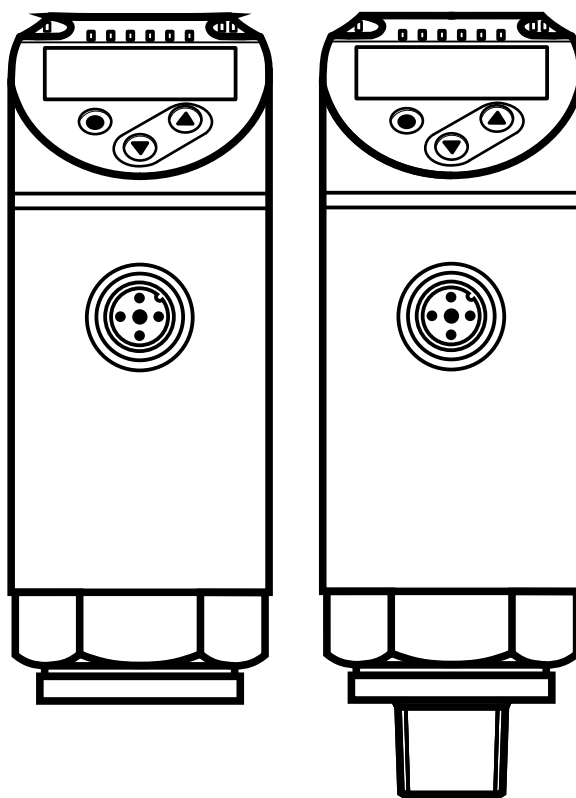


Operating instructions  
Electronic pressure sensor

**PN22**

**PN26**

**UK**





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# 1 Preliminary note

## 1.1 Symbols used

- Instruction
- > Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note  
Non-compliance may result in malfunction or interference
-  Information  
Supplementary note

## 2 Safety instructions

- The device described is a subcomponent for integration into a system.
  - The manufacturer is responsible for the safety of the system.
  - The system manufacturer undertakes to perform a risk assessment and to create a documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the manufacturer of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Functions and features).
- Only use the product for permissible media (→ Technical data).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, programming, configuration, operation and maintenance of the product must be carried out by personnel qualified and authorised for the respective activity.
- Protect units and cables against damage.
- If the devices are used in gas applications with pressures > 25 bar the notes in chapter 3.1 for devices with the marking \*\*) must be absolutely observed!

## 3 Functions and features

The device monitors the system pressure of machines and installations.

## 3.1 Applications

Type of pressure: relative pressure



Information on pressure rating and bursting pressure → data sheet.



Avoid static and dynamic overpressure exceeding the indicated pressure rating by taking appropriate measures.

The indicated bursting pressure must not be exceeded.

Even if the bursting pressure is exceeded only for a short time, the unit may be destroyed. ATTENTION: risk of injury!



The units are vacuum resistant.



Pressure Equipment Directive (PED):

The units comply with the Pressure Equipment Directive. They are designed for group 2 fluids and are manufactured in accordance with sound engineering practice. Use of media from group 1 fluids on request.


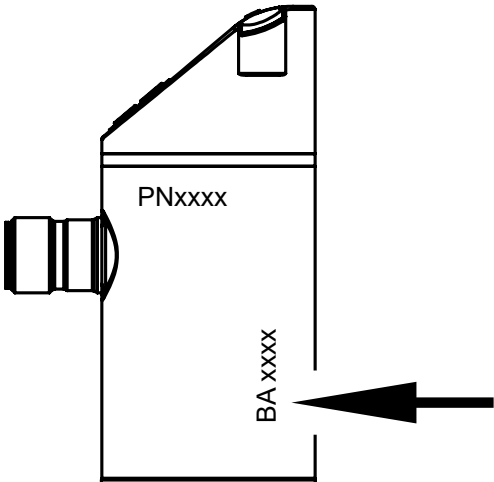
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## 4 Function

- The unit displays the current system pressure.
- It generates output signals according to the operating mode and the parameter setting.
- Moreover, it provides the process data via IO-Link.
- The unit is designed for fully bidirectional communication.  
So the following options are possible:
  - Remote display: reading and display of the current system pressure.
  - Remote parameter setting: reading and changing the current parameter setting.
  - IO-Link parameter setting (→ 4.5).

## 4.1 Operating modes

Operating mode 2	
Description	Operating mode on delivery.
Application	Standard applications.
IODD designation	Example PN2294 Factory setting / (CMPT = 2): At <a href="http://www.ifm.com">www.ifm.com</a> in the download area of the corresponding article.

Operating mode 3	
Description	<p>High IO-Link process value and parameter resolution (device-specific: see IODD suitable for the operating mode). The menu items [ou1] and [ou2] are extended by the setting option [OFF] (→ 9.4.1). IO-Link standard command "Flash" is available (→ 4.5.2).</p> <p> This operating mode is available as of device status BA. For the device status see the labelling on the device.</p> 
Application	Improved controllability via IO-Link. Highly granular setting of set and reset points.
IODD designation	Example PN2294 Status_B High Resolution / (CMPT = 3): At <a href="http://www.ifm.com">www.ifm.com</a> in the download area of the corresponding article.

## 4.2 Communication, parameter setting, evaluation

<b>OUT1 (pin 4)</b>	<ul style="list-style-type: none"><li>• Switching signal for system pressure limit</li><li>• Communication via IO-Link</li></ul>
<b>OUT2 (pin 2)</b>	<ul style="list-style-type: none"><li>• Switching signal for system pressure limit</li><li>• Analogue signal 4...20 mA / 0...10 V</li></ul>

### 4.3 Switching function

OUTx changes its switching status if it is above or below the set switching limits (SPx, rPx). The following switching functions can be selected:

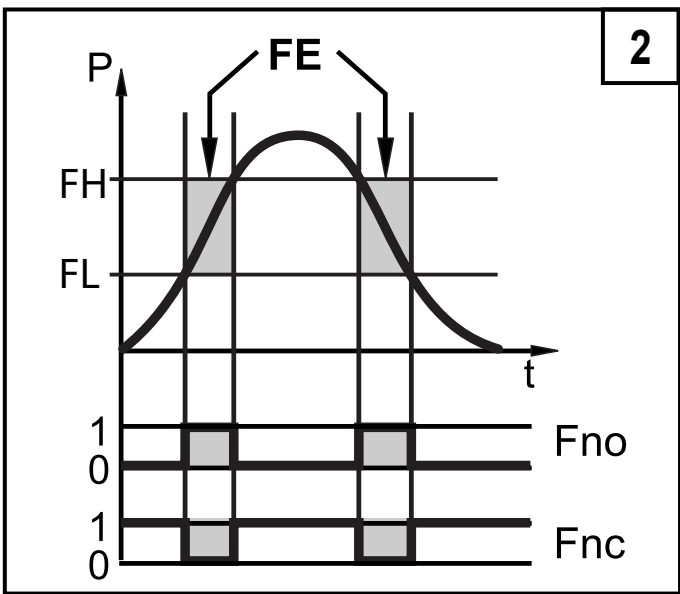
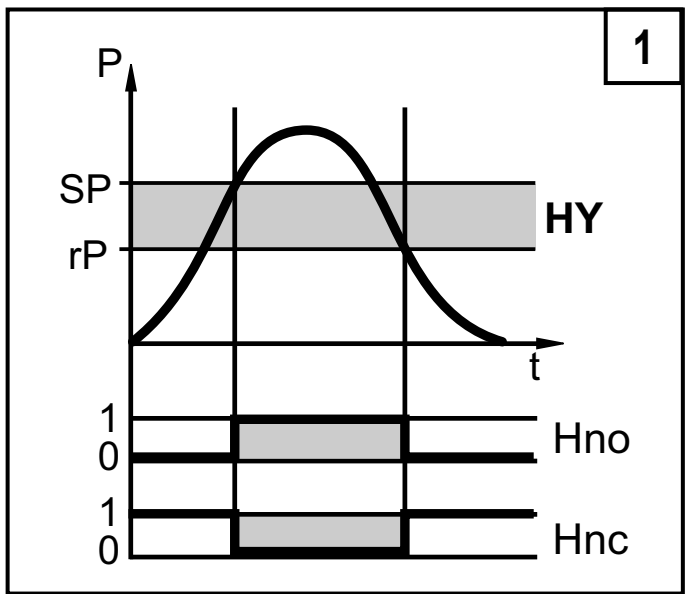
- Hysteresis function / normally open: [ou1/ou2] = [Hno] (→ Fig. 1).
- Hysteresis function / normally closed: [ou1/ou2] = [Hnc] (→ Fig. 1).

