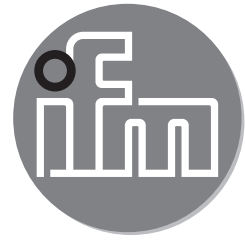


ifm electronic



Operating instructions  
Pressure sensor

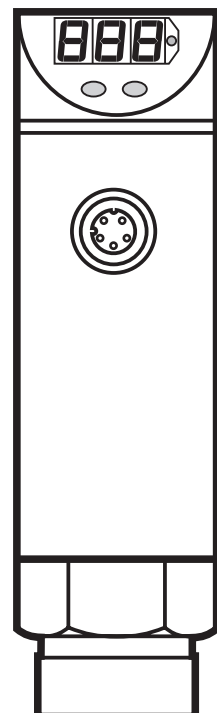
**efector500<sup>®</sup>**

**PN422x**

**UK**

11 / 2013

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## 1 Preliminary note

### 1.1 Symbols used

► Instructions

> Reaction, result

[...] Designation of pushbuttons, buttons or indications

→ Cross-reference



Important note

Non-compliance can result in malfunction or interference.



Information

Supplementary note.

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## 2 Safety instructions

- Please read the product description prior to setup 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 (see technical data) with the media to be measured in all applications.
- Use in gases at pressures > 25 bar only on request.

## 3 Functions and features

The pressure sensor detects the system pressure.

- It is shown on a display.
- It generates 1 output signal according to the set output configuration:  
OUT1 = switching signal for system pressure limit value.

## Applications

Type of pressure: relative pressure

Order no.	Measuring range		Permissible overpressure		Bursting pressure	
	bar	PSI <sup>1)</sup>	bar	PSI	bar	PSI
PN4220	0...400	0...5 800	600	8 700	1 000	14 500
PN4221	0...250	0...3 630	400	5 800	850	12 300
PN4222	0...100	0...1 450	300	4 350	650	9 400
PN4223	0...25	0...363	100	1 450	350	5 075
PN4224	0...10	0...145	75	1088	150	2 175
PN4226	0...2.5	0...36.3	20	290	50	725
	mbar	PSI	bar	PSI	bar	PSI
PN4227	0...1 000	0...14.5	10	150	30	430
	bar	inHg	bar	inHg	bar	inHg
PN4229	-1...1	-30...30	20	590	50	1 476

<sup>1)</sup> For units with a measuring range of > 999 PSI, 1/10 of the PSI value is displayed.

Consequently, the display value is to be multiplied by the factor 10.

Example: Display value = 15; real value = 15 × 10 = 150 PSI.

MPa = bar ÷ 10 / kPa = bar × 100



**Pressure Equipment Directive (PED):** Units with a final value of the measuring range of 1...400 bar comply with section 3, article (3) of the Directive 97/23/EC and are designed and manufactured for group 2 fluids (stable gases and non-superheated liquids) in accordance with the sound engineering practice.



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!**

Use in gases at pressures > 25 bar only on request.

Indication of the current system pressure as from 1% of the final value of the measuring range. Display "0%" does not mean that no pressure is applied to the system!

