overview]

3. Select the menu item "Application" with [->] and edit with [OK].

**Warning:**
Note the warning: "Output can change".

4. Select with [->] "OK" and confirm with [OK].
5. Select "Process pressure" from the list and confirm with [OK].

---

### Select unit

In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

To select the adjustment unit (in the example switching over from bar to mbar), proceed as follows:

1. Push the [OK] button in the measured value display, the menu overview is displayed.

---

3) Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH₂O, mmH₂O.
2 Confirm the menu "Basic adjustment" with [OK], the menu item "Unit" will be displayed.

3 Activate the selection with [OK] and select "Units of measurement with [-]."

4 Activate the selection with [OK] and select the requested unit with [-] (in the example mbar).

5 Confirm with [OK] and move to position correction with [-].

The adjustment unit is thus switched over from bar to mbar.

Proceed as follows to select the temperature unit:

→ Activate the selection with [OK] and select "Temperature unit with [-]."
→ Activate the selection with [OK] and select the requested unit with [-] (e.g. °F).
→ Confirm with [OK].

The temperature unit is hence switched over from °C to °F.

### Carry out position correction

Proceed as follows:

1 Activate in the menu item "Position correction" the selection with [OK].

2 Select with [-], e.g. to accept actual measured value.

3 Confirm with [OK] and move to min.(zero) adjustment with [-].

4 Selection options: °C, °F.
Carrying out zero adjustment

Proceed as follows:

1. Edit the mbar value in the menu item "zero" with [OK].

```
Zero
000.0 % = +0000.0 mbar
0000.0 mbar
```

2. Set the requested mbar value with [+I] and [-I].

3. Confirm with [+I] and move to span adjustment with [-I].

The zero adjustment is finished.

**Information:**
The zero adjustment shifts the value of the span adjustment. The span, i.e. the difference between these values, however, remains unchanged.

**Information:**
For an adjustment with pressure, simply enter the actual measured value indicated at the bottom of the display.

If the adjustment ranges are exceeded, the message "Outside parameter limits" appears. The editing procedure can be aborted with [ESC] or the displayed limit value can be accepted with [OK].

Carrying out span adjustment

Proceed as follows:

1. Edit the mbar value in the menu item "span" with [OK].

```
Span
100.0 % = +1000.0 mbar
0000.0 mbar
```

**Information:**
The displayed pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 1 bar = 1000 mbar).

2. Set the requested mbar value with [-I] and [OK].

3. Confirm with [OK] and move to the menu overview with [ESC].

The span adjustment is finished.

**Information:**
For an adjustment with pressure, simply enter the actual measured value indicated at the bottom of the display.
If the adjustment ranges are exceeded, the message "Outside parameter limits" appears. The editing procedure can be aborted with [ESC] or the displayed limit value can be accepted with [OK].

Copy sensor data

This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "Indicating and adjustment module".

The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Display unit
- Scaling
- Current output
- Unit of measurement
- Language

The following safety-relevant data are not read out or written:

- SIL
- HART mode
- PIN
- Application

Reset

Basic adjustment

If the "Reset" (sensor-specific basic adjustment) is carried out, the sensor resets the values of the following menu items to the reset values (see chart):

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<tr>
<td></td>
<td>Current output - max. current</td>
<td>20.5 mA</td>
</tr>
</tbody>
</table>

The values of the following menu items are not reset with "Reset:"

<table>
<thead>
<tr>
<th>Menu section</th>
<th>Function</th>
<th>Reset value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic settings</td>
<td>Position correction</td>
<td>no reset</td>
</tr>
<tr>
<td>Display</td>
<td>Lighting</td>
<td>no reset</td>
</tr>
<tr>
<td>Service</td>
<td>SIL</td>
<td>no reset</td>
</tr>
<tr>
<td></td>
<td>Language</td>
<td>no reset</td>
</tr>
<tr>
<td></td>
<td>HART mode</td>
<td>no reset</td>
</tr>
<tr>
<td></td>
<td>Application</td>
<td>no reset</td>
</tr>
</tbody>
</table>

**Factory setting**

Like basic adjustment, in addition, special parameters are reset to default values.\(^5\)

**Pointer**

The min. and max. temperature or pressure values are each reset to the actual value.