First the set point (SPx) is set, then the reset point (rPx).

The hysteresis defined remains even if SPx is changed again.

- Window function / normally open: [ou1/ou2] = [Fno] (→ Fig. 2).
- Window function / normally closed: [ou1/ou2] = [Fnc] (→ Fig. 2).

The width of the window can be set by means of the difference between FHx and FLx. FHx = upper value, FLx = lower value.



P = system pressure; HY = hysteresis; FE = window



When set to the window function the set and reset points have a fixed hysteresis of 0.25 % of the measuring span.

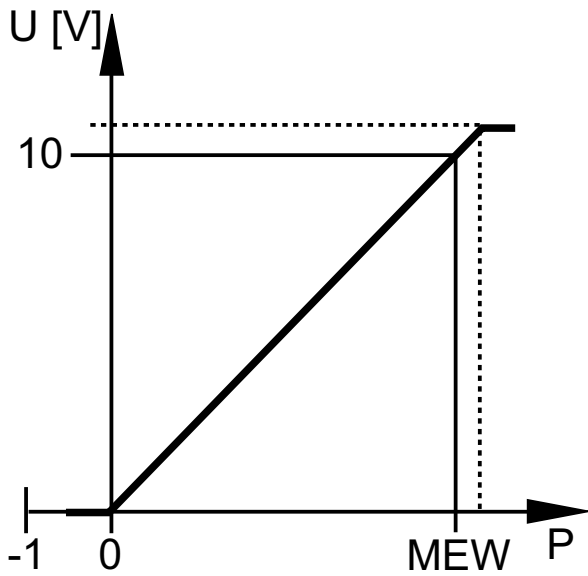
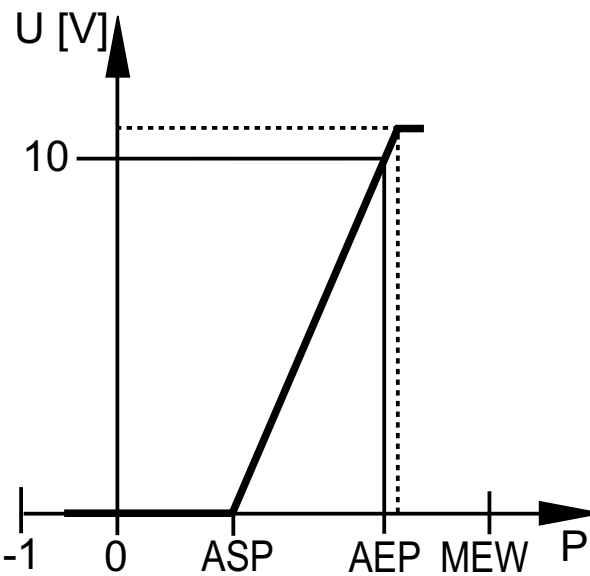
## 4.4 Analogue function

OUT2 is an analogue output:

- [ou2] determines whether the set measuring range is provided as 4...20 mA ([ou2] = [I]) or as 0...10 V ([ou2] = [U]).
- Analogue start point [ASP2] determines at which measured value the output signal is 4 mA or 0 V.
- Analogue end point [AEP2] determines at which measured value the output signal is 20 mA or 10 V.

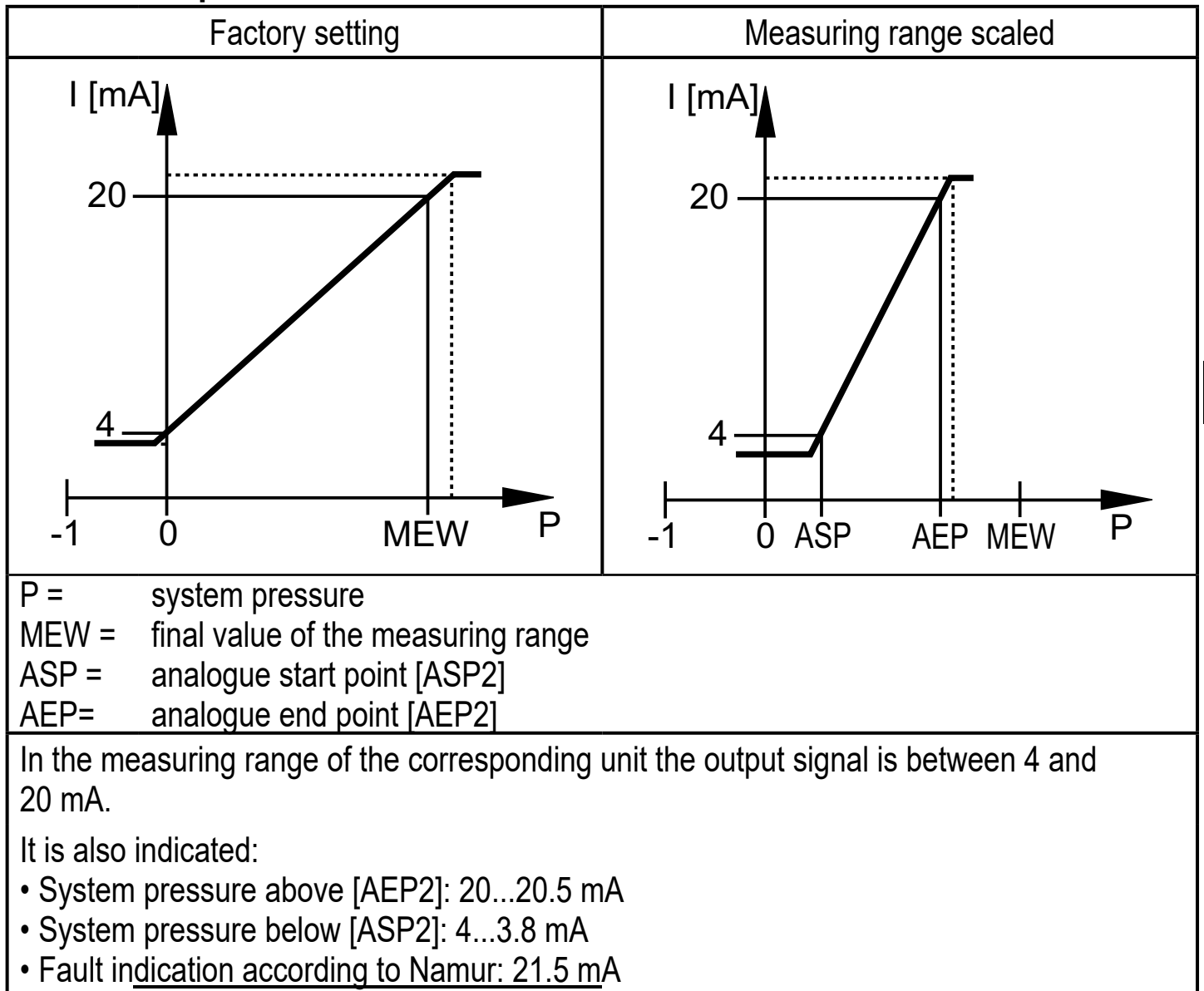
Minimum distance between [ASP2] and [AEP2] = 20 % of the measuring span.

### Voltage output 0 ... 10 V:

Factory setting	Measuring range scaled
	
<p>P = system pressure  MEW = final value of the measuring range  ASP = analogue start point [ASP2]  AEP = analogue end point [AEP2]</p>	
<p>In the measuring range of the respective unit the output signal is between 0 and 10 V.  It is also indicated:</p> <ul style="list-style-type: none"> <li>• System pressure above [AEP2]: 10...10.3 V</li> <li>• Fault indication according to Namur: 11 V</li> </ul>	



## Current output 4...20 mA



## 4.5 IO-Link

### 4.5.1 General information

The device has an IO-Link communication interface which requires an IO-Link-capable module (IO-Link master) for operation.