## 4 Function

### 4.1 Switching function

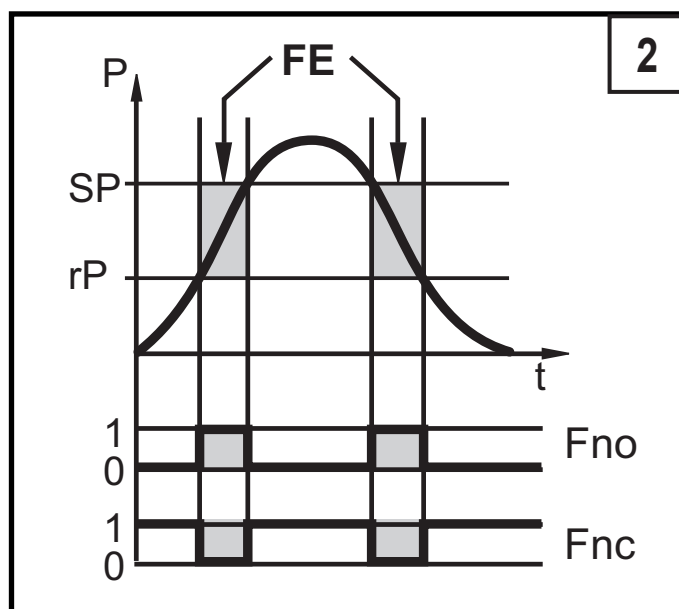
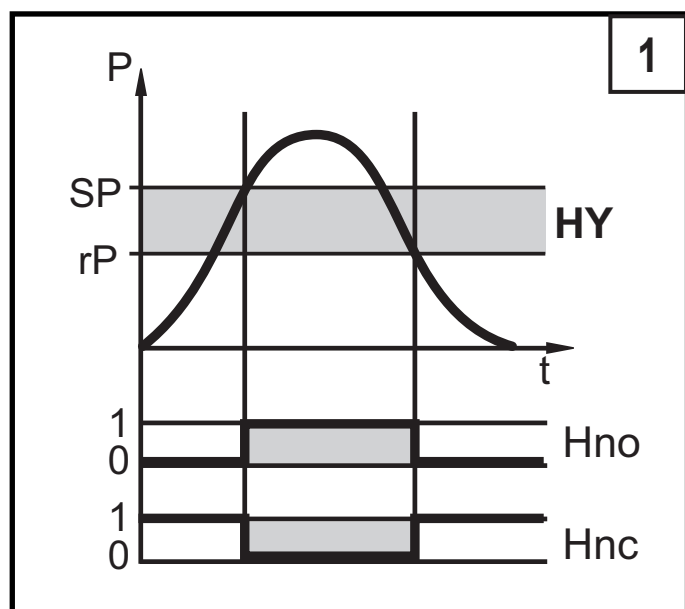
OUT1 changes its switching state if it is above or below the set switching limits (SP1, rP1). The following switching functions can be selected:

- Hysteresis function / normally open: [OU1] = [Hno] (→ Fig. 1).
- Hysteresis function / normally closed: [OU1] = [Hnc] (→ Fig. 1).

First the set point (SP1) is set, then the reset point (rP1) with the requested difference.

- Window function / normally open: [OU1] = [Fno] (→ Fig. 2).
- Window function / normally closed: [OU1] = [Fnc] (→ Fig. 2).

The width of the window can be set by means of the difference between SP1 and rP1. SP1 = upper value, rP1 = lower value.



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

## 5 Installation

### 5.1 Installation of the sensor



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

- Insert the unit in a 1/4" NPT process connection.
- Tighten firmly.

## 5.2 Installation of the grounding clamp

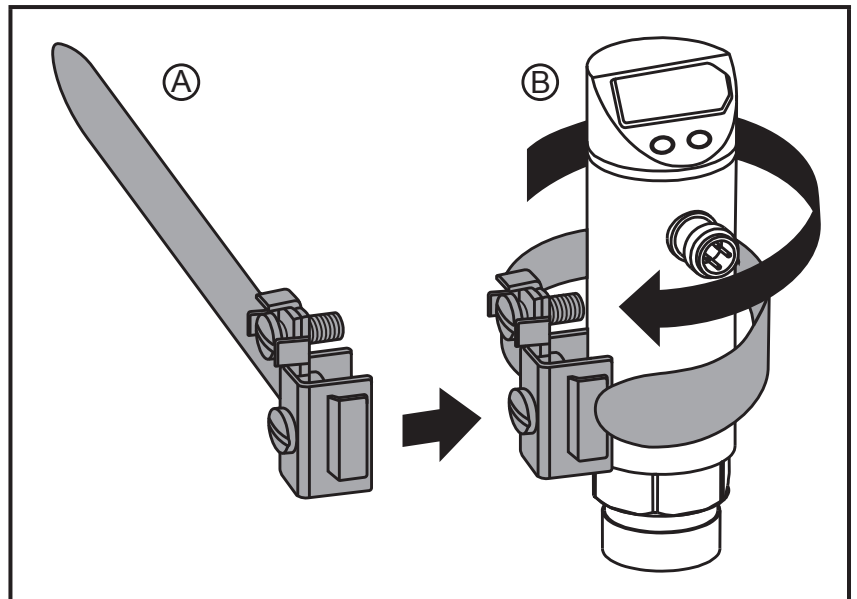


If installed in an ungrounded pipe system (e.g. plastic pipes), the unit must be grounded. The grounding clamp (order no. E43321) serves this purpose. It is designed to discharge noise voltages in case the sensor is mounted to ungrounded installations. It is available as an accessory and to be used preferably on PN42xx series sensors.



