ifm electronic

CE

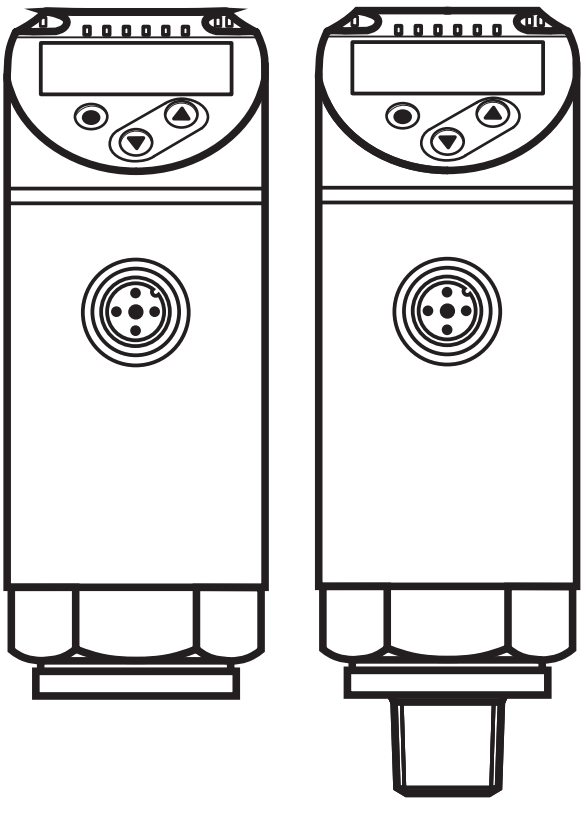
Operating instructions
Electronic pressure sensor

efector500

**PN22xx**

**PN26xx**

UK



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# 1 Preliminary note

## 1.1 Symbols used

▶ Instructions

> 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

- Please read this document prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.
- Check the compatibility of the product materials with the media to be measured in all applications.
- Correct condition of the device for the operating time can only be guaranteed if the device is only used for media to which the wetted materials are sufficiently resistant → 3.1 Applications.
- If the devices are used in gas applications with pressures > 362 psi (25 bar) the notes in chapter 3.1 for devices with the marking **), must be absolutely observed!

The responsibility whether the measurement device is suitable for the respective application lies with the operator. The manufacturer assumes no liability for consequences of misuse by the operator. Improper installation and use of the devices result in a loss of the warranty claims.

# 3 Functions and features

The device monitors the system pressure of machines and installations.

## 3.1 Applications

Type of pressure: Relative pressure

| Order number | Measuring range | | Pressure resistance (max. permissible pressure) *) | | Bursting pressure | |
|---|---|---|---|---|---|---|
| | psi | bar | psi | bar | psi | bar |
| Pressure sensors with ¼ - 18 NPT internal thread | | | | | | |
| PN2270 | 0…5800 | 0...400 | 11580 | 800 | 24650 | 1700 |
| PN2271 | 0…3625 | 0...250 | 7250 | 500 | 17400 | 1200 |
| PN2292** | 0…1450 | 0...100 | 4350 | 300 | 9400 | 650 |
| PN2293** | -14.5…362.5 | -1...25 | 2175 | 150 | 5075 | 350 |
| PN2294** | -14.6…145 | -1...10 | 1087 | 75 | 2175 | 150 |
| PN2296 | -1.8…36.25 | -0.125...2.5 | 290 | 20 | 725 | 50 |
| | psi | mbar | psi | mbar | psi | mbar |
| PN2299 | -14.5...14.5 | -1000...1000 | 145 | 10000 | 450 | 30000 |
| PN2297 | -0.72…14.5 | -50...1000 | 145 | 10000 | 450 | 30000 |
| PN2298 | -- | -12.5...250 | -- | 10000 | -- | 30000 |
| Pressure sensors with ¼ - 18 NPT external thread | | | | | | |
| | psi | bar | psi | bar | psi | bar |
| PN2670 | 0…5800 | 0...400 | 11580 | 800 | 24650 | 1700 |
| PN2671 | 0…3625 | 0...250 | 7250 | 500 | 17400 | 1200 |
| PN2692** | 0…1450 | 0...100 | 4350 | 300 | 9400 | 650 |
| PN2693** | -14.5…362.5 | -1...25 | 2175 | 150 | 5075 | 350 |
| PN2694** | -14.6…145 | -1...10 | 1087 | 75 | 2175 | 150 |
| PN2696 | -1.8…36.25 | -1.25...2.5 | 290 | 20 | 725 | 50 |
| | psi | mbar | psi | mbar | psi | mbar |
| PN2699 | -14.5...14.5 | -1000...1000 | 145 | 10000 | 450 | 30000 |
| PN2697 | -0.72…14.5 | -50...1000 | 145 | 10000 | 450 | 30000 |
| PN2698 | | -12.5...250 | -- | 10000 | -- | 30000 |

*) With static overload pressure or max. 100 million pressure cycles.

**) Use devices with a measuring range ≥ 3625 psi (250 bar) for gas applications > 362 psi (25 bar)!

MPa = (measured value in bar) ÷ 10
kPa = (measured value in bar) x 100

UK

Avoid static and dynamic overpressure exceeding the specified overload pressure 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. With a nominal pressure range ≤ 4,35 psi (300 mbar) observe the specifications in the data sheet!

Pressure Equipment Directive (PED):
The units comply with the Pressure Equipment Directive and are designed and manufactured for group 2 fluids in accordance with the sound engineering practice.
Use of group 1 fluids on request!

# 4 Function

- The unit displays the current system pressure.
- It generates output signals according to the operating mode and the parameter setting.
- It moreover provides the process data via IO-Link.
- The unit is laid out 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 → 4.4.

## 4.1 Communication, parameter setting, evaluation

| | |
|---|---|
| **OUT1 (pin 4)** | • Switching signal for system pressure limit value<br>• Communication via IO-Link |
| **OUT2 (pin 2)** | • Switching signal for system pressure limit value<br>• Analogue signal 4...20 mA / 0...10 V |

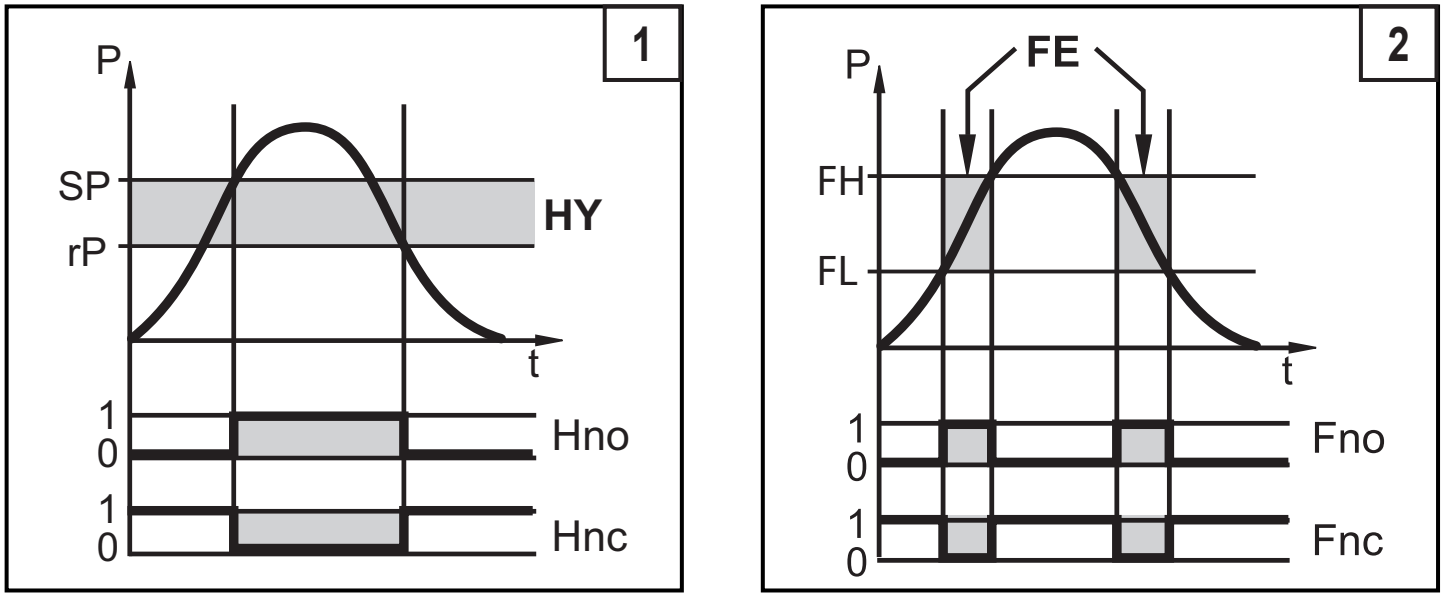
## 4.2 Switching function

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 final value of the measuring span.