The IO-Link interface enables direct access to the process and diagnostic data and provides the possibility to set the parameters of the unit during operation.

In addition, communication is possible via a point-to-point connection with a USB adapter cable.

## 4.5.2 Functions only available via IO-Link communication

- HIPC: number of overload processes (→ 9.6.2).
- HIPS: threshold for the overload counter (→ 9.6.2).
- Flash: via this standard command, the sensor can be localised in the plant. When the command is used, the switching status LEDs flash and "IO-L" is displayed. (Function only available in operating mode [3]).
- Application Specific Tag: freely definable text assigned to the unit.
- Function Tag: freely definable text describing the device function in the plant. (Function only available in operating mode [3]).
- Location Tag: freely definable text describing the installation location in the plant. (Function only available in operating mode [3]).

For more detailed information refer to the device-specific IO Device Description PDF at [www.ifm.com](http://www.ifm.com).

## 5 Installation



Before installing and removing the unit: Make sure that no pressure is applied to the system.

- ▶ Insert the unit in a 1/4 - 18 NPT process connection.
- ▶ Tighten firmly. Recommended tightening torque:  $\leq 50$  Nm  
Depends on lubrication, seal and pressure load!

The sensor housing can be rotated by 345° with regard to the process connection.



Do not rotate past the end stop!

# 6 Electrical connection



The unit must be connected by a qualified electrician.  
The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply according to EN 50178, SELV, PELV.

- ▶ Disconnect power.
- ▶ Connect the unit as follows:

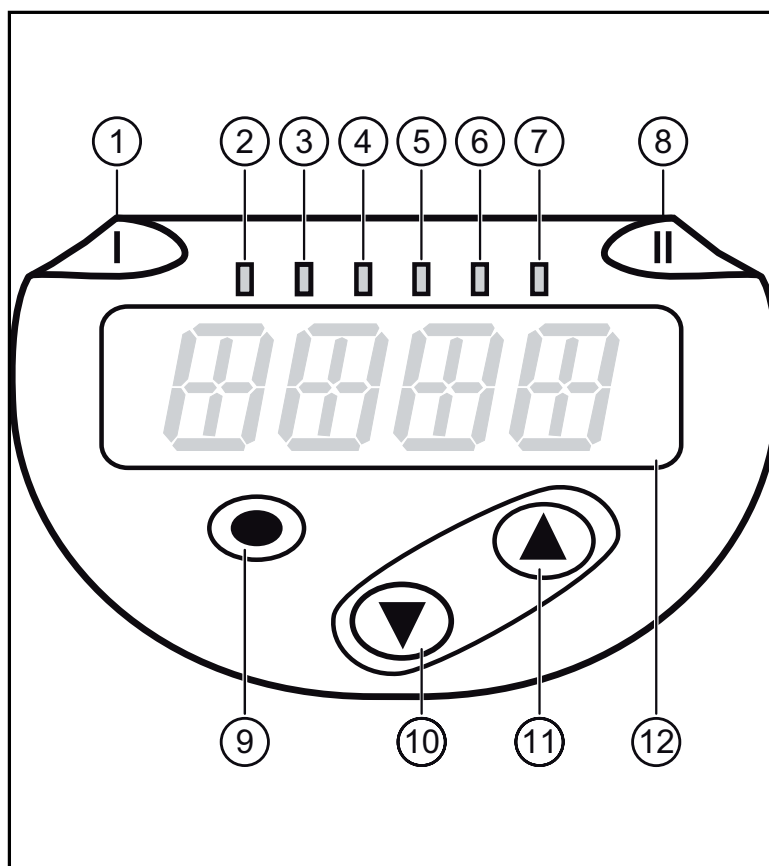
Core colours			
BK	black		
BN	brown		
BU	blue		
WH	white		

OUT1: switching output or IO-Link  
OUT2: switching output or analogue output  
Colours to DIN EN 60947-5-2

Wiring example	
2 x pnp	2 x npn
1 x pnp / 1 x analogue	1 x npn / 1 x analogue

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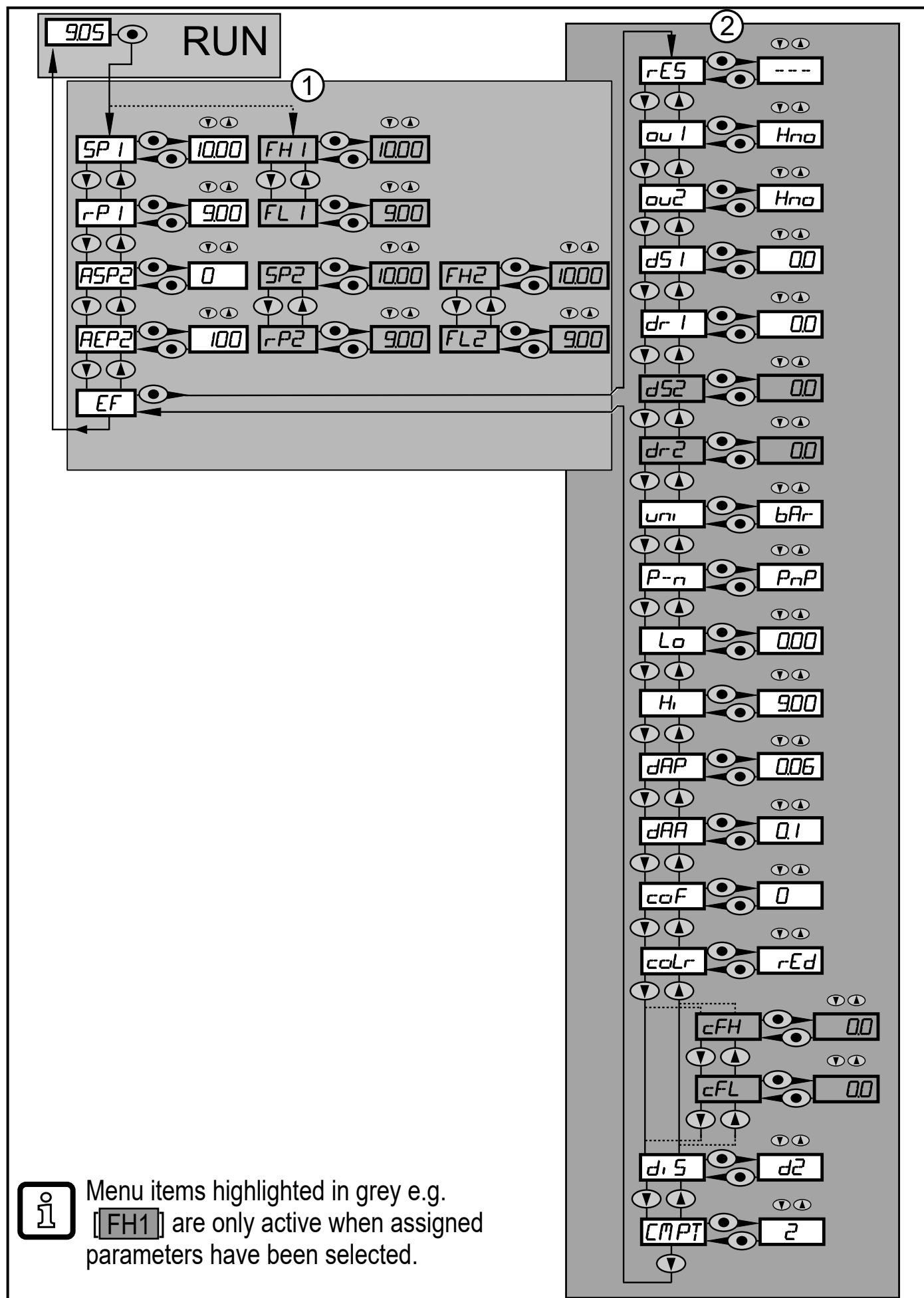
## 7 Operating and display elements