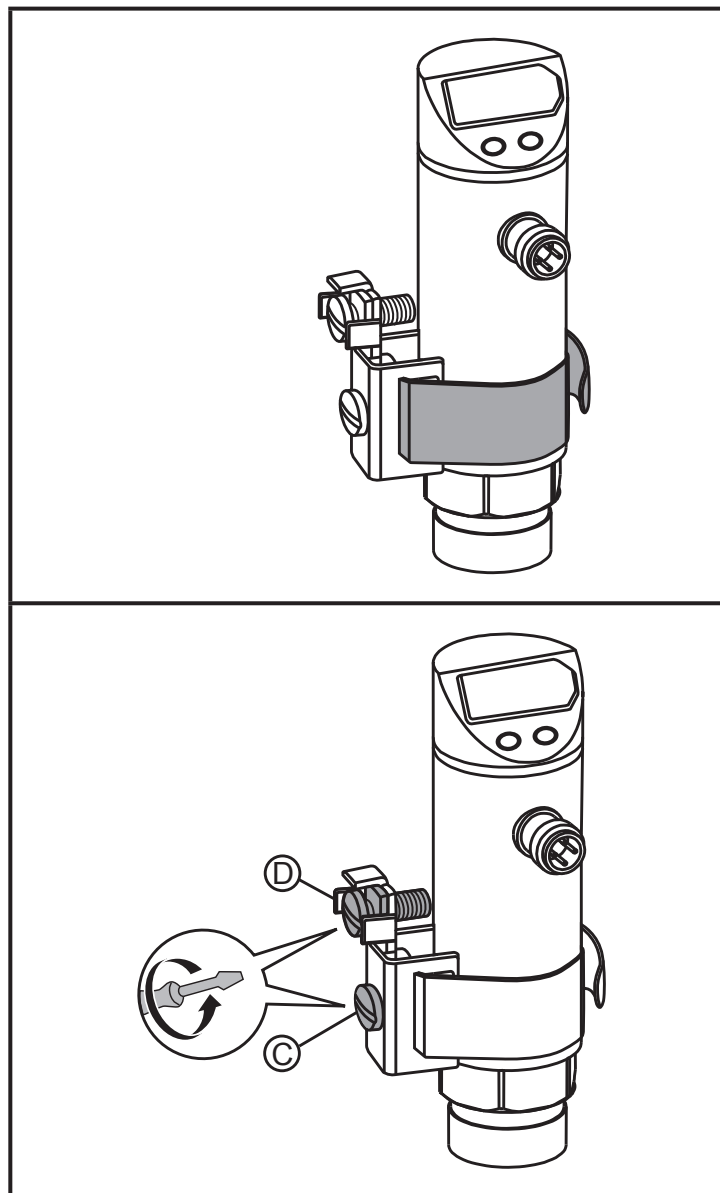
The earthing strap and the clamping device must be in contact with the sensor sleeve outside of the area where the type label is!

- ▶ Attach the clamping device of the grounding clamp to the sensor in the area beneath the M12 connector (A).
- ▶ Bend the earthing strap around the sensor sleeve and insert it in the slot of the clamping device (B).



- Push the earthing strap into the clamping device until it is in close contact with the sensor sleeve.

- Use an adequate screwdriver to tighten the lower screw until the earthing strap can no longer be moved on the sensor sleeve (C).
- Make sure that the washer is fitted on the upper screw.
- Fasten the ground cable with the upper screw and an adequate screwdriver to the clamping device (D).