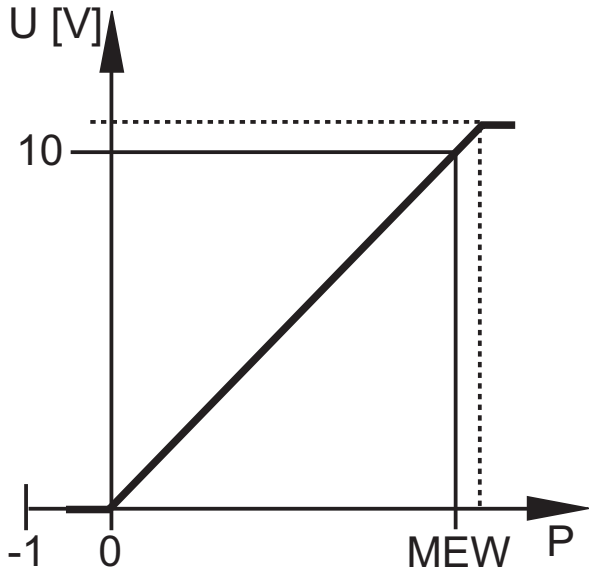
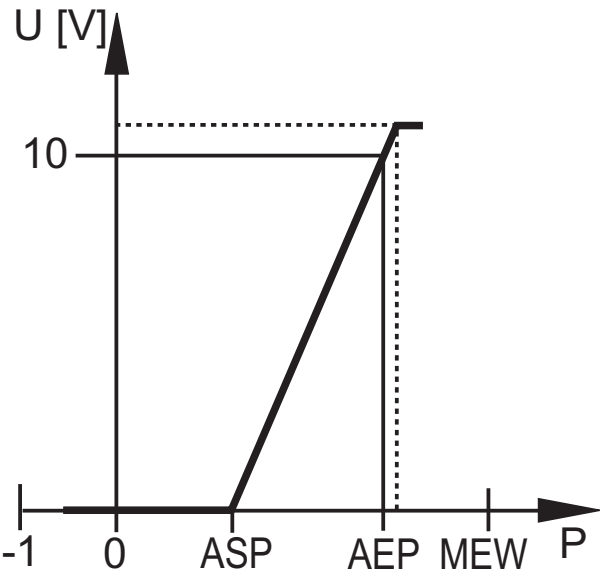
## 4.3 Analogue function

OUT2 is an analogue output:

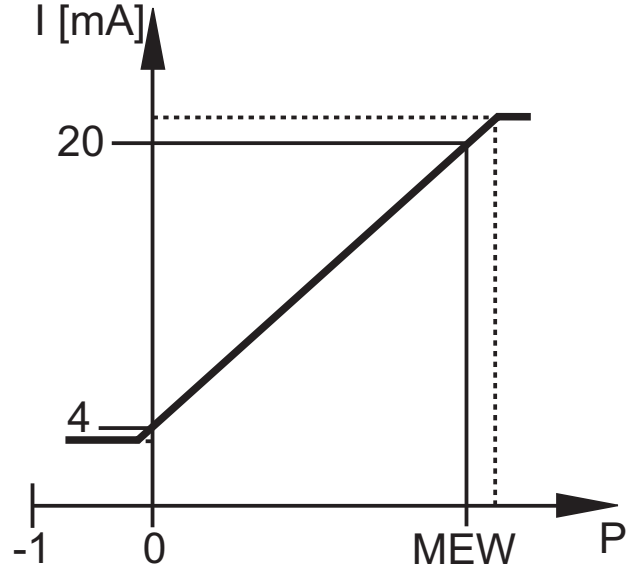
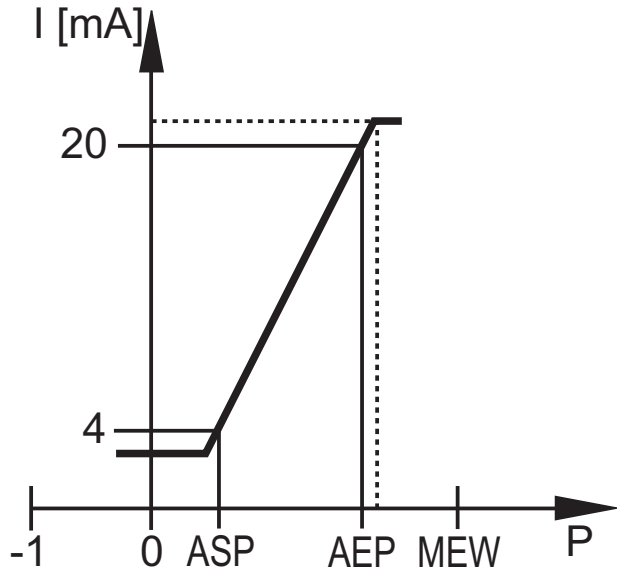
- [ou2] defines whether the set measuring range is provided as 4...20 mA ([ou2]= [I]) or as 0...10 V ([ou2] = [U]).
- Analogue start point [ASP2] determines at which measured value the output signal is 4 mA or 0 V.
- Analogue end point [AEP2] determines at which measured value the output signal is 20 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 = System pressure<br>VMR = Final value of the measuring range<br>ASP = Analogue start point [ASP2]<br>AEP= Analogue end point [AEP2] | |
| In the measuring range of the respective unit the output signal is between 0 and 10 V.<br>It is also indicated:<br>• System pressure above [AEP2]: 10...10.3 V<br>• Fault indication according to Namur: 11 V | |

**Current output 4...20 mA**

| Factory setting | Measuring range scaled |
|---|---|
|  |  |





P = System pressure
VMR = Final value of the measuring range
ASP = Analogue start point [ASP2]
AEP= Analogue end point [AEP2]

In the measuring range, the output signal is between 4 and 20 mA.

It is also indicated:
- System pressure above [AEP2]: 20...20.5 mA
- System pressure below [ASP2]: 4...3.8 mA
- Fault indication according to Namur: 21.5 mA.

## 4.4 IO-Link

### General information

This unit 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.

Further information about IO-Link at www.ifm.com → "more product information" → "Specials" → "IO-Link".

### Device-specific information

You can find the IODDs necessary for the configuration of the IO-Link unit and detailed information about process data structure, diagnostic information and parameter addresses at www.ifm.com → "more product information" → "Specials" → "IO-Link".

### Parameter setting tools

You will find all necessary information about the required IO-Link hardware and software at www.ifm.com → "more product information" → "Specials" → "IO-Link".

## 5 Installation

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

- ▶ Insert the unit in a ¼ - 18 NPT process connection.
- ▶ Tighten firmly. Recommended tightening torque: ≤ 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.

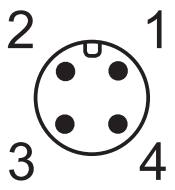
The national and international regulations for the installation of electrical equipment must be adhered to.