1 to 8: Indicator LEDs	
LED 1	Switching status OUT1 (on if output 1 is switched).
LED 8	Switching status OUT2 (on if output 2 is switched).
LEDs 2 - 7	System pressure in the indicated unit of measurement (indication is device-specific)
9: [Enter] button [●]	
- Selection of the parameters and acknowledgement of the parameter values.	
10 to 11: Arrow keys up [▲] and down [▼]	
- Setting of the parameter values (scrolling by holding pressed, incrementally by pressing once).	
12: Alphanumeric display, 4 digits	
<ul style="list-style-type: none"> <li>- Display of the current system pressure.</li> <li>- Indication of the parameters and parameter values.</li> </ul>	

## 8 Menu

### 8.1 Menu structure: main menu




## 8.2 Explanation of the menu

### 8.2.1 Explanation of menu level 1

SPx/rPx	Upper / lower limit for system pressure at which OUTx switches with hysteresis setting. Requirement: OUTx setting is [Hno] or [Hnc].
FHx / FLx	Upper / lower limit for system pressure at which OUTx switches with window setting. Requirement: OUTx setting is [Fno] or [Fnc].
ASP2	Analogue start point for system pressure: measured value at which 4 mA / 0 V are provided. Requirement: OUT2 setting is [I] or [U].
AEP2	Analogue end point for system pressure: measured value at which 20 mA / 10 V are provided. Requirement: OUT2 setting is [I] or [U].
EF	Extended functions / opening of menu level 2.

### 8.2.2 Explanation of menu level 2

rES	Restore factory setting.
ou1	Output function for OUT1: <ul style="list-style-type: none"> <li>Switching signal for the pressure limits: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc].</li> <li>Output off [OFF] (function only available in operating mode [3]).</li> </ul>
ou2	Output function for OUT2: <ul style="list-style-type: none"> <li>Switching signal for the pressure limits: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc].</li> <li>Analogue signal for the current system pressure: 4...20 mA [I] or 0...10 V [U].</li> <li>Output off [OFF] (function only available in operating mode [3]).</li> </ul>
dS1 / dS2	Switch-on delay for OUT1 or OUT2.
dr1 / dr2	Switch-off delay for OUT1 / OUT2.
uni	Standard unit of measurement for system pressure (display): [bAr] / [mbar] / [MPa] / [kPa] / [PSI] / [inHG] / [iH2O] / [mmWS]  The selectable units of measurement depend on the respective unit. See table Setting ranges (→ 11.1.1).
P-n	Output logic: pnp / npn.
Lo	Minimum value memory for system pressure.
Hi	Maximum value memory for system pressure.
dAP	Damping of the switch point / process data flow (IO-Link communication) and display.
dAA	Damping of the analogue output. Requirement: OUT2 setting is [I] or [U].
coF	Zero-point calibration.
coLr	Assignment of the display colours "red" and "green" within the measuring range.
cFH / cFL	Upper / lower value for colour change. Parameter only active after selection of a freely definable colour window in the coLr parameter: [r-cF] or [G-cF].

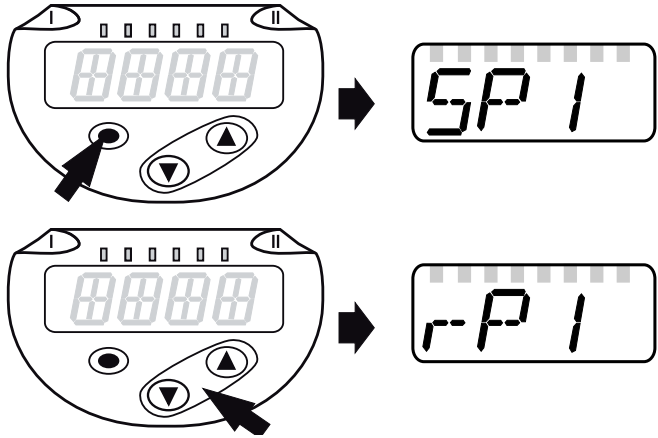
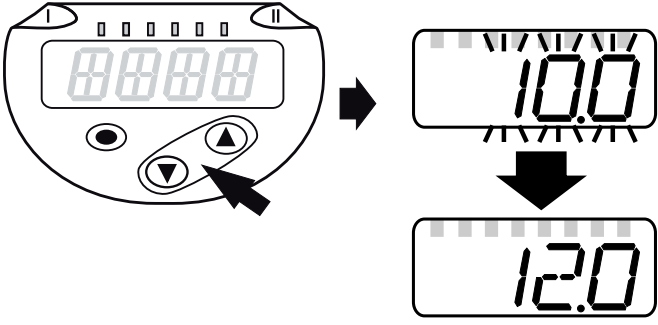
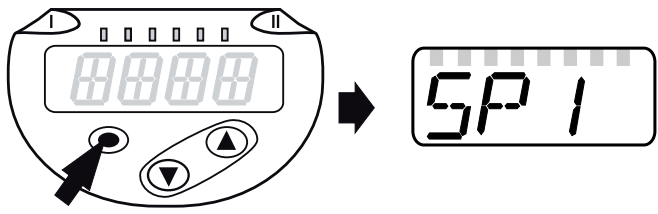
diS	Update rate and orientation of the display.
CMPT	Selection of the operating mode

## 9 Parameter setting

During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameters until the parameter setting has been completed.

### 9.1 Parameter setting in general

3 steps must be taken for each parameter setting:

1	<b>Select parameter</b> <ul style="list-style-type: none"> <li>▶ Press [●] to get to the menu.</li> <li>▶ Press [▲] or [▼] until the required parameter is displayed.</li> </ul>	
2	<b>Set parameter value</b> <ul style="list-style-type: none"> <li>▶ Press [●] to edit the selected parameter.</li> <li>▶ Press [▲] or [▼] for at least 1 s.</li> <li>&gt; After 1 s: setting value is changed: incrementally by pressing the button once or continuously by keeping the button pressed.</li> </ul>	
Numerical values are incremented continuously with [▲] or decremented with [▼].		
3	<b>Acknowledge parameter value</b> <ul style="list-style-type: none"> <li>▶ Briefly press [●].</li> <li>&gt; The parameter is displayed again. The new setting value is saved.</li> </ul>	
<b>Set other parameters</b> <ul style="list-style-type: none"> <li>▶ Press [▲] or [▼] until the required parameter is displayed.</li> </ul>		
<b>Finish parameter setting</b> <ul style="list-style-type: none"> <li>▶ Press [▲] or [▼] several times until the current measured value is displayed or wait for 30 s.</li> <li>&gt; The unit returns to the process value display.</li> </ul>		

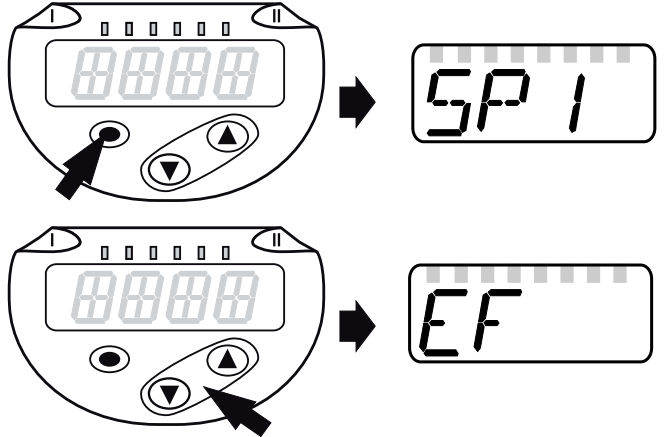
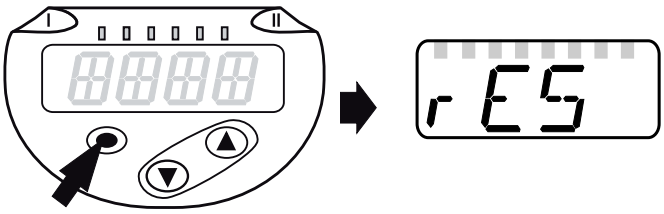


If [C.Loc] is displayed when you try to change a parameter value, a parameter setting process is active via the IO-Link communication (temporary locking).