**Optional settings**

Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "Indicating and adjustment module".

---

\(^5\) Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware.
6.5 Menu schematic

**Information:**
Depending on the version and application, the highlighted menu windows may not always be available.

**Basic adjustment**

- **Unit**
  - Unit of measurement: bar
  - Temperature unit: °C

- **Position correction**
  - Offset: 0.2 mbar
  - 0000 mbar

- **Min. adjustment**
  - 000.0 %
  - 0.0 mbar

- **Max. adjustment**
  - 100.00 %
  - 100.00 mbar

- **Damping**
  - 1 s

- **Linearisation curve**
  - Linear

**Display**

- **Displayed value**
  - Pressure

- **Display unit**
  - Volume

- **Lighting**
  - Switched off
6.6 Saving the parameter adjustment data

It is recommended noting the adjusted data, e.g. in this operating instructions manual and archive them afterwards. They are hence available for multiple use or service purposes.

If IPT-11 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into indicating and adjustment module. The procedure is described in the operating instructions manual "Indicating and adjustment module" in the menu item "Copy sensor data". The data remain there permanently even if the sensor power supply fails.

If it is necessary to exchange the sensor, the indicating and adjustment module is inserted into the replacement instrument and the data are written into the sensor under the menu item "Copy sensor data".
7 Setup with PACTware and other adjustment programs

7.1 Connecting the PC

Fig. 10: Connecting the PC to the signal cable

1 RS232 connection
2 HART resistor 250 Ω
3 IPT-11

Necessary components:

- IPT-11
- PC with PACTware and suitable WIKA DTM
- HART modem
- HART resistance approx. 250 Ω
- Power supply unit

Note:
For power supply units with integrated HART resistance (inner resistance approx. 250 Ω), there is no additional external resistance necessary. Standard Ex separators are often provided with a sufficiently high current limitation resistance. In such cases, the modem can be connected in parallel to the 4 … 20 mA cable.

7.2 Parameter adjustment with PACTware

Further setup steps are described in the operating instructions manual "DTM Collection/PACTware" attached to each CD and which can also be downloaded from our homepage. A detailed description is available in the online help of PACTware and the WIKA DTM.
**Note:**
Keep in mind that for setup of IPT-11, DTM-Collection in the actual version must be used.

All currently available WIKA DTMs are provided in the DTM Collection on CD and can be obtained from the responsible WIKA agency for a token fee. This CD includes also the up-to-date PACTware version. The basic version of this DTM Collection incl. PACTware is also available as a free-of-charge download from the Internet.

Go via [www.wika.com](http://www.wika.com) to the item "Service".

### 7.3 Parameter adjustment with AMS™ and PDM

For WIKA sensors, instrument descriptions for the adjustment programs AMS™ and PDM are available as DD or EDD. The instrument descriptions are already implemented in the current versions of AMS™ and PDM. For older versions of AMS™ and PDM, a free-of-charge download is available via Internet.

Go via [www.wika.com](http://www.wika.com) to the item "Service".
8 Maintenance and fault rectification

8.1 Maintenance, cleaning

When the instrument is used properly, no special maintenance is required in normal operation.

In some applications, product buildup on the sensor diaphragm can influence the measuring result. Depending on the sensor and application, take precautions to ensure that heavy buildup, and especially a hardening thereof, is avoided.

If necessary, the transmitter has to be cleaned. In this case, make sure that the materials are resistant against the cleaning detergents.

8.2 Rectify malfunctions

Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to remove interferences.

Causes of malfunction

IPT-11 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware and the suitable DTM. In many cases, the causes can be determined this way and faults rectified.

Checking the 4 … 20 mA signal

Connect a handheld multimeter in the suitable measuring range according to the wiring plan.