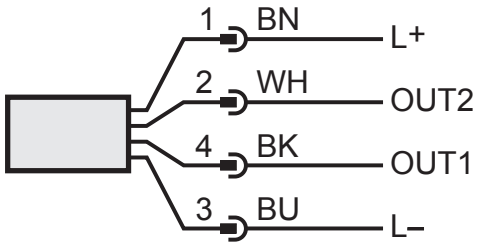
Voltage supply according to EN 50178, SELV, PELV.

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



| Core colours | |
|---|---|
| BK | black |
| BN | brown |
| BU | blue |
| WH | white |



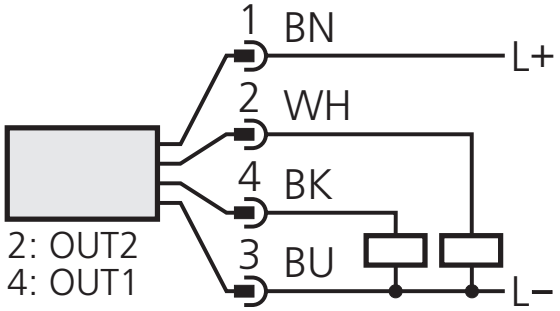

OUT1: switching output or IO-Link

OUT2: switching outputs or analogue output

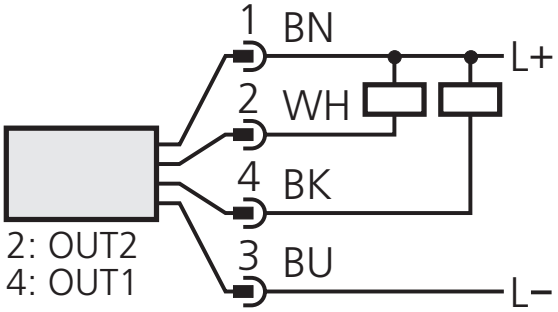
Colours to DIN EN 60947-5-2

**Example circuit**

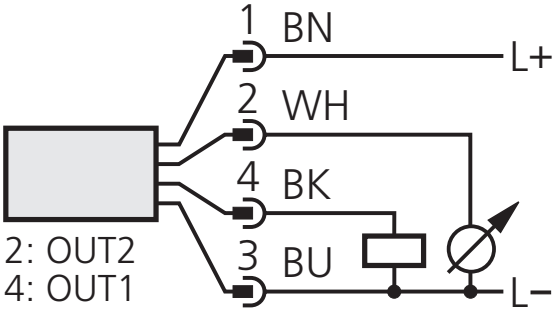
2 x positive switching



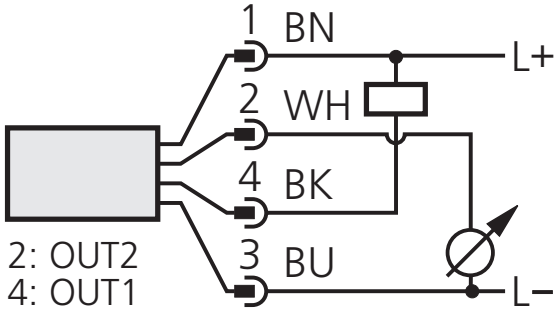

2 x negative switching



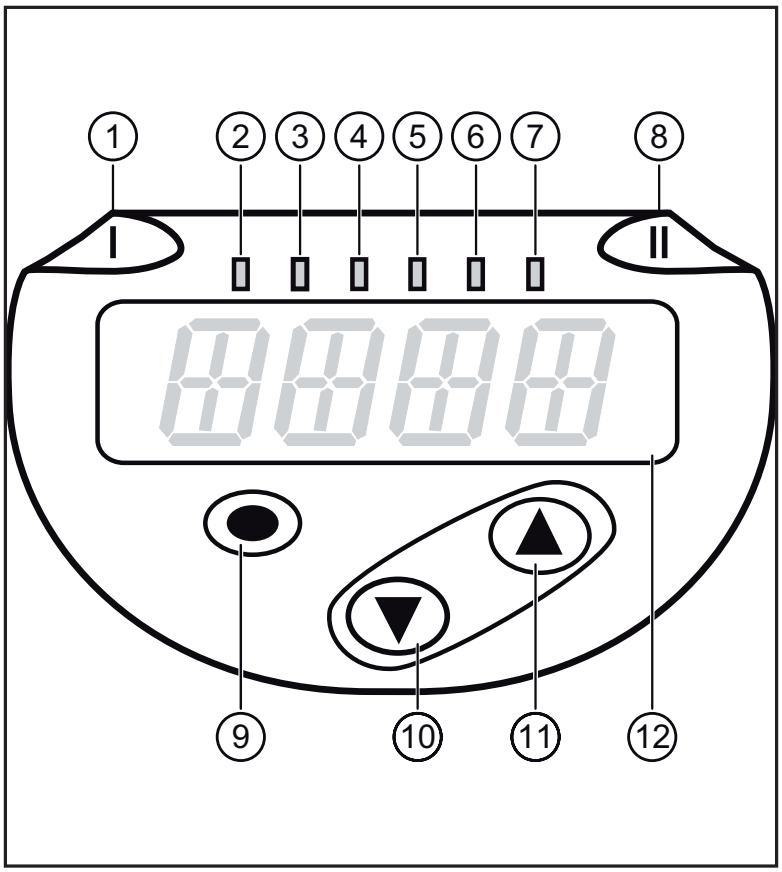

1 x positive switching / 1 x analogue




1 x negative switching / 1 x analogue



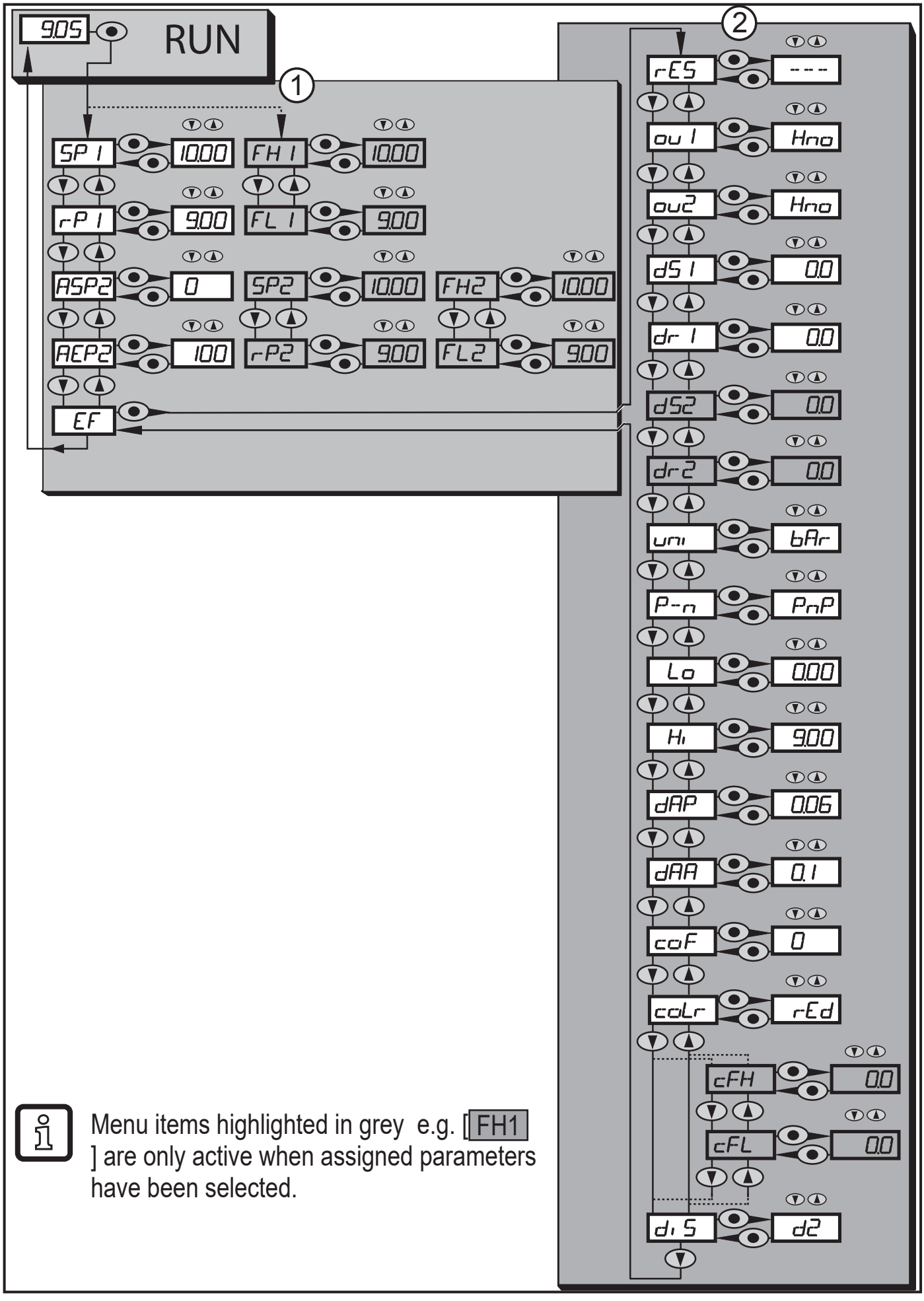
# 7 Operating and display elements




| 1 to 8: indicator LEDs | |
|---|---|
| LED 1 | Switching status OUT1 (lights when output 1 is switched). |
| LED 8 | Switching status OUT2 (lights when output 2 is switched). |
| LEDs<br>2 - 7 | System pressure in the indicated unit of measurement<br>(pin connection 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; incremental by pressing once). | |
| **12: Alphanumeric display, 4 digits** | |
| - Display of the current system pressure.<br>- Indication of the parameters and parameter values. | |

# 8 Menu

## 8.1 Menu structure: main menu




Menu items highlighted in grey e.g. [ FH1 ] are only active when assigned parameters have been selected.

UK

## 8.2 Explanation of the menu

### 8.2.1 Explanation of the menu level 1

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

### 8.2.2 Explanation of the menu level 2

| | |
|---|---|
| rES | Restore factory setting. |
| ou1 | Output function for OUT1:<br>• Switching signal for the pressure limit values: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc]. |