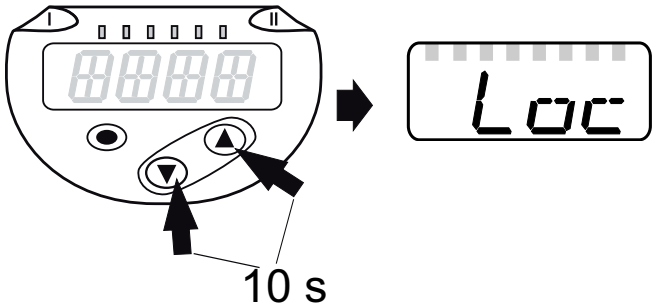
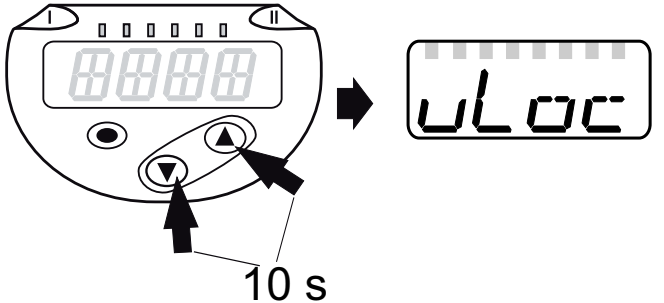
If [S.Loc] is displayed, the sensor is permanently locked via software. This locking can only be removed with a parameter setting software.

- Change from menu level 1 to menu level 2:

<ul style="list-style-type: none"> <li>▶ Press [●] to get to the menu.</li> <li>▶ Press [▼] until [EF] is displayed.</li> </ul>	
<ul style="list-style-type: none"> <li>▶ Press [●].</li> <li>&gt; The first parameter of the submenu is displayed (here: [rES]).</li> </ul>	

- Locking / unlocking

The unit can be locked electronically to prevent unintentional settings.

<ul style="list-style-type: none"> <li>▶ Make sure that the unit is in the normal operating mode.</li> <li>▶ Press [▲] + [▼] simultaneously for 10 s.</li> <li>&gt; [Loc] is displayed.</li> </ul>	
<p>During operation: [Loc] is briefly displayed if you try to change parameter values.</p>	
<p>For unlocking:</p> <ul style="list-style-type: none"> <li>▶ Make sure that the unit is in the normal operating mode.</li> <li>▶ Press [▲] + [▼] simultaneously for 10 s.</li> <li>&gt; [uLoc] is displayed.</li> </ul>	

On delivery: not locked.



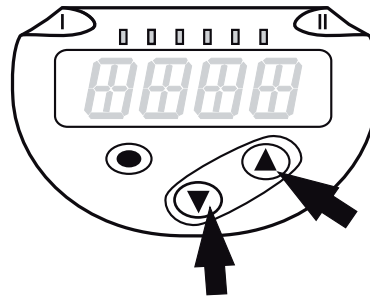
- Timeout:

If no button is pressed for 30 s during parameter setting, the unit returns to the operating mode with unchanged values.

- Exit parameter without applying the settings

To exit a parameter without applying the settings:

- ▶ Press [▲] + [▼] simultaneously.
- > Return to the menu level.

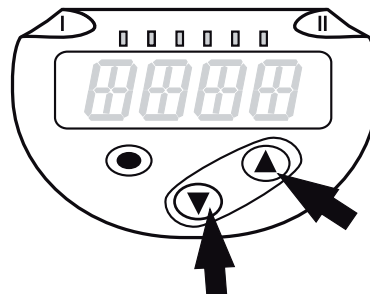


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- Exit menu level

To exit the menu level:

- ▶ Press [▲] + [▼] simultaneously.
- > Menu level 2 changes to level 1 or level 1 changes to display.



## 9.2 Define operating mode (optional)

- ▶ Select [CMPT] and set the operating mode
  - [2] = operating mode 2
  - [3] = operating mode 3

**CMPT**



Description of the operating modes see (→ 4.1)



When using IO-Link, an IODD suitable for the operating mode must be used.



When the operating mode is changed, all parameters are reset to factory setting.

## 9.3 Configure display (optional)

<p>► Select [uni] and set the unit of measurement:</p> <ul style="list-style-type: none"> <li>- [bAr], [mbAr],</li> <li>- [MPa], [kPa],</li> <li>- [PSI],</li> <li>- [inHG]</li> <li>- [iH2O]</li> <li>- [mmWS]</li> </ul>	
<p>► Select [diS] and set the update rate and orientation of the display:</p> <ul style="list-style-type: none"> <li>- [d1]: update of the measured values every 50 ms.</li> <li>- [d2]: update of the measured values every 200 ms.</li> <li>- [d3]: update of the measured values every 600 ms.</li> <li>- [rd1], [rd2], [rd3]: display as with d1, d2, d3; rotated by 180°.</li> <li>- [OFF] = the display is switched off in the operating mode. When one of the buttons is pressed, the current measured value is displayed for 30 s. The LEDs remain active even if the display is deactivated. Error messages are displayed even if the display is deactivated.</li> </ul>	
<div data-bbox="92 936 188 1025"></div> <p>Even with unsteady pressure characteristics [d1] provides optimum readability; corresponding algorithms are stored.</p>	

## 9.4 Set output signals

### 9.4.1 Set output functions

<p>► Select [ou1] and set the switching function:</p> <ul style="list-style-type: none"> <li>- [Hno] = hysteresis function/normally open</li> <li>- [Hnc] = hysteresis function/normally closed</li> <li>- [Fno] = window function/normally open</li> <li>- [Fnc] = window function/normally closed</li> <li>- [OFF] = output off</li> </ul>	
<div data-bbox="92 1518 188 1608"></div> <p>Parameter [OFF] is only available in operating mode 3 ([CMPT] = [3])</p>	
<p>► Select [ou2] and set the switching function:</p> <ul style="list-style-type: none"> <li>- [Hno] = hysteresis function/normally open</li> <li>- [Hnc] = hysteresis function/normally closed</li> <li>- [Fno] = window function/normally open</li> <li>- [Fnc] = window function/normally closed</li> <li>- [I] = current signal 4...20 mA</li> <li>- [U] = voltage signal 0...10 V</li> <li>- [OFF] = output off</li> </ul>	
<div data-bbox="92 2056 188 2145"></div> <p>Parameter [OFF] is only available in operating mode 3 ([CMPT] = [3])</p>	

### 9.4.2 Define switching limits for the hysteresis function

<ul style="list-style-type: none"> <li>▶ [ou1] / [ou2] must be set as [Hno] or [Hnc].</li> <li>▶ Select [SPx] and set the value at which the output switches.</li> </ul>	<div>SP 1</div> <div>SP 2</div>
<ul style="list-style-type: none"> <li>▶ Select [rPx] and set the value at which the output switches off.</li> </ul> <p>rPx is always smaller than SPx. The unit only accepts values which are lower than the value for SPx.</p>	<div>rP 1</div> <div>rP 2</div>

### 9.4.3 Define switching limits for the window function

<ul style="list-style-type: none"> <li>▶ [ou1] / [ou2] must be set as [Fno] or [Fnc].</li> <li>▶ Select [FHx] and set the upper limit.</li> </ul>	<div>FH 1</div> <div>FH 2</div>
<ul style="list-style-type: none"> <li>▶ Select [FLx] and set the lower limit.</li> </ul> <p>FLx is always lower than FHx. The unit only accepts values which are lower than the value for FHx.</p>	<div>FL 1</div> <div>FL 2</div>

### 9.4.4 Scale analogue value

<ul style="list-style-type: none"> <li>▶ Select [ASP2] and set the value at which 4 mA / 0 V is provided.</li> </ul>	<div>ASP 2</div>
<ul style="list-style-type: none"> <li>▶ Select [AEP] and set the value at which 20 mA / 10 V is provided.</li> </ul> <p>Minimum distance between ASP2 and AEP2 = 20 % of the measuring span (scaling factor 5).</p>	<div>AEP 2</div>

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## 9.5 User settings (optional)

### 9.5.1 Set delay time for the switching outputs

<p>[dS1] / [dS2] = switch-on delay for OUT1 / OUT2.  [dr1] / [dr2] = switch-off delay for OUT1 / OUT2.</p> <p>► Select [dS1], [dS2], [dr1] or [dr2] and set a value between 0 and 50 s (at 0 the delay time is not active).</p>	<div>dS 1</div> <div>dr 1</div> <div>dS 2</div> <div>dr 2</div>
---	---

Output function:	A:	B:
[Hno] / [Hnc]	DS	dr

Output function:	A:	B:	C:	D:
[Fno] / [Fnc]	dS	dr	dS	dr

P = system pressure; SP = set point; rP = reset point; HY = hysteresis; FE = window; FH = upper value; FL = lower value.