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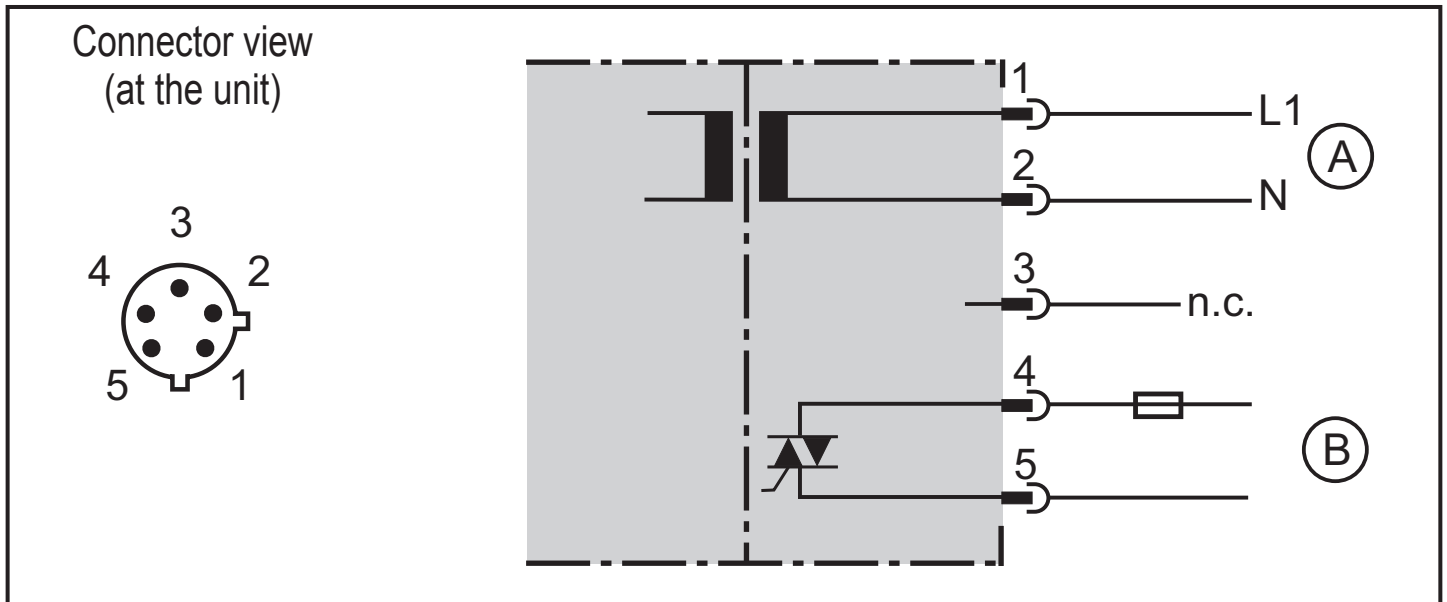
## 6 Electrical connection



- The unit must be connected by a qualified electrician.
- The national and international regulations for the installation of electrical equipment must be adhered to.
- For the output circuit, the same protective measures as for the supply circuit must be taken. Insert a miniature fuse according to IEC60127-2 Sheet 1 (5 A fast acting).
- The permissible potential difference between supply and output circuit is max. 300 V.
- The equalisation of potential of metal housing parts must be ensured via the sensor housing. Ensure an electrically conductive connection. The grounding clamp (order no. E43321) can be used for the equalisation of potential.
- Due to the integrated EMC filters, leakage currents of typ. < 0.5 mA can flow via the potential equalisation to the earth potential.
- If several units are used in parallel, take into account that the leakage currents add.
- The applicable standards must be adhered to.

► Disconnect power.

► Connect the unit as follows:



A: Supply circuit

B: Output circuit

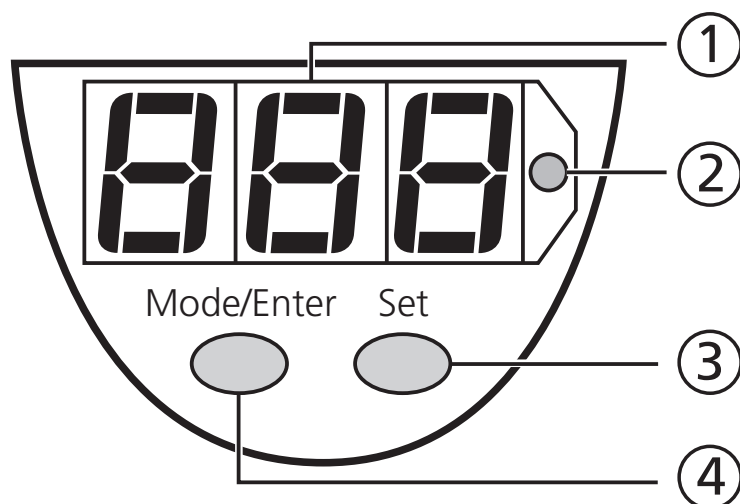
— · — · — · — : Safe separation

Core colours of ifm sockets:

1 = BN (brown), 2 = BU (blue), 4 = BK (black), 5 = WH (white)



## 7 Operating and display elements



### 1: 7-segment display

- Display of the current system pressure <sup>1)</sup>.
- Indication of the parameters and parameter values.

### 2: LED red

Indication of the switching status; lights when the output is switched.

### 3: Set button

- Setting of the parameter values (scrolling by holding pressed; incremental by pressing briefly).