| ou2 | Output function for OUT2:<br>• Switching signal for the pressure limit values: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc].<br>• Analogue signal for the current system pressure: 4...20 mA [I] or 0...10 V [U]. |
| dS1 / dS2 | Switching delay for OUT1 / OUT2. |
| dr1 / dr2 | Switch-off delay for OUT1 / OUT2. |
| uni | Standard unit of measurement for system pressure (display):<br>[PSI] / [bAr] / [mbar] / [MPA] / [kPA] / [inHG] / [iH2O] / [mmWS] . |
| 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. |
| dAA | Damping of the analogue output.<br>Prerequisite: 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. |

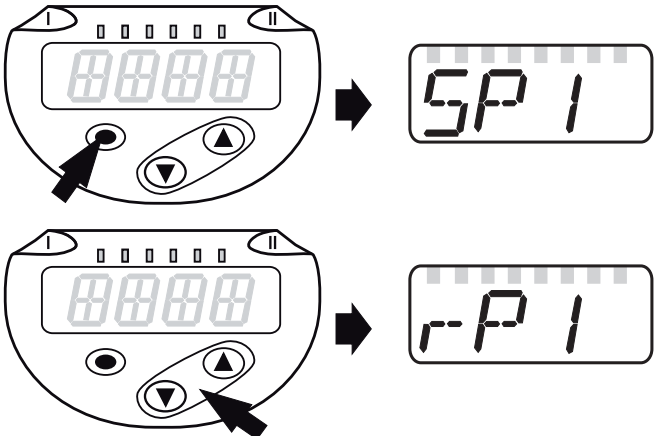
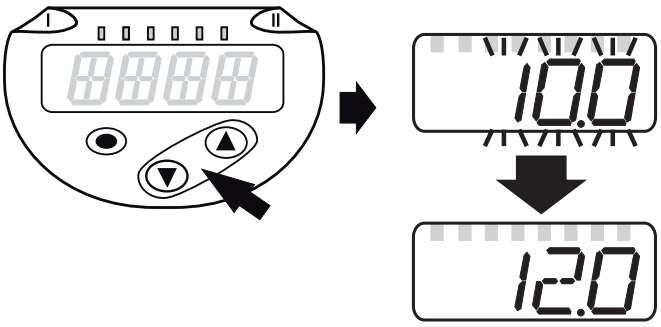
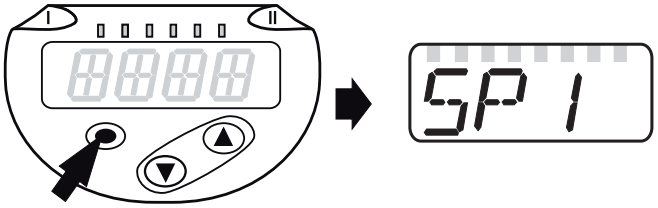
# 9 Parameter setting

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 | **Select parameter**<br>▶ Press [●] to get to the menu.<br>▶ Press [▲] or [▼] until the requested parameter is displayed. |  |
| 2 | **Set parameter value**<br>▶ Press [●] to edit the selected parameter.<br>▶ Press [▲] or [▼] for min. 1 s.<br>> After 1 s: setting value is changed: incrementally by pressing the button once or continuously by keeping the button pressed. |  |
| | Numerical values are incremented continuously with [▲] or decremented with [▼]. | |
| 3 | **Acknowledge parameter value**<br>▶ Briefly press [●].<br>> The parameter is displayed again. The new setting value is saved. |  |

**Set other parameters**

▶ Press [▲] or [▼] until the requested parameter is displayed.

**Finish parameter setting**

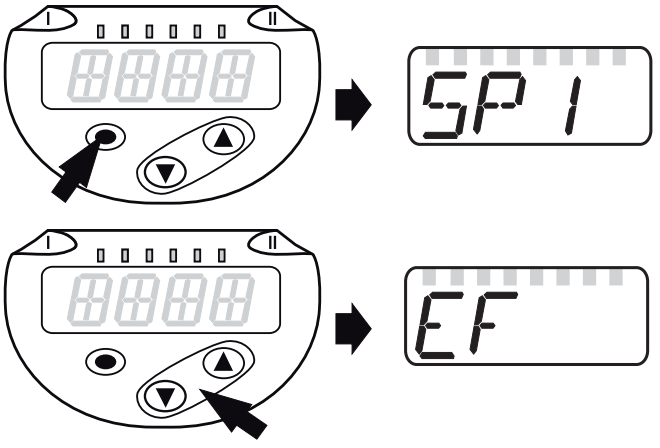
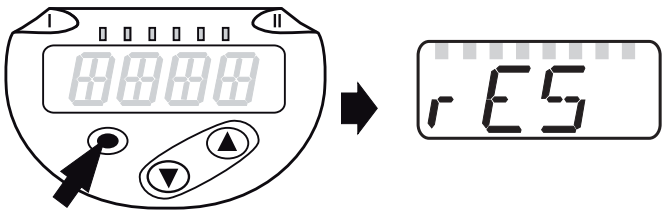
▶ Press [▲] or [▼] several times until the current measured value is displayed or wait for 30 s.

> The unit returns to the process value display.