? 4 … 20 mA signal not stable

- Level fluctuations
  → Set the integration time via the indicating and adjustment module or PACTware
- no atmospheric pressure compensation
  → Check the pressure compensation in the housing and clean the filter element, if necessary
8. Maintenance and fault rectification

? 4 ... 20 mA signal missing
  • Connection to voltage supply wrong
  → Check connection according to chapter "Connection steps" and if necessary, correct according to chapter "Wiring plan"
  • No power supply
  → Check cables for breaks; repair if necessary
  • Operating voltage too low or load resistance too high
  → Check, adapt if necessary

? Current signal greater than 22 mA or less than 3.6 mA
  • electronics module or measuring cell defective
  → Exchange the instrument or send it for repair

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Fault messages via the indicating/adjustment module

? E013
  • no measured value available(6)
  → Exchange the instrument or send it for repair

? E017
  • Adjustment span too small
  → repeat with modified values

? E036
  • no operable sensor software
  → Carry out a software update or send instrument for repair

? E041
  • Hardware error
  → Exchange the instrument or send it for repair

Reaction after fault rectification

Depending on the failure reason and measures taken, the steps described in chapter "Set up" must be carried out again, if necessary.

8.3 Instrument repair

You can download a return form (24 KB) in the Internet from our homepage www.wika.com under the item "Service".

If a repair is necessary, please proceed as follows:
  • Print and fill out one form per instrument

(6) Fault message can also appear if the pressure is higher than the nominal range.
If necessary, state a contamination
Clean the instrument and pack it damage-proof
Attach the completed form and probably a safety data sheet to the instrument
Please contact the agency serving you for the address of the return shipment

By doing this you help us carry out the repair quickly and without having to call back for needed information.
9 Dismounting

9.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "Mounting" and "Connecting to power supply" and carry out the listed steps in reverse order.

9.2 Removal

Note:
When disposing of old instruments, take note of the valid legal and municipal regulations. The appropriate parts must be recycled.
## 10 Supplement

### 10.1 Technical data

#### General data

<table>
<thead>
<tr>
<th>Parameter, pressure</th>
<th>Gauge pressure, absolute pressure, vacuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring principle</td>
<td>Ceramic-capacitive, dry measuring cell</td>
</tr>
<tr>
<td>Service interface</td>
<td>I²C bus</td>
</tr>
</tbody>
</table>

#### Materials and weights

- **Material 316L corresponds to 1.4404 or 1.4435**

**Materials, wetted parts**

- Process fitting: 316L
- Diaphragm: Ceramic® (99.9% oxide ceramic)
- Joining material diaphragm/Basic element measuring cell: Glass solder
- Measuring cell seal: FKM (VP2/A), FFKM (Kalrez 6375), EPDM (A+P 75.5/KW75F), FFKM (Chemraz 535), FFKM (FDA/3A)

**Materials, non-wetted parts**

- Housing: Plastic PBT, Alu die-casting powder-coated, 316L
- Seal between housing and housing cover: NBR (stainless steel housing), silicone (Aluminium housing)
- Inspection window in housing cover for indicating and adjustment module: Polycarbonate (UL-746-C listed)
- Ground terminal: 316Ti/316L

**Weight**

0.8 ... 8 kg (1.764 ... 17.64 lbs), depending on process fitting

#### Output variable

- **Output signal**: 4 ... 20 mA
- **Signal resolution**: 1.6 µA
- **Failure signal output current**: mA-value unchanged 20.5 mA, 22 mA, < 3.6 mA (adjustable)
- **Max. output current**: 22 mA
- **Load**: see load diagram under Power supply
- **Fulfilled NAMUR recommendations**: NE 43

#### Dynamic behaviour output

- **Run-up time approx.**: 10 s
Fig. 11: Sudden change of the process variable. $t_T$: dead time; $t_A$: rise time; $t_S$: jump response time