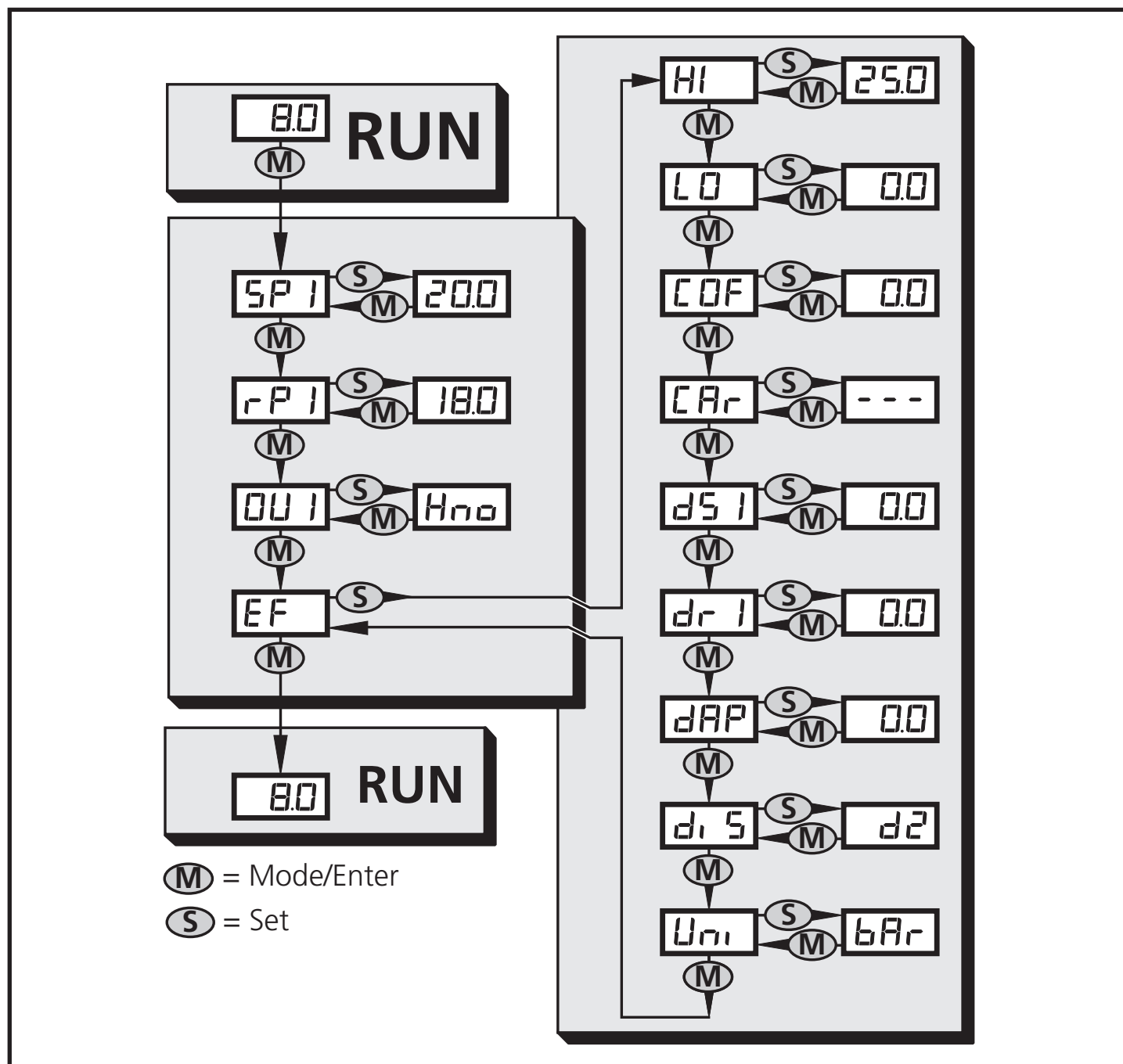
### 4: Mode/Enter button

- Selection of the parameters and acknowledgement of the parameter values.

<sup>1)</sup>PSI value in case of units with a measuring range > 999 PSI = displayed value × 10

## 8 Menu

### 8.1 Menu structure



### 8.2 Explanation of the menu

SP1/rP1	Upper / lower limit value for system pressure at which OUT1 switches.
OU1	Output function for OUT1: Switching signal for the pressure limit values: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc].
EF	Extended functions / opening of menu level 2.
HI / LO	Maximum / minimum value memory for system pressure.
COF	Zero-point calibration.
CAr	Reset of the zero-point calibration.

dS1 / dr1	Switch-on delay / switch-off delay for OUT1.
dAP	Damping for OUT1.
diS	Update rate and orientation of the display.
Uni	Standard unit of measurement for system pressure.