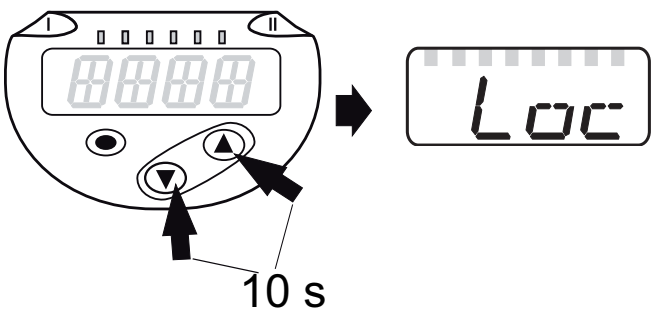
If [C.Loc] is displayed when an attempt is made to modify a parameter value, a parameter setting process is active via the IO-Link communication (temporary locking).

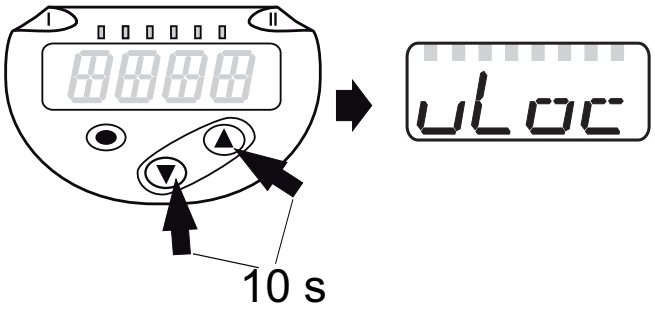
If [S.Loc] is displayed, the sensor is permanently locked via software. This locking can only be removed with a parameter setting software.

- Change from menu level 1 to menu level 2:

| | |
|---|---|
| ▶ Press [●] to get to the menu.<br>▶ Press [▲] [▼]until [EF] is displayed. |  |
| ▶ Press [●].<br>> The first parameter of the submenu is displayed (here: [rES]). |  |

- Locking / unlocking
  The unit can be locked electronically to prevent unintentional settings.

| | |
|---|---|
| ▶ Make sure that the unit is in the normal operating mode.<br>▶ Press [▲] + [▼] simultaneously for 10 s.<br>> [Loc] is displayed. |  |
| During operation: [Loc] is briefly displayed if you try to change parameter values. | |

| | |
|---|---|
| For unlocking:<br>▶ Make sure that the unit is in the normal operating mode.<br>▶ Press [▲] + [▼] simultaneously for 10 s.<br>> [uLoc] is displayed. |  |

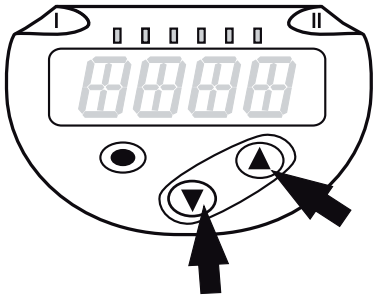
On delivery: not locked.

- Timeout:

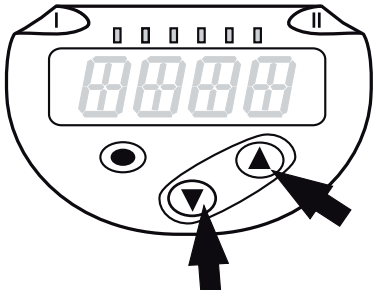
| |
|---|
| If no button is pressed for 30 s during parameter setting, the unit returns to the operating mode with unchanged values. |



- Exit a parameter without adopting the settings

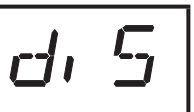
| | |
|---|---|
| To exit a parameter without adopting the settings:<br>▶ Press [▲] + [▼] simultaneously.<br>> Return to the menu level. |  |

- Leaving the menu level

| | |
|---|---|
| To leave the menu level:<br>▶ Press [▲] + [▼] simultaneously.<br>> Menu level 2 changes to level 1<br>or<br>level 1 changes to display. |  |

## 9.2 Configure display (optional)

| | |
|---|---|
| ▶ Select [Uni] and set the unit of measurement:<br>- [PSI],<br>- [bAr], [mbAr],<br>- [MPA], [kPA],<br>- [inHG],<br>- [iH2O],<br>- [mmWS] | Uni |
| The selectable units of measurement depend on the respective unit. | |

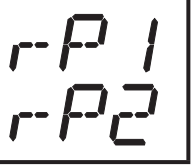
| | |
|---|---|
| ▶ Select [diS] and set the update rate and orientation of the display:<br>- [d1]: update of the measured values every 50 ms.<br>- [d2]: update of the measured values every 200 ms.<br>- [d3]: update of the measured values every 600 ms.<br>- [rd1], [rd2], [rd3]: display as for d1, d2, d3; rotated by 180°.<br>- [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. |  |
| Even with unsteady pressure characteristics [d1] provides optimum readability; the corresponding algorithms are stored. | |

## 9.3 Set output signals

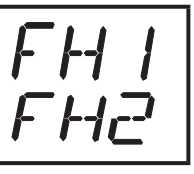
### 9.3.1 Set output functions

| | |
|---|---|
| ▶ Select [ou1] and set the switching function:<br>- [Hno] = hysteresis function/NO,<br>- [Hnc] = hysteresis function/NC,<br>- [Fno] = window function/NO,<br>- [Fnc] = window function/NC. | |
| ▶ Select [OU2 ] and set the analogue function:<br>- [Hno] = hysteresis function/NO,<br>- [Hnc] = hysteresis function/NC,<br>- [Fno] = window function/NO,<br>- [Fnc] = window function/NC.<br>- [I] = current signal 4...20 mA,<br>- [U] = voltage signal 0...10 V. | |

### 9.3.2 Define switching limits for the hysteresis function

| | |
|---|---|
| ▶ [ou1] / [ou2] must be set as [Hno] or [Hnc].<br>▶ Select [SPx] and set the value at which the output is set. | |
| ▶ Select [rPx] and set the value at which the output resets.<br>[rPx] is always smaller than [SPx]. The unit only accepts values which are lower than the value for [SPx]. |  |

### 9.3.3 Define switching limits for the window function

| | |
|---|---|
| ▶ [ou1] /[ou2] must be set as [Fno] or [Fnc].<br>▶ Select [FHx] and set the upper limit value. |  |

| | |
|---|---|
| ▶ Select [FLx] and set the lower limit value.<br>[FLx] is always lower than [FHx]. The unit only accepts values which are lower than the value for [FHx]. | FL1<br>FL2 |

### 9.3.4 Scaling of the analogue value

| | |
|---|---|
| ▶ Select [ASP2] and set the value at which 4 mA / 0 V is provided. | ASP2 |
| ▶ Select [AEP2] and set the value at which 20 mA / 10 V is provided.<br>Minimum distance between [ASP2] and [AEP2] = 20 % of the measuring span (scaling factor 5). | AEP2 |

UK

## 9.4 User settings (optional)

### 9.4.1 Set delay for the switching outputs

| | |
|---|---|
| [dS1] / [dS2] = switching delay for OUT1 / OUT2.<br>[dr1] / [dr2] = reset delay for OUT1 / OUT2.<br>▶ Select [dS1], [dS2], [dr1] or [dr2] and set a value between 0 and 50 s (at 0 the delay time is not active). | dS1<br>dr1<br>dS2<br>dr2 |
| For this unit the parameters [dSx] and [drx] for the set and reset points are designed strictly to the VDMA guideline. | |

### 9.4.2 Set output logic for the switching outputs

| | |
|---|---|
| ▶ Select [P-n] and set [PnP] or [nPn]. | P-n |

### 9.4.3 Set damping for the switching signal

| | |
|---|---|
| ▶ Select [dAP] and set the damping constant in seconds (value T: 63 %); setting range 0.000...4.000 s. | dAP |
| Damping affects [dAP] the switch point / process data flow (IO-Link communication) and the display. | |

### 9.4.4 Damping for analogue output

| | |
|---|---|
| ▶ Select [dAA] and set the damping constant (rise time 10...90 %) in seconds; setting range 0.000...4.000 s. | dAA |
| Damping [dAA] only affects the analogue output / analogue signal path. | |