1  Process variable 
2  Output signal 

Dead time $\leq 150$ ms  
Rise time $\leq 100$ ms ($10 \ldots 90\%$)  
Step response time $\leq 250$ ms (ti: $0$ s, $10 \ldots 90\%$)  
Damping (63 % of the input variable) $0 \ldots 999$ s, adjustable

Input variable 

Adjustment 

Adjustment range of the min./max. adjustment relating to the nominal measuring range:  
- Percentage value $-10 \ldots 110\%$  
- Pressure value $-20 \ldots 120\%$

Adjustment range of the zero/span adjustment relating to the nominal measuring range:  
- zero $-20 \ldots +95\%$  
- span $-120 \ldots +120\%$\(^7\)  
- Difference between zero and span max. 120 % of the nominal range

Recommended max. turn down $10:1$ (no limitation)

Nominal measuring ranges and overload capability in bar/kPa

<table>
<thead>
<tr>
<th>Nominal range</th>
<th>Overload capacity, max. pressure</th>
<th>Overload capacity, min. pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauge pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 \ldots 0.1 bar/0 \ldots 10 kPa</td>
<td>15 bar/1500 kPa</td>
<td>-0.2 bar/-20 kPa</td>
</tr>
<tr>
<td>0 \ldots 0.2 bar/0 \ldots 20 kPa</td>
<td>20 bar/2000 kPa</td>
<td>-0.4 bar/-40 kPa</td>
</tr>
<tr>
<td>0 \ldots 0.4 bar/0 \ldots 40 kPa</td>
<td>30 bar/3000 kPa</td>
<td>-0.8 bar/-80 kPa</td>
</tr>
<tr>
<td>0 \ldots 1 bar/0 \ldots 100 kPa</td>
<td>35 bar/3500 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
</tbody>
</table>

\(^7\) Values less than -1 bar cannot be set.
### Nominal range

<table>
<thead>
<tr>
<th>Nominal range</th>
<th>Overload capacity, max. pressure</th>
<th>Overload capacity, min. pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 2.5 bar/0 ... 250 kPa</td>
<td>50 bar/5000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>0 ... 5 bar/0 ... 500 kPa</td>
<td>65 bar/6500 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>0 ... 10 bar/0 ... 1000 kPa</td>
<td>90 bar/9000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>0 ... 25 bar/0 ... 2500 kPa</td>
<td>130 bar/13000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>0 ... 60 bar/0 ... 6000 kPa</td>
<td>200 bar/20000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>-1 ... 0 bar/-100 ... 0 kPa</td>
<td>35 bar/3500 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>-1 ... 1.5 bar/-100 ... 150 kPa</td>
<td>50 bar/5000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>-1 ... 5 bar/-100 ... 500 kPa</td>
<td>65 bar/6500 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>-1 ... 10 bar/-100 ... 1000 kPa</td>
<td>90 bar/9000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>-1 ... 25 bar/-100 ... 2500 kPa</td>
<td>130 bar/13000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>-1 ... 60 bar/-100 ... 6000 kPa</td>
<td>200 bar/20000 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
<tr>
<td>-0.05 ... 0.05 bar/-5 ... 5 kPa</td>
<td>15 bar/1500 kPa</td>
<td>-0.2 bar/-20 kPa</td>
</tr>
<tr>
<td>-0.1 ... 0.1 bar/-10 ... 10 kPa</td>
<td>20 bar/2000 kPa</td>
<td>-0.4 bar/-40 kPa</td>
</tr>
<tr>
<td>-0.2 ... 0.2 bar/-20 ... 20 kPa</td>
<td>30 bar/3000 kPa</td>
<td>-0.8 bar/-80 kPa</td>
</tr>
<tr>
<td>-0.5 ... 0.5 bar/-50 ... 50 kPa</td>
<td>35 bar/3500 kPa</td>
<td>-1 bar/-100 kPa</td>
</tr>
</tbody>
</table>