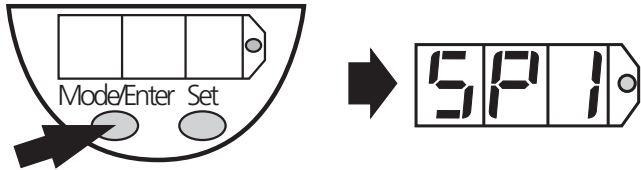
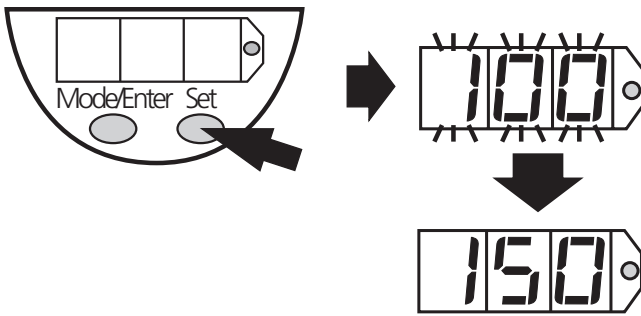
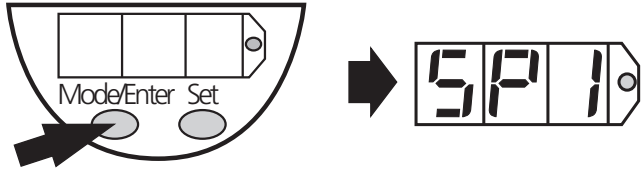
## 9 Parameter setting

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.

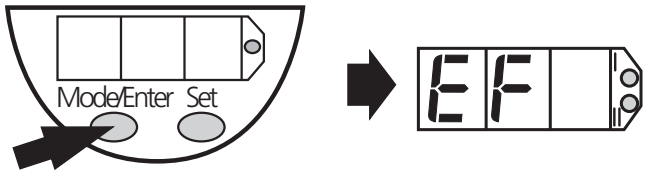
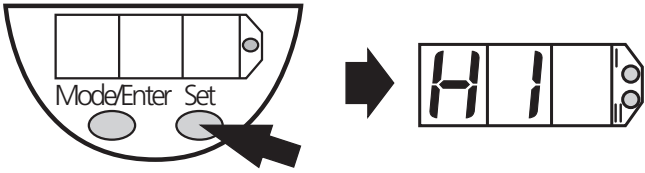
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### 9.1 Parameter setting in general

3 steps must be taken for each parameter setting:

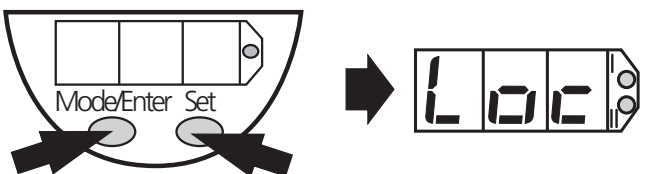
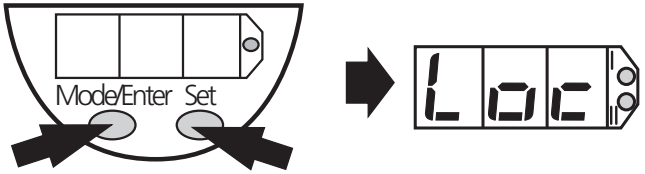
1	<b>Parameter selection</b> <ul style="list-style-type: none"> <li>Press [Mode/Enter] until the requested parameter is displayed.</li> </ul>	
2	<b>Setting of the parameter value</b> <ul style="list-style-type: none"> <li>Press [Set] and keep it pressed.</li> <li>&gt; Current setting value of the parameter flashes for 5 s.</li> <li>&gt; After 5 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. To reduce the value: let the display move to the maximum setting value. Then the cycle starts again at the minimum setting value.		
3	<b>Acknowledgement of the parameter value</b> <ul style="list-style-type: none"> <li>Briefly press [Mode/Enter].</li> <li>&gt; The parameter is displayed again. The new setting value is saved.</li> </ul>	
<b>Setting of other parameters:</b> <ul style="list-style-type: none"> <li>Start again with step 1.</li> </ul>		
<b>Finishing the parameter setting:</b> <ul style="list-style-type: none"> <li>[Press Mode/Enter] several times until the current measured value is displayed or wait for 15 s. The unit returns to the operating mode if no button is pressed for 15 s after acknowledgement of the new parameter value.</li> </ul>		

- Change from menu level 1 to menu level 2:

<p>► Press [Mode/Enter] until [EF] is displayed.</p>	
<p>► Briefly press [Set]. &gt; The first parameter of the submenu is displayed (here: [HI]).</p>	

- Locking / unlocking

The unit can be locked electronically to prevent unintentional settings.