For this unit the parameters [dSx] and [drx] for the set and reset points are assigned strictly to the VDMA guideline.



### 9.5.2 Set output logic for the switching outputs

<p>► Select [P-n] and set [PnP] or [nPn].</p>	<div>P--n</div>
---	-----------------

### 9.5.3 Set damping for the switching signal


<p>► Select [dAP] and set the damping constant in seconds (<math>\tau</math> value: 63 %); setting range 0.000...4.000 s.</p>	
<p> Damping [dAP] affects the switch point / process data flow (IO-Link communication) and the display.</p>	

### 9.5.4 Set damping for the analogue output



<p>► Select [dAA] and set the damping constant (rise time 10...90 %) in seconds; setting range 0.000...4.000 s.</p>	
<p> Damping [dAA] only influences the analogue output / analogue signal path.</p>	

UK

### 9.5.5 Zero-point calibration

<p>► Select [coF] and set a value between -5 % and 5 % of the final value of the measuring range (if PN2x69 and PN2x99 <math>\pm 5</math> % of the measuring span). The internal measured value "0" is shifted by this value.</p>	
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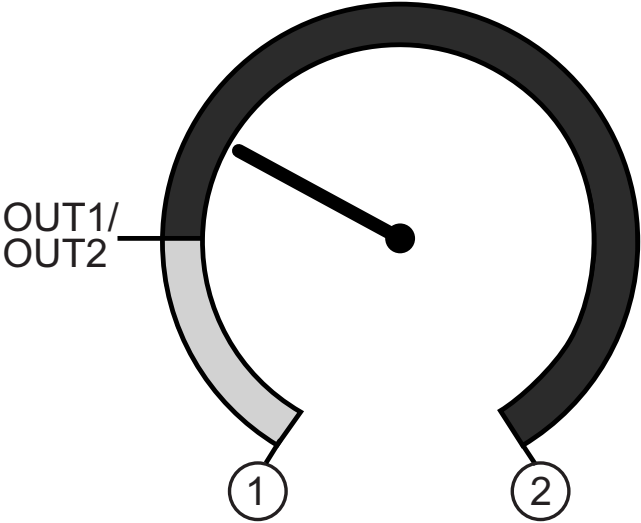
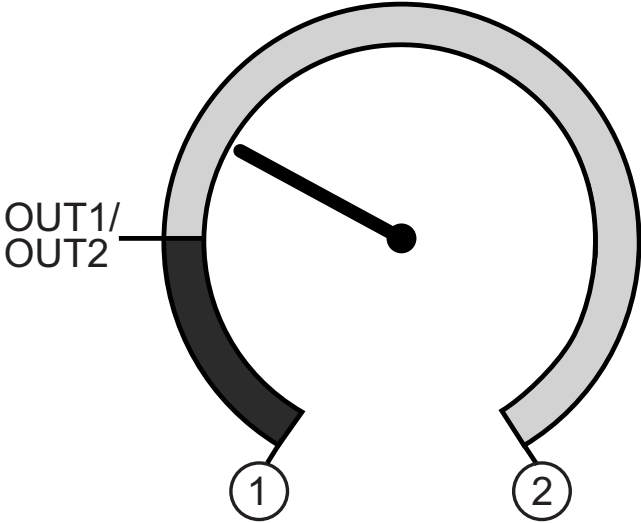
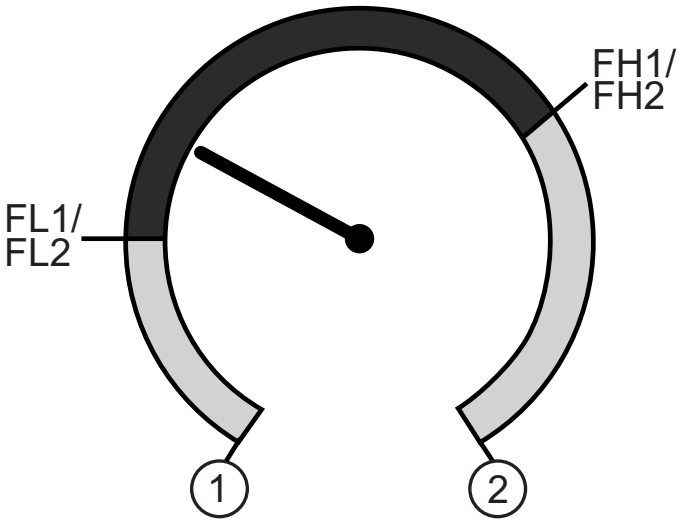
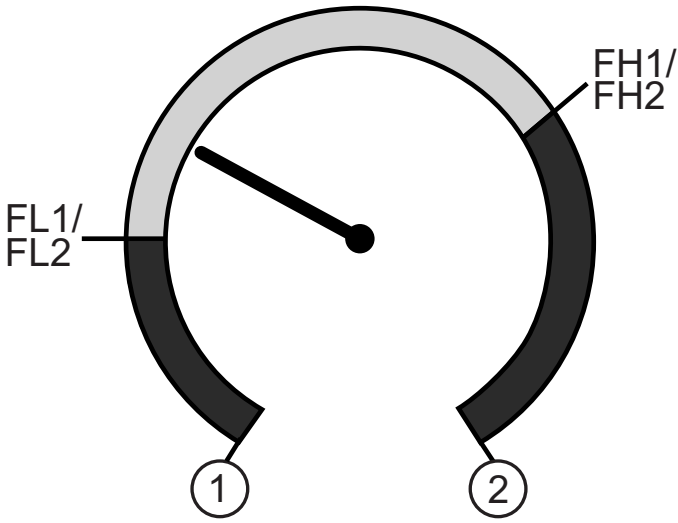


### 9.5.6 Reset all parameters to factory setting

<p>► Select [rES].          ► Press [•].          ► Press [▲] or [▼] and keep pressed until [----] is displayed.          ► Briefly press [•].          It is recommended to note down your own settings before carrying out a reset (→ 12 Factory setting).</p>	
<p> The operating mode [CMPT] is also reset to the factory setting ([CMPT] = [2]).</p>	

## 9.5.7 Set colour change of the display

<p>► Select [coLr] and set the function:</p> <ul style="list-style-type: none"> <li>- [rEd] = display colour red (independent of the measured value).</li> <li>- [GrEn] = display colour green (independent of the measured value).</li> <li>- [r1ou] = display colour red when OUT1 switches.</li> <li>- [G1ou] = display colour green when OUT1 switches.</li> <li>- [r2ou] = Display colour red when OUT2 switches ([ou2] = [Hxx] / [Fxx]).</li> <li>- [G2ou] = Display colour green when OUT2 switches ([ou2] = [Hxx] / [Fxx]).</li> <li>- [r-12] = Display colour red when the measured value is between the limit values of OUT1 and OUT2 ([ou2] = [Hxx] / [Fxx]).</li> <li>- [G-12] = Display colour green when the measured value is between the limits of OUT1 and OUT2 ([ou2] = [Hxx] / [Fxx]).</li> <li>- [r-cF] = Display colour red when the measured value is between the freely definable limits [cFH]* and [cFL]*).</li> <li>- [G-cF] = Display colour green when the measured value is between the freely definable limits [cFH]* and [cFL]*).</li> </ul> <p>*) The parameters [cFH] and [cFL] can only be selected in the menu tree if [r-cF] or [G-cF] has been activated.</p>	<i>c o L r</i>
<p>► Select [cFH] and set the upper limit (only possible if [r-cF] or [G-cF] has been activated).</p> <p>&gt; The setting range corresponds to the measuring range and its minimum limit is [cFL].</p>	<i>c F H</i>
<p>► Select [cFL] and set the lower limit (only possible if [r-cF] or [G-cF] has been activated).</p> <p>&gt; The setting range corresponds to the measuring range and its maximum limit is [cFH].</p>	<i>c F L</i>