### Absolute pressure

<table>
<thead>
<tr>
<th>Nominal range</th>
<th>Overload capacity, max. pressure</th>
<th>Overload capacity, min. pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 0.1 bar/0 ... 10 kPa</td>
<td>15 bar/1500 kPa</td>
<td>0 bar abs.</td>
</tr>
<tr>
<td>0 ... 1 bar/0 ... 100 kPa</td>
<td>35 bar/3500 kPa</td>
<td>0 bar abs.</td>
</tr>
<tr>
<td>0 ... 2.5 bar/0 ... 250 kPa</td>
<td>50 bar/5000 kPa</td>
<td>0 bar abs.</td>
</tr>
<tr>
<td>0 ... 5 bar/0 ... 500 kPa</td>
<td>65 bar/6500 kPa</td>
<td>0 bar abs.</td>
</tr>
<tr>
<td>0 ... 10 bar/0 ... 1000 kPa</td>
<td>90 bar/9000 kPa</td>
<td>0 bar abs.</td>
</tr>
<tr>
<td>0 ... 25 bar/0 ... 2500 kPa</td>
<td>130 bar/13000 kPa</td>
<td>0 bar abs.</td>
</tr>
<tr>
<td>0 ... 60 bar/0 ... 6000 kPa</td>
<td>200 bar/20000 kPa</td>
<td>0 bar abs.</td>
</tr>
</tbody>
</table>

### Nominal measuring ranges and overload capability in psig

<table>
<thead>
<tr>
<th>Nominal range</th>
<th>Overload capacity, max. pressure</th>
<th>Overload capacity, min. pressure</th>
</tr>
</thead>
</table>

#### Gauge pressure

<table>
<thead>
<tr>
<th>Nominal range</th>
<th>Overload capacity, max. pressure</th>
<th>Overload capacity, min. pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 1.5 psig</td>
<td>200 psig</td>
<td>-3 psig</td>
</tr>
<tr>
<td>0 ... 3 psig</td>
<td>290 psig</td>
<td>-6 psig</td>
</tr>
<tr>
<td>0 ... 6 psig</td>
<td>430 psig</td>
<td>-12 psig</td>
</tr>
<tr>
<td>0 ... 15 psig</td>
<td>500 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>0 ... 35 psig</td>
<td>700 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>0 ... 70 psig</td>
<td>950 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>0 ... 150 psig</td>
<td>1300 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>0 ... 350 psig</td>
<td>1900 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>0 ... 900 psig</td>
<td>2900 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>-15 ... 0 psig</td>
<td>500 psig</td>
<td>-15 psig</td>
</tr>
</tbody>
</table>
### Nominal range

<table>
<thead>
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<th>Nominal range</th>
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<th>Overload capacity, min. pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>-15 ... 25 psig</td>
<td>700 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>-15 ... 70 psig</td>
<td>950 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>-15 ... 150 psig</td>
<td>1300 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>-15 ... 350 psig</td>
<td>1900 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>-15 ... 900 psig</td>
<td>2900 psig</td>
<td>-15 psig</td>
</tr>
<tr>
<td>-0.7 ... 0.7 psig</td>
<td>200 psig</td>
<td>-3 psig</td>
</tr>
<tr>
<td>-1.5 ... 1.5 psig</td>
<td>290 psig</td>
<td>-6 psig</td>
</tr>
<tr>
<td>-3 ... 3 psig</td>
<td>430 psig</td>
<td>-12 psig</td>
</tr>
<tr>
<td>-7 ... 7 psig</td>
<td>500 psig</td>
<td>-15 psig</td>
</tr>
</tbody>
</table>

### Absolute pressure

<table>
<thead>
<tr>
<th>Absolute pressure</th>
<th>Overload capacity, max. pressure</th>
<th>Overload capacity, min. pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 1.5 psi</td>
<td>200 psi</td>
<td>0 psi</td>
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<td>500 psi</td>
<td>0 psi</td>
</tr>
<tr>
<td>0 ... 35 psi</td>
<td>700 psi</td>
<td>0 psi</td>
</tr>
<tr>
<td>0 ... 70 psi</td>
<td>900 psi</td>
<td>0 psi</td>
</tr>
<tr>
<td>0 ... 150 psi</td>
<td>1300 psi</td>
<td>0 psi</td>
</tr>
<tr>
<td>0 ... 350 psi</td>
<td>1900 psi</td>
<td>0 psi</td>
</tr>
<tr>
<td>0 ... 900 psi</td>
<td>2900 psi</td>
<td>0 psi</td>
</tr>
</tbody>
</table>