### 9.4.5 Zero-point calibration

| | |
|---|---|
| ▶ Select [coF] and set a value between -5 % and 5 % of the final value of the measuring range (if PN2x69 and PN2x99 ±5 % of the measuring span). The internal measured value "0" is shifted by this value. | coF |

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

| | |
|---|---|
| ▶ Select [HI] or [Lo] and briefly press [●].<br>[HI] = maximum value, [Lo] = minimum value.<br>Delete memory:<br>▶ Select [HI] or [Lo].<br>▶ Press and hold [▲] or [▼] until [----] is displayed.<br>▶ Briefly press [●]. | |

### 9.4.7 Reset all parameters to factory setting

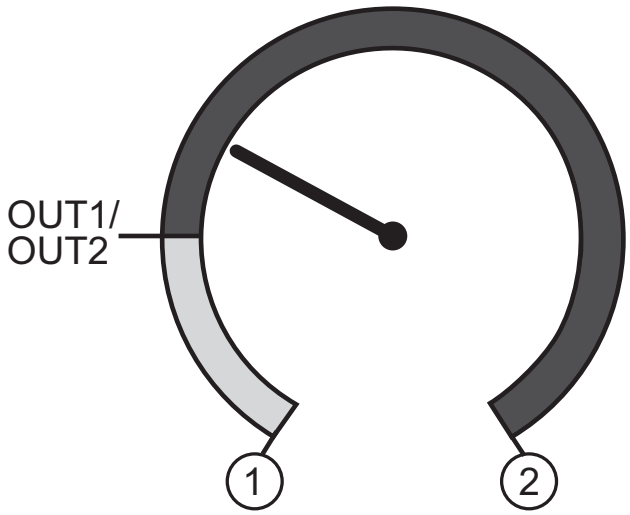
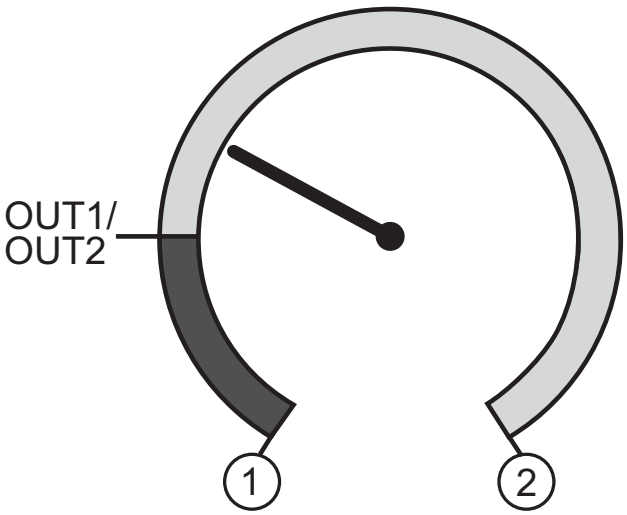
| | |
|---|---|
| ▶ Select [rES].<br>▶ Press [●].<br>▶ Press and hold [▲] or [▼] until [----] is displayed.<br>▶ Briefly press [●].<br>We recommend noting down your own settings before carrying out a reset (→ 12 Factory setting). | |

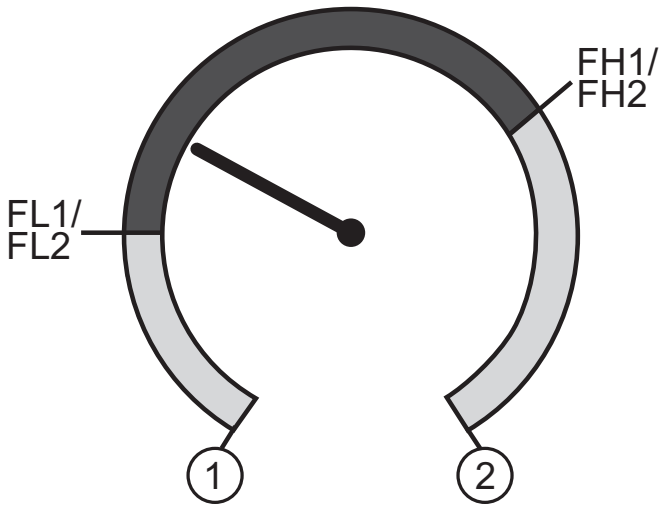
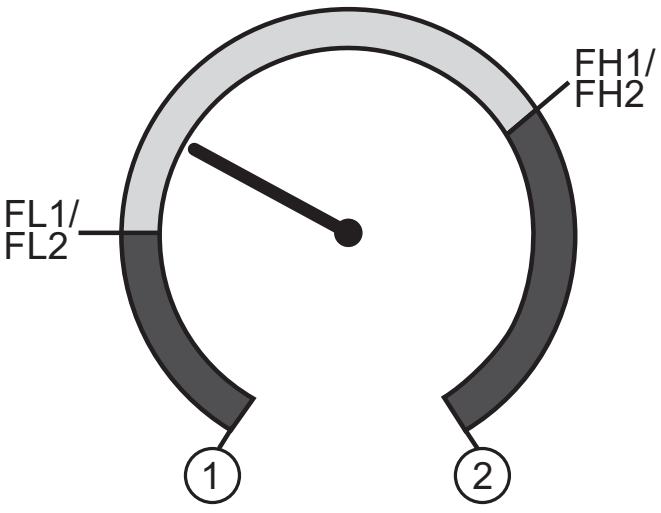
### 9.4.8 Set colour change of the display

| | |
|---|---|
| ▶ Select [coLr] and set the function:<br>- [rEd] = display colour red (independent of the measured value).<br>- [GrEn] = display colour green (independent of the measured value).<br>- [r1ou] = display colour red when OUT1 switches.<br>- [G1ou] = display colour green when OUT1 switches.<br>- [r2ou] = display colour red when OUT2 switches ([ou2] = [Hxx] / [Fxx]).<br>- [G2ou] = display colour green when OUT2 switches ([ou2] = [Hxx] / [Fxx]).<br>- [r-12] = display colour red when the measured value is between the limit values of OUT1 and OUT2 ([ou2] = [Hxx] / [Fxx]).<br>- [G-12] = display colour green when the measured value is between the limit values of OUT1 and OUT2 ([ou2] = [Hxx] / [Fxx]).<br>- [r-cF] = display colour red when the measured value is between the freely definable limit values [cFH]*) and [cFL]*).<br>- [G-cF] = display colour green when the measured value is between the freely definable limit values [cFH]*) und [cFL]*)<br>*) The parameters [cFL] and [cFH ] can only be selected in the menu tree when [r-cF] or [G-cF] were activated. | |
| ▶ Select [cFH] and set the upper limit value.<br>(only possible when [r-cF] or [G-cF] were activated).<br>> The setting range corresponds to the measuring range and its minimum limit is [cFL]. | |

| | |
|---|---|
| ▶ Select [cFL] and set the lower limit value (only possible when [r-cF] or [G-cF] were activated).<br>> The setting range corresponds to the measuring range and its maximum limit is [cFH]. | cFL |