9.5.8 Graphical depiction of the colour change of the display

Display colour change for the parameters [r1ou] / [r2ou], mode <b>hysteresis function</b>	Display colour change for the parameters [G1ou] / [G2ou], mode <b>hysteresis function</b>
	
Measured value > switch point OUT1/OUT2; display = red	Measured value > switch point OUT1/OUT2; display = green
Display colour change for the parameters [r1ou] / [r2ou], mode <b>window function</b>	Display colour change for the parameters [G1ou] / [G2ou], mode <b>window function</b>
	
Measured value between FL1/FL2 and FH1/FH2; display = red	Measured value between FL1/FL2 and FH1/FH2; display = green
	Colour change display green
	Colour change display red
1	Initial value of the measuring range
2	Final value of the measuring range



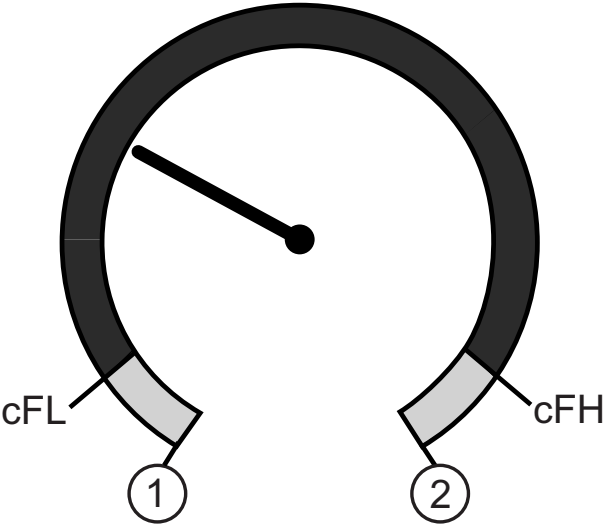
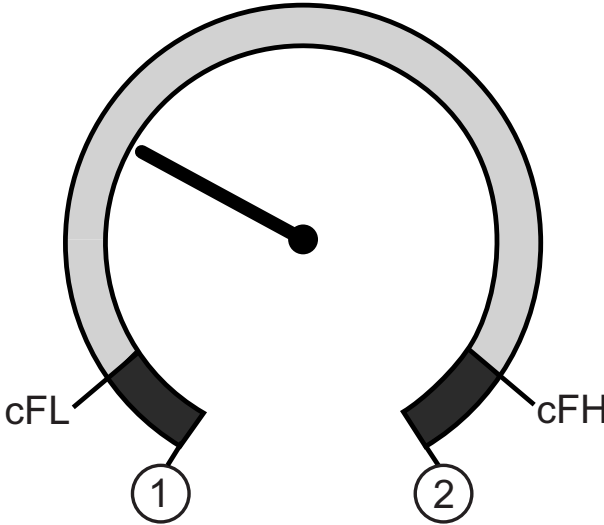
Visualisation [r-12] / [G-12] only possible if [ou2] = switching output.

Display colour change for the parameter <b>[r-12]</b> , mode <b>hysteresis function</b>	Display colour change for the parameter <b>[G-12]</b> , mode <b>hysteresis function</b>
Measured value between OUT1 and OUT2; display = red	Measured value between OUT1 and OUT2; display = green



Display colour change for the parameter <b>[r-12]</b> , mode <b>window function</b>	Display colour change for the parameter <b>[G-12]</b> , mode <b>window function</b>
Measured value outside FL1...FH1 and FL2...FH2; display = red	Measured value outside FL1...FH1 and FL2...FH2; display = green

	Colour change display green
	Colour change display red
1	Initial value of the measuring range
2	Final value of the measuring range
FL1 / FL2	Lower limit window function outputs OUT1 / OUT2
FH1 / FH2	Upper limit window function outputs OUT1 / OUT2



Display colour change with parameter <b>[r-cF]</b> independent of OUT1.	Display colour change with parameter <b>[G-cF]</b> independent of OUT1.
	
Measured value between cFL and cFH; display = red	Measured value between cFL and cFH; display = green

UK


	Colour change display green
	Colour change display red
1	Initial value of the measuring range
2	Final value of the measuring range
cFL	Lower limit (independent of the output function)
cFH	Upper limit (independent of the output function)

## 9.6 Diagnostic functions

### 9.6.1 Read min/max values for the system pressure

<ul style="list-style-type: none"> <li>▶ Select [Hi] or [Lo] and briefly press [•].</li> </ul> [Hi] = maximum value, [Lo] = minimum value. Delete memory: <ul style="list-style-type: none"> <li>▶ Select [Hi] or [Lo].</li> <li>▶ Press [▲] or [▼] and keep pressed until [----] is displayed.</li> <li>▶ Briefly press [•].</li> </ul>	Hi Lo
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## 9.6.2 Read overload processes

<ul style="list-style-type: none"> <li>• HIPC: number of overload processes HIPC counts how often the limit HIPS has been exceeded. The limit must be exceeded for at least 0.5 ms.</li> <li>• HIPS: setting of the threshold for the overload counter.</li> </ul>	
<div data-bbox="114 358 204 448"></div> <p>The parameters HIPC and HIPS are only available via IO-Link communication.</p> <div data-bbox="114 481 204 571"></div> <p>In case of a voltage interruption, the counter events of the last 10 minutes can be lost.</p>	

## 10 Operation

After power on, the unit is in the Run mode (= normal operating mode). It carries out its measurement and evaluation functions and provides output signals according to the set parameters.

Operation indication (→ 7 Operating and display elements).

### 10.1 Read set parameters

- ▶ Press [●].
- ▶ Press [▲] or [▼] until the requested parameter is displayed.
- ▶ Briefly press [●].
- > The unit displays the corresponding parameter value for approx. 30 s; then it changes to the process value display.

### 10.2 Self-diagnostics / fault indications

The unit has many self-diagnostic options.

- It monitors itself automatically during operation.
- Warnings and faults are displayed (even if the display is deactivated), in addition they are available via IO-Link.

Display	Status LED OUT1	Status LED OUT2	Type of fault *)	Fault / warning	Corrective measures
PARA			F	Parameter setting outside the permitted range.	▶ Repeat parameter setting.
none			F	Supply voltage too low.	▶ Check / correct the supply voltage.

Display	Status LED OUT1	Status LED OUT2	Type of fault *)	Fault / warning	Corrective measures
SC flashes	flashes	flashes	F	Excessive current on switching outputs OUT1 and OUT2 **).	► Check switching outputs for short circuit or excessive current; remove the fault.
SC1 flashes	flashes		F	Excessive current at switching output OUT1 **).	► Check switching output OUT1 for short circuit or excessive current; remove the fault.
SC2 flashes		flashes	F	Excessive current at switching output OUT2 **).	► Check switching output OUT2 for short circuit or excessive current; remove the fault.
Loc			W	Parameter setting locked via buttons.	► Unlock buttons (→ 9.1 Parameter setting in general)→ "Locking / unlocking".
C.Loc			W	Parameter setting locked via pushbuttons, parameter setting is active via IO-Link communication (→ 9.1).	► Wait until parameter setting via IO-Link is finished.
S.Loc			W	Setting buttons locked via parameter setting software. Parameter change is rejected (→ 9.1).	► Unlocking only possible via IO-Link interface / parameter setting software.
OL			W	Process value too high (measuring range exceeded).	► Check / reduce system pressure / select unit with corresponding measuring range.
UL			W	Process value too low (value below measuring range).	► Check / increase system pressure / select unit with corresponding measuring range.
Err flashes			F	Internal fault / malfunction.	► Contact the manufacturer.

\*) F = fault, W = warning

\*\*) The output remains deactivated as long as the excessive current / short circuit continues.