### Reference conditions and actuating variables (similar to DIN EN 60770-1)

#### Reference conditions according to DIN EN 61298-1
- Temperature: +15 ... +25 °C (+59 ... +77 °F)
- Relative humidity: 45 ... 75 %
- Air pressure: 860 ... 1060 mbar/86 ... 106 kPa (12.5 ... 15.4 psig)

#### Determination of characteristics
- Limit point adjustment according to IEC 61298-2
- Characteristics: linear
- Reference installation position: upright, diaphragm points downward
- Influence of the installation position: < 0.2 mbar/20 Pa (0.003 psig)

### Deviation determined according to the limit point method according to IEC 60770\(^8\)

Applies to digital interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to analogue current output 4 ... 20 mA. Specifications refer to the set span. Turn down (TD) is the ratio nominal measuring range/set span.

#### Deviation
- Turn down 1 : 1 up to 5 : 1: < 0.075 %
- Turn down > 5 : 1: < 0.015 % x TD

#### Deviation with absolute pressure measuring range 0.1 bar

\(^8\) Incl. non-linearity, hysteresis and non-repeatability.
- Turn down 1 : 1 up to 5 : 1 < 0.25 % x TD
- Turn down > 5 : 1 < 0.05 % x TD

Influence of the product or ambient temperature

Thermal change zero signal and output span

Applies to the digital signal output (HART, Profibus PA, Foundation Fieldbus) as well as to the analogue current output 4 … 20 mA and refers to the set span. Turn down (TD) is the ratio nominal measuring range/set span.

Thermal change zero signal and output span, reference temperature 20 °C (68 °F):
- In the compensated temperature range 0 … +100 °C (+32 … +212 °F) < (0.05 % + 0.1 % x TD)
- Outside the compensated temperature range < (0.05 % + 0.15 % x TD)

Thermal change zero signal and output span with absolute pressure measuring range 0.1 bar, reference temperature 20 °C (68 °F):
- In the compensated temperature range 0 … +100 °C (+32 … +212 °F) < (0.1 % + 0.1 % x TD)
- Outside the compensated temperature range < (0.15 % + 0.15 % x TD)

Thermal change, current output

Applies also to the analogue 4 … 20 mA current output and refers to the set span.

Thermal change, current output < 0.15 % at -40 … +80 °C (-40 … +176 °F)

Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Applies to digital interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to analogue current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

Long-term drift of the zero signal < (0.1 % x TD)/year

Ambient conditions

Ambient, storage and transport temperature -40 … +80 °C (-40 … +176 °F)

Process conditions

The specifications to the pressure stage and the product temperature are used as an overview. The specifications of the type label are applicable.

Pressure stage, process fitting
- Thread 316L PN 60
- Thread Aluminium PN 25
- Thread PVDF PN 10
- Hygienic fittings 316L PN 6, PN 10, PN 25, PN 40
- Flange 316L PN 16, PN 40 or 150 lbs, 300 lbs, 600 lbs
- Flange with extension 316L
without PN specification, PN 16, PN 40 or 150 lbs, 300 lbs, 600 lbs

Flange PVDF

PN 16

Product temperature standard version, depending on the meas. cell seal[^9]
- FKM (VP2/A) -20 ... +120 °C (-4 ... +248 °F)
- EPDM (A+P 75.5/KW75F) -40 ... +120 °C (-40 ... +248 °F), 1 h: 140 °C/284 °F cleaning temperature
- FFKM (Kalrez 6375) -10 ... +120 °C (+14 ... +248 °F)
- FFKM (Chemraz 535) -30 ... +120 °C (-22 ... +248 °F)