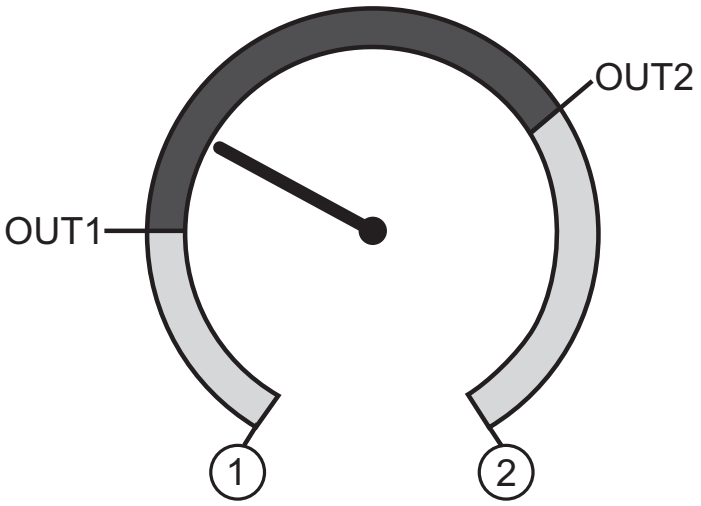
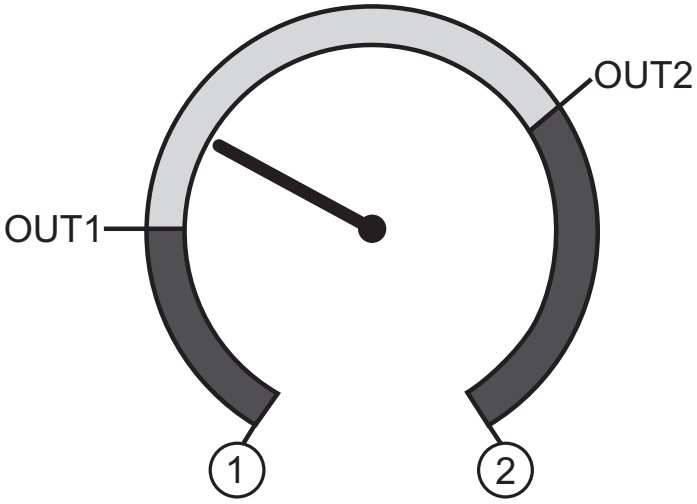
## 9.4.9 Graphical depiction of the colour change of the display

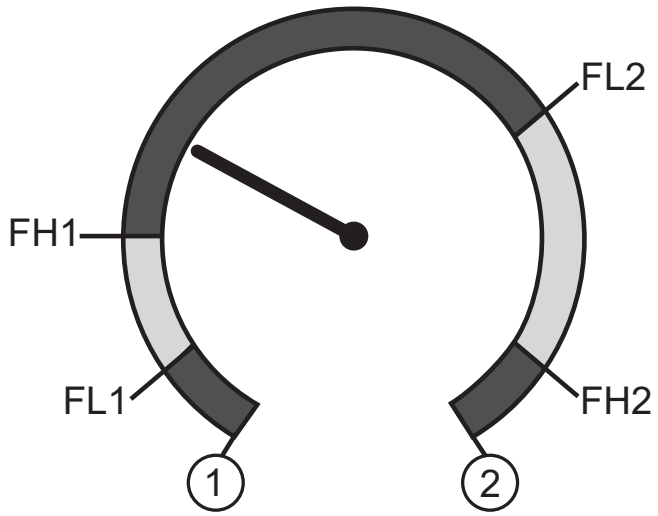
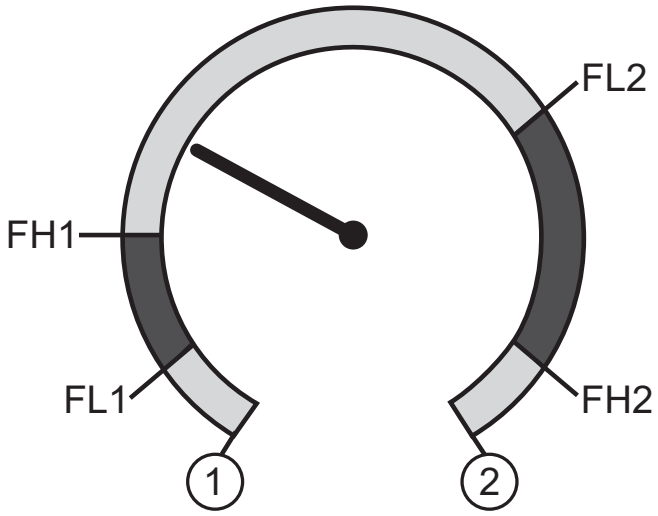
| Display colour change for the parameters **[r1ou]** / **[r2ou]**, mode **hysteresis function** | Display colour change for the parameters **[G1ou]** / **[G2ou]**, mode **hysteresis function** |
|---|---|
|  |  |
| Measured value > switch point OUT1/OUT2; Display = red | Measured value > switch point OUT1/OUT2; Display = green |

| Display colour change for the parameters **[r1ou]** / **[r2ou]**, mode **window function** | Display colour change for the parameters **[G1ou]** / **[G2ou]**, mode **window function** |
|---|---|
|  |  |
| Measured value between FL1/FL2 and FH1/FH2; Display = red | Measured value between FL1/FL2 and FH1/FH2; Display = green |

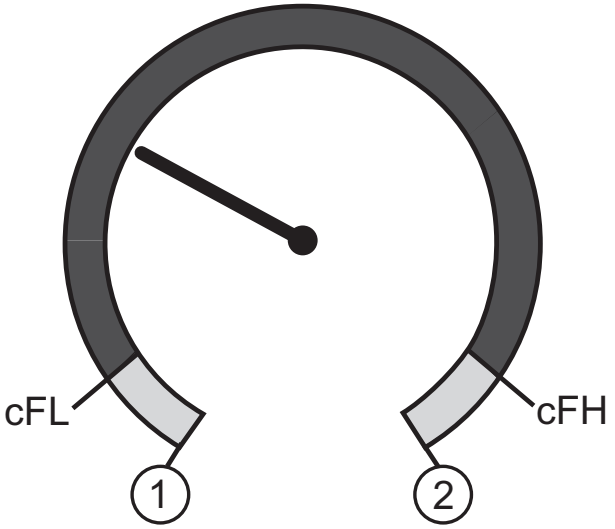
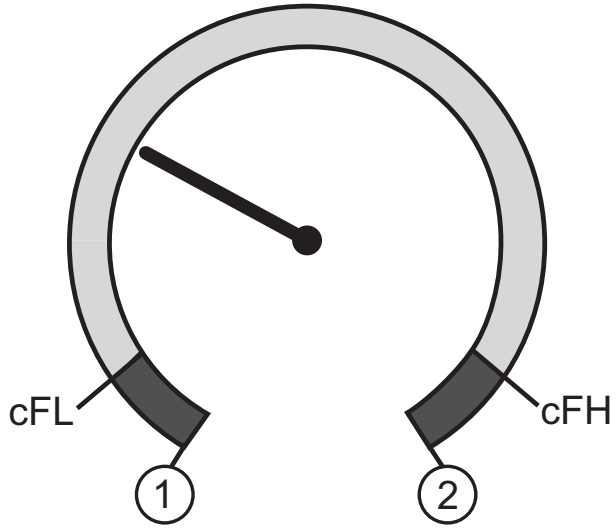
| | |
|---|---|
| | Colour change display green |
| | Colour change display red |
| 1 | Initial value of the measuring range |
| 2 | Final value of the measuring range |

Representation [r-12] / [G-12] only possible when [ou2] = switching output.

| Display colour change for the parameters **[r-12],** mode **hysteresis function** | Display colour change for the parameters **[G-12]**, mode **hysteresis function** |
|---|---|
|  |  |
| Measured value between OUT1 and OUT2; Display = red | Measured value between OUT1 and OUT2; Display = green |

| Display colour change for the parameters **[r-12],** mode **window function** | Display colour change for the parameters **[G-12]**, mode **window function** |
|---|---|
|  |  |
| 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 value window function outputs OUT1 / OUT2 |
| FH1 / FH2 | Upper limit value window function outputs OUT1 / OUT2 |

| Display colour change with parameter **[r-cF]** independent of OUT1. | Display colour change with parameter **[G-cF]** independent of OUT1. |
|---|---|
|  |  |
| Measured value between cFL and cFH; Display = red | Measured value between cFL and cFH; Display = green |



| | |
|---|---|
| | 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 value (independent of the output function) |
| cFH | Upper limit value (independent of the output function) |

# 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-diagnosis / error 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 the parameter setting software.