# 11 Technical data

## 11.1 Setting ranges



The setting ranges depend on the operating mode (→ 4.1).

### 11.1.1 Setting ranges in operating mode 2

		rP / SP		cFL / cFH		ASP / AEP		$\Delta P$
		Setting range	Min. distance	Setting range	Min. distance	Setting range	Min. distance	
PN2270 PN2670	psi	10...5800	30	0...5800	30	0...5800	1170	10
	bar	1...400	2	0...400	2	0...400	80	0.5
	MPa	0,1...40	0,2	0...40	0.2	0...40	8	0.05
PN2271 PN2671	psi	10...3625	15	0...3625	15	0...3625	730	5
	bar	0.5...250	1.5	0...250	1.5	0...250	50	0.5
	MPa	0.05...25	0.15	0...25	0.15	0...25	5	0.05
PN2292 PN2692	psi	4...1450	6	0...1450	6	0...1450	292	2
	bar	0.2...100	0.6	0...100	0.6	0...100	20	0.2
	MPa	0.02...10	0.06	0...10	0.06	0...10	2	0.02
PN2293 PN2693	psi	-13.5...362.5	1.5	-14.5...362.5	1.5	-14.5...362.5	73	0.5
	bar	-0.95...25	0.15	-1...25	0.15	-1...25	5	0.05
	MPa	-0.095...2.5	0.015	-0.1...2.5	0.015	-0.1...2.5	0.5	0.005
PN2294 PN2694	psi	-14.2...145	0.6	-14.6...145	0.6	-14.6...145	29.2	0.2
	bar	-0.98...10	0.06	-1...10	0.06	-1...10	2	0.02
	MPa	-0.098...1	0.006	-0.1...1	0.006	-0.1...1	0.2	0.002

$\Delta P$  = step increment

		rP / SP		cFL / cFH		ASP / AEP		$\Delta P$
		Setting range	Min. distance	Setting range	Min. distance	Setting range	Min. distance	
PN2296 PN2696	psi	-1.75...36.25	0.15	-1.8...36.25	0.15	-1.8...36.25	7.3	0.05
	bar	-0.12...2.5	0.015	-0.125...2.5	0.015	-0.125...2.5	0,5	0.005
	kPa	-12...250	1.5	-12.5...250	1.5	-12.5...250	50	0.500
PN2297 PN2697	psi	-0.7...14.5	0.06	-0.72...14.5	0.06	-0.72...14.5	2.92	0.02
	mbar	-48...1000	6	-50...1000	6	-50...1000	200	2
	kPa	-4.8...100	0.6	-5...100	0.6	-5...100	20	0.2
	inH2O	-19...401.5	2	-20...401.5	2	-20...401.5	80.5	0.5
PN2299 PN2699	psi	-14.45...14.5	0.15	-14.5...14.5	0.15	-14.5...14.5	5.8	0.05
	mbar	-995...1000	10	-1000...1000	10	-1000...1000	400	5
	kPa	-99.5...100	1	-100...100	1	-100...100	40	0.5
	inH2O	-400...402	4	-402...402	4	-402...402	162	2
	inHg	-29.4...29.5	0.3	-29.5...29.5	0.3	-29.5...29.5	11.9	0.1
PN2298 PN2698	inH2O	-4.8...100.4	0.6	-5...100.4	0.6	-5...100.4	20.2	0.2
	mbar	-12...250	1.5	-12.5...250	1.5	-12.5...250	50	0.5
	mmWS	-120...2550	15	-125...2550	15	-125...2550	510	5
	kPa	-1.2...25	0.15	-1.25...25	0.15	-1.25...25	5	0.05

$\Delta P$  = step increment

### 11.1.2 Setting ranges in operating mode 3

		rP / SP		cFL / cFH		ASP / AEP		$\Delta P$
		Setting range	Min. distance	Setting range	Min. distance	Setting range	Min. distance	
PN2270 PN2670	psi	13...5802	24	0...5802	24	0...5802	1161	1
	bar	0.9...400	1.7	0...400	1.7	0...400	80	0.1
	MPa	0.09...40	0.17	0...40	0.17	0...40	8	0.01
PN2271 PN2671	psi	8...3626	15	0...3626	15	0...3626	726	1
	bar	0.5...250	1.1	0...250	1.1	0...250	50	0.1
	MPa	0.05...25	0.11	0...25	0.11	0...25	5	0.01
PN2292 PN2692	psi	3...1450	6	0...1450	6	0...1450	291	1
	bar	0.2...100	0.5	0...100	0.5	0...100	20	0.1
	MPa	0.02...10	0.05	0...10	0.05	0...10	2	0.01
PN2293 PN2693	psi	-13.7...362.6	1.5	-14.5...362.6	1.5	-14.5...362.6	72.6	0.1
	bar	-0.95...25	0.11	-1...25	0.11	-1...25	5	0.01
	MPa	-0.095...2.5	0.011	-0.1...2.5	0.011	-0.1...2.5	0.5	0.001
PN2294 PN2694	psi	-14.2...145	0.6	-14.5...145	0.6	-14.5...145	29.1	0.1
	bar	-0.98...10	0.05	-1...10	0.05	-1...10	2	0.01
	MPa	-0.098...1	0.005	-0.1...1	0.005	-0.1...1	0.2	0.001
PN2296 PN2696	psi	-1.73...36.26	0.15	-1.81...36.26	0.15	-1.81...36.26	7.26	0.01
	bar	-0.12...2.5	0.011	-0.125...2.5	0.011	-0.125...2.5	0.5	0.001
	kPa	-12...250	1.1	-12.5...250	1.1	-12.5...250	50	0.100

$\Delta P$  = step increment

		rP / SP		cFL / cFH		ASP / AEP		$\Delta P$
		Setting range	Min. distance	Setting range	Min. distance	Setting range	Min. distance	
PN2297 PN2697	psi	-0.69...14.5	0.06	-0.73...14.5	0.06	-0.73...14.5	2.91	0.01
	mbar	-48...1000	5	-50...1000	5	-50...1000	200	1
	kPa	-4.8...100	0.5	-5...100	0.5	-5...100	20	0.1
	inH <sub>2</sub> O	-19.2...401.5	1.7	-20.1...401.5	1.7	-20.1...401.5	80.3	0.1
PN2299 PN2699	psi	-14.44...14.5	0.12	-14.5...14.5	0.12	-14.5...14.5	5.8	0.01
	mbar	-996...1000	9	-1000...1000	9	-1000...1000	400	1
	kPa	-99.6...100	0.9	-100...100	0.9	-100...100	40	0.1
	inH <sub>2</sub> O	-400...401	4	-401...401	4	-401...401	161	1
	inHg	-29.4...29.5	0.3	-29.5...29.5	0.3	-29.5...29.5	11.9	0.1
PN2298 PN2698	inH <sub>2</sub> O	-4.8...100.4	0.5	-5...100.4	0.5	-5...100.4	20.1	0.1
	mbar	-12...250	1.1	-12.5...250	1.1	-12.5...250	50	0.1
	mmWS	-122...2550	11	-127...2550	11	-127...2549	510	1
	kPa	-1.2...25	0.11	-1.25...25	0.11	-1.25...25	5	0.01

$\Delta P$  = step increment

## 12 Factory setting

	Werkseinstellung	Benutzer-Einstellung
SP1	25 % MEW*	
rP1	23 % MEW*	
ou1	Hno	
ou2	I	
SP2	75 % MEW*	
rP2	73 % MEW*	
ASP2	0 (PN2x99: -14.5 psi)	
AEP2	100% MEW*	
coF	0	
dSx	0.0	
drx	0.0	
P-n	PnP	
dAP	0.06	
dAA	0.1	
diS	d2	
uni	psi / inH2O	
coLr	rEd	
cFH	MEW	
cFL	MAW	
HIPS**	MEW	
CMPT	2	

(MEW) final value of the measuring range, MAW = initial value of the measuring range  
 \* = The indicated percentage of the final value of the measuring range (MEW) of the corresponding sensor is set in psi. (for PN2x99 the percentage of the measuring span).

\*\* = HIPS is only available via IO-Link communication