Product temperature version with extended temperature range, depending on the meas. cell seal as well as order specification
- FKM (VP2/A) -20 ... +150 °C (-4 ... +302 °F)
- EPDM (A+P 75.5/KW75F) -40 ... +150 °C (-40 ... +302 °F)
- FFKM (Kalrez 6375) -10 ... +150 °C (+14 ... +302 °F)
- FFKM (Chemraz 535) -30 ... +150 °C (-22 ... +302 °F)

Vibration resistance mechanical vibrations with 4 g and 5 ... 100 Hz[^10]

Shock resistance Acceleration 100 g[^11]

**Electromechanical data - version IP 66/IP 67**

**Cable entry/plug[^12]**
- Single chamber housing
  - 1 x cable gland M20 x 1.5 (cable: Ø 5 ... 9 mm),
  - 1 x blind stopper M20 x 1.5
  - or:
  - 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
  - or:
  - 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5
- Double chamber housing
  - 1 x cable entry M20 x 1.5 (cable: Ø 5 ... 9 mm),
  - 1 x blind stopper M20 x 1.5; plug M12 x 1 for the external indicating and adjustment unit (optional)
  - or:

[^9]: With process fitting PVDF, max. 100 °C (212 °F).
[^10]: Tested according to the regulations of German Lloyd, GL directive 2.
[^11]: Tested according to EN 60068-2-27.
[^12]: Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.
• 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for the external indicating and adjustment unit (optional)

or:

• 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; plug M12 x 1 for the external indicating and adjustment unit (optional)

Spring-loaded terminals for wire cross-section up to 2.5 mm² (AWG 14)

### Indicating and adjustment module

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage supply and data transmission</td>
<td>through the sensor</td>
</tr>
<tr>
<td>Indication</td>
<td>LC display in dot matrix</td>
</tr>
<tr>
<td>Adjustment elements</td>
<td>4 keys</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP 20</td>
</tr>
<tr>
<td>– unassembled</td>
<td>IP 40</td>
</tr>
<tr>
<td>– mounted into the sensor without cover</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td></td>
</tr>
<tr>
<td>– Housing</td>
<td>ABS</td>
</tr>
<tr>
<td>– Inspection window</td>
<td>Polyester foil</td>
</tr>
</tbody>
</table>

### Voltage supply

**Operating voltage**

- Non-Ex instrument 12 ... 36 V DC
- EEx-ia instrument 12 ... 30 V DC
- Exd instrument 18 ... 36 V DC

**Operating voltage with lighted indicating and adjustment module**

- Non-Ex instrument 20 ... 36 V DC
- EEx-ia instrument 20 ... 30 V DC
- EEx-d-ia instrument 20 ... 36 V DC

**Permissible residual ripple**

- < 100 Hz $U_{ss} < 1 \text{ V}$
- 100 Hz ... 10 kHz $U_{ss} < 10 \text{ mV}$

**Load**

see diagram
Fig. 12: Voltage diagram
1 Voltage limit EEx-ia instrument
2 Voltage limit non-Ex/Exd instrument
3 Operating voltage

Electrical protective measures

Protection rating
- Housing, standard IP 66/Ip 67\textsuperscript{13)}

Overvoltage category III
Protection class II

Approvals
Depending on the version, instruments with approvals can have different technical data. For these instruments, please note the corresponding approval documents. They are included in the scope of delivery.

\textsuperscript{13)} Instruments with gauge pressure measuring ranges cannot detect the ambient pressure when submerged, e.g. in water. This can lead to falsification of the measured value.
10.2 Dimensions

Housing

Fig. 13: Housing versions (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

1 Plastic housing
2 Stainless steel housing
3 Aluminium double chamber housing
4 Aluminium housing
IPT-11, front-flush connection

Fig. 14: IPT-11 SA = Tri-Clamp 2", RT = Tri-Clamp 1½", 3T = DRD, 3R = Varivent Form F
All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Subject to change without prior notice