| Display | Status LED OUT1 | Status LED OUT2 | Type of fault *) | Fault / warning | Corrective measures |
|---|---|---|---|---|---|
| none | | | F | Supply voltage too low. | ▶ Check / correct the supply voltage. |
| SC flashes | flashes | flashes | F | Excessive current at 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 pushbuttons. | ▶ 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 software. Parameter change is rejected → 9.1. | ▶ Unlocking only possible via IO-Link interface / parameter setting software. |

| Display | Status LED OUT1 | Status LED OUT2 | Type of fault *) | Fault / warning | Corrective measures |
|---|---|---|---|---|---|
| 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 and scale drawing

## 11.1 Setting ranges

| | | SP | | rP | | ASP2 | | AEP2 | | cFH | | cFL | | ΔP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | min | max | min | max | min | max | min | max | min | max | min | max | |
| PN2270 PN2670 | psi | 40 | 5800 | 10 | 5780 | 0 | 4640 | 1160 | 5800 | 20 | 5800 | 0 | 5780 | 10 |
| | bar | 2.5 | 400 | 1 | 398.5 | 0 | 320 | 80 | 400 | 1.5 | 400 | 0 | 398.5 | 0.5 |
| | MPa | 0.25 | 40 | 0.1 | 39.85 | 0 | 32 | 8 | 40 | 0.15 | 40 | 0.0 | 39.85 | 0.05 |
| PN2271 PN2671 | psi | 25 | 3625 | 10 | 3610 | 0 | 2900 | 725 | 3625 | 15 | 3625 | 0 | 3610 | 5 |
| | bar | 1.5 | 250 | 0.5 | 249 | 0 | 200 | 50 | 250 | 1 | 250 | 0 | 249 | 0.5 |
| | MPa | 0.15 | 25 | 0.05 | 24.9 | 0 | 20 | 5 | 25 | 0.1 | 25 | 0.0 | 24.9 | 0.05 |

ΔP = Schrittweite

| | | SP | | rP | | ASP2 | | AEP2 | | cFH | | cFL | | ΔP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | min | max | min | max | min | max | min | max | min | max | min | max | |
| **PN2292 PN2692** | psi | 10 | 1450 | 4 | 1444 | 0 | 1160 | 290 | 1450 | 6 | 1450 | 0 | 1444 | 2 |
| | bar | 0.6 | 100 | 0.2 | 99.6 | 0 | 80 | 20 | 100 | 0.4 | 100 | 0 | 99.6 | 0.2 |
| | MPa | 0.06 | 10 | 0.02 | 9.96 | 0 | 8 | 2 | 10 | 0.04 | 10 | 0 | 9.96 | 0.02 |
| **PN2293 PN2693** | psi | -12 | 362.5 | -13.5 | 361 | -14.5 | 290 | 58 | 362.5 | -13 | 362.5 | -14.5 | 361 | 0.5 |
| | bar | -0.85 | 25 | -0.95 | 24.9 | -1 | 20 | 4 | 25 | -0.9 | 25 | -1 | 24.9 | 0.05 |
| | MPa | -0.085 | 2.5 | -0.095 | 2.49 | -0.1 | 2 | 0.4 | 2.5 | -0.09 | 2.5 | -0.1 | 2.49 | 0.005 |
| **PN2294 PN2694** | psi | -13.6 | 145 | -14.2 | 144.4 | -14.6 | 116 | 14.6 | 145 | -13.8 | 145 | -14.6 | 144.4 | 0.2 |
| | bar | -0.94 | 10 | -0.98 | 9.96 | -1 | 8 | 1 | 10 | -0.96 | 10 | -1 | 9.96 | 0.02 |
| | MPa | -0.094 | 1 | -0.098 | 0.996 | -0.1 | 0.8 | 0.1 | 1 | -0.096 | 1 | -0.1 | 0.996 | 0.002 |
| **PN2296 PN2696** | psi | -1.6 | 36.25 | -1.75 | 36.1 | -1.8 | 29 | 5.45 | 36.25 | -1.65 | 36.25 | -1.8 | 36.1 | 0.05 |
| | bar | -0.11 | 2.5 | -0.12 | 2.49 | -0.125 | 2 | 0.375 | 2.5 | -0.115 | 2.5 | -0.125 | 2.49 | 0.005 |
| | kPa | -11 | 250 | -12 | 249 | -12.5 | 200 | 37.5 | 250 | -11.5 | 250 | -12.5 | 249 | 0.5 |
| **PN2297 PN2697** | psi | -0.64 | 14.5 | -0.7 | 14.44 | -0.72 | 11.6 | 2.18 | 14.5 | -0.66 | 14.5 | -0.72 | 14.44 | 0.02 |
| | mbar | -44 | 1000 | -48 | 996 | -50 | 800 | 150 | 1000 | -46 | 1000 | -50 | 996 | 2 |
| | kPa | -4.4 | 100 | -4.8 | 99.6 | -5 | 80 | 15 | 100 | -4.6 | 100 | -5 | 99.6 | 0.2 |
| | inH2O | -17.5 | 401.5 | -19 | 400 | -20 | 321 | 60.5 | 401.5 | -18.5 | 401.5 | -20 | 400 | 0.5 |

ΔP = Schrittweite

| | | SP | | rP | | ASP2 | | AEP2 | | cFH | | cFL | | ΔP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | min | max | min | max | min | max | min | max | min | max | min | max | |
| PN2299 PN2699 | psi | -14.3 | 14.5 | -14.45 | 14.4 | -14.5 | 8.7 | -8.7 | 14.5 | -14.4 | 14.5 | -14.5 | 14.4 | 0.05 |
| | mbar | -985 | 1000 | -995 | 990 | -1000 | 600 | -600 | 1000 | -990 | 1000 | -1000 | 990 | 5 |
| | kPa | -98.5 | 100 | -99.5 | 99 | -100 | 60 | -60 | 100 | -99 | 100 | -100 | 99 | 0.5 |
| | inH2O | -396 | 402 | -400 | 398 | -402 | 240 | -240 | 402 | -398 | 402 | -402 | 398 | 2 |
| | inHg | -29.2 | 29.5 | -29.4 | 29.3 | -29.5 | 17.7 | -17.7 | 29.5 | -29.3 | 29.5 | -29.5 | 29.3 | 0.1 |
| PN2298 PN2698 | inH2O | -4.4 | 100.4 | -4.8 | 100 | -5 | 80.2 | 15 | 100.4 | -4.6 | 100.4 | -5 | 100 | 0.2 |
| | mbar | -11 | 250 | -12 | 249 | -12.5 | 200 | 37.5 | 250 | -11.5 | 250 | -12.5 | 249 | 0.5 |
| | mmWS | -110 | 2550 | -120 | 2540 | -125 | 2040 | 385 | 2550 | -115 | 2550 | -125 | 2540 | 5 |
| | kPa | -1.1 | 25 | -1.2 | 24.9 | -1.25 | 20 | 3.75 | 25 | -1.15 | 25 | -1.25 | 24.9 | 0.05 |

ΔP = Schrittweite



## 11.2 Further technical data

Further technical data and scale drawing at:
www.ifm.com

# 12 Factory setting

| | Factory setting | User setting |
|---|---|---|
| SP1 | 25% MEW*** | |
| rP1 | 23% MEW*** | |
| ou1 | Hno | |
| ou2 | I | |
| SP2 | 75% MEW*** | |
| rP2 | 73% MEW*** | |
| ASP2 | 0<br>(PN2x99: -14,4 psi)<br>(PN2x69: -7,3 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 / IH2O | |
| coLr | rEd | |
| cFH | VMR* | |
| cFL | MAW** | |

* = Final value of the measuring range (MEW)
** = Initial value of the measuring range (MAW)
*** = The indicated percentage of the final value of the measuring range (VMR) of the respective sensor in psi (for PN2x69 and PN2x99 the percentage of the measuring span) is set.

More information at www.ifm.com