<p>► Make sure that the unit is in the normal operating mode. ► Press [Mode/Enter] + [Set] for 10 s. &gt; [Loc] is displayed.</p>	
<p>During operation: &gt; [<b>Loc</b>] is briefly displayed if you try to change parameter values.</p>	
<p>For unlocking: ► Press [Mode/Enter] + [Set] for 10 s. &gt; [Loc] is displayed.</p>	

On delivery: not locked.

- Timeout:

If no button is pressed for 15 s during parameter setting, the unit returns to the operating mode with unchanged values.

## 9.2 Set output signals

### 9.2.1 Set switching limits

► Select [SP1] and set the value at which the output switches.	SP 1
► Select [rP1] and set the value at which the output switches off. rP1 is always lower than SP1. The unit only accepts values which are lower than SP1.	rP 1

### 9.2.2 Setting of the output function

► Select [ou1] [Hno] = hysteresis function/normally open, [Hnc] = hysteresis function/normally closed, [Fno] = window function/normally open, [Fnc] = window function / normally closed.	ou 1
--	------

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## 9.3 User settings (optional)

### 9.3.1 Set the unit of measurement for system pressure

► Select [Uni] and set the unit of measurement: [bAr] (= bar / mbar), [PA] (= MPa / kPa), [inH] (= inHg), or [PSI]. For units with a measuring range of > 999 PSI, 1/10 of the PSI value is displayed. Consequently, the display value is to be multiplied by the factor 10. Example: Display value = 15; real value = 15 * 10 = 150 PSI. The unit is delivered with stickers for different units of measurement and correction factors. Attach the corresponding sticker to the unit or mark the sticker.	Uni
---	-----

### 9.3.2 Configuration of the display

► Select [diS] and set the update rate and orientation of the display: [d1]: update of the measured values every 50 ms. [d2]: update of the measured values every 200 ms. [d3]: update of the measured values every 600 ms. [Ph]: display of the pressure peaks remains for a short time (peak hold). [rd1], [rd2], [rd3], [Ph]: display as for d1, d2, d3, Ph; rotated by 180°. [OFF]: the display is switched off in the operating mode.	d1 5
--	------

### 9.3.3 Zero-point calibration

<ul style="list-style-type: none"> <li>▶ Select [COF] and set a value between -5% and 5% of the final value of the measuring range. The internal measured value "0" is shifted by this value.</li> </ul>	COF
Zero-point calibration reset: <ul style="list-style-type: none"> <li>▶ Press [Mode/Enter] until [CAr] is displayed.</li> <li>▶ Press and hold [Set] until [---] is displayed.</li> <li>▶ Briefly press [Mode/Enter].</li> </ul>	CAr

### 9.3.4 Set delay time for OUT1

[dS1] = switch-on delay for OUT1. [dr1] = switch-off delay for OUT1. <ul style="list-style-type: none"> <li>▶ Select [dS1] or [dr1] and set a value between 0.1 and 50 s (at 0.0 the delay time is not active).</li> </ul>	dS 1 dr 1
---	--------------

### 9.3.5 Setting the damping for OUT1

<ul style="list-style-type: none"> <li>▶ Select [dAP] and set a value between 0.01 and 4.00 s; (at 0.00 [dAP] is not active).</li> </ul> dAP value = response time between pressure change and change of the switching status in seconds. [dAP] influences the switching frequency: $f_{\max} = 1 \div 2dAP$ .	dAP
---	-----

## 9.4 Service functions

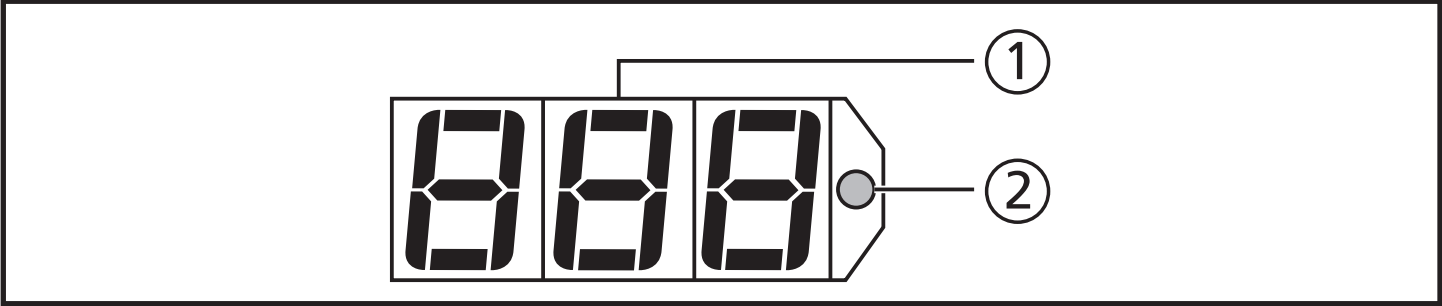
### 9.4.1 Read min/max values for the system pressure

<ul style="list-style-type: none"> <li>▶ Select [HI] or [LO], briefly press [Set].              [HI] = maximum value, [LO] = minimum value.</li> </ul> Delete memory: <ul style="list-style-type: none"> <li>▶ Select [HI] or [LO].</li> <li>▶ Press and hold [Set] until [---] is displayed.</li> <li>▶ Briefly press [Mode/Enter].</li> </ul>	HI LO
---	----------

# 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.

## 10.1 Operating indicators



1	Current system pressure in bar, MPa, PSI. PSI value in case of units with a measuring range > 999 PSI = display value × 10.
2	Switching status OUT1.

## 10.2 Read set parameters

- ▶ Briefly press [Mode/Enter]: the parameters are displayed one after the other.
- ▶ Briefly press [Set]: the corresponding parameter value is displayed for about 15 s. After another 15 s the unit returns to the Run mode.

## 10.3 Error indications

[OL]	Overload pressure (above measuring range)
[UL]	Underload pressure (below measuring range)

# 11 Technical data and scale drawing

Information according to cULus approval:

- Enclosure type 1
- Ambient temperature 0...40 °C
- For use in pollution degree 2 environment

Further technical data and scale drawing at [www.ifm.com](http://www.ifm.com) → Data sheet search → Enter the article number.

## 11.1 Setting ranges

		SP1		rP1		ΔP
		min	max	min	max	
PN4220	bar	4	400	2	398	1
	PSI * 10	6	580	3	577	1
	MPa	0.4	40.0	0.2	39.8	0.1
PN4221	bar	2	250	1	249	1
	PSI * 10	4	363	2	361	1
	MPa	0.2	25.0	0.1	24.9	0.1
PN4222	bar	1.0	99.9	0.5	99.5	0.1
	PSI * 10	1	145	1	144	1
	MPa	0.10	10.00	0.05	9.95	0.01
PN4223	bar	0.2	25.0	0.1	24.9	0.1
	PSI	4	363	2	362	1
	MPa	0.02	2.50	0.01	2.49	0.01
PN4224	bar	0.10	9.99	0.05	9.94	0.01
	PSI	1	145	1	144	1
	kPa	10	999	5	994	1
PN4226	bar	0.02	2.50	0.01	2.49	0.01
	PSI	0.4	36.3	0.2	36.2	0.1
	kPa	2	250	1	249	1

ΔP = step increment



		SP1		rP1		$\Delta P$
		min	max	min	max	
<b>PN4227</b>	mbar	10	999	5	994	1
	PSI	0.1	14.6	0.1	14.5	0.1
	kPa	1.0	99.9	0.5	99.4	0.1
<b>PN4229</b>	bar	-0.97	1.00	-0.99	0.98	0.01
	inHg	-29	30	-30	29	1
	kPa	-97	100	-99	98	1

$\Delta P$  = step increment

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## 12 Factory setting

	Factory setting	User setting
<b>SP1</b>	<b>25% VMR</b>	
<b>rP1</b>	<b>23% VMR</b>	
<b>OU1</b>	<b>Hno</b>	
<b>COF</b>	<b>0.0</b>	
<b>dS1</b>	<b>0.0</b>	
<b>dr1</b>	<b>0.0</b>	
<b>dAP</b>	<b>0.06</b>	
<b>diS</b>	<b>d2</b>	
<b>Uni</b>	<b>bAr / mbAr</b>	

MEW = final value of the measuring range

More information at [www.ifm.com](http://www.ifm.com)