

ifm electronic



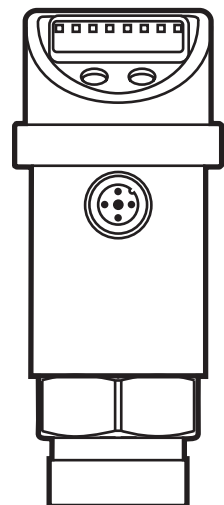
Operating instructions
Pressure sensor

efector500[®]

PN00xA

UK

704531 / 00 12 / 2008



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1 Preliminary note

1.1 Symbols used

- ▶ Instruction
- > Reaction, result
- [...] Designation of pushbuttons, buttons or indications
- Cross-reference



Important note:
Non-compliance can result in malfunctions or interference.

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 (→ chapter 12 Technical data) with the media to be measured in all applications.
- Observe the instructions for the safe use in hazardous areas: → Operating instructions (Ex protection related part) for pressure sensors according to EU directive 94/9/EC annex VIII (ATEX) group II, equipment category 3D.
If no operating instructions (Ex protection related part) or EC declaration of conformity is supplied with this product in the language of the EU user country, these can be requested from your dealer (see delivery note) or manufacturer (see cover sheet / back).

3 Functions and features

The unit monitors the system pressure of machines and plants.

Applications

Type of pressure: relative pressure

Order no.	Measuring range		Permissible overpressure		Bursting pressure	
	bar	PSI	bar	PSI	bar	PSI
PN004A	-1...10	-14,5...145	75	1 087	150	2 175
PN006A	0...2,5	0...36,3	20	290	50	725
PN007A	0...1	0...14,5	10	145	30	450
PN009A	-1...0	-14,5...0	10	145	30	450

$$\text{MPa} = \text{bar} \div 10 / \text{kPa} = \text{bar} \times 100$$

Analogue measuring range for PN004A = 0...10 bar.



Avoid static and dynamic overpressure exceeding the given 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. NOTE: Risk of injury!

4 Function

4.1 Processing of the measured signals

- The unit displays the current system pressure.
- It generates 2 output signals according to the parameter setting.

OUT1	Switching signal for system pressure limit value.
OUT2	Analogue signal 4...20 mA / 0...10 V.

4.2 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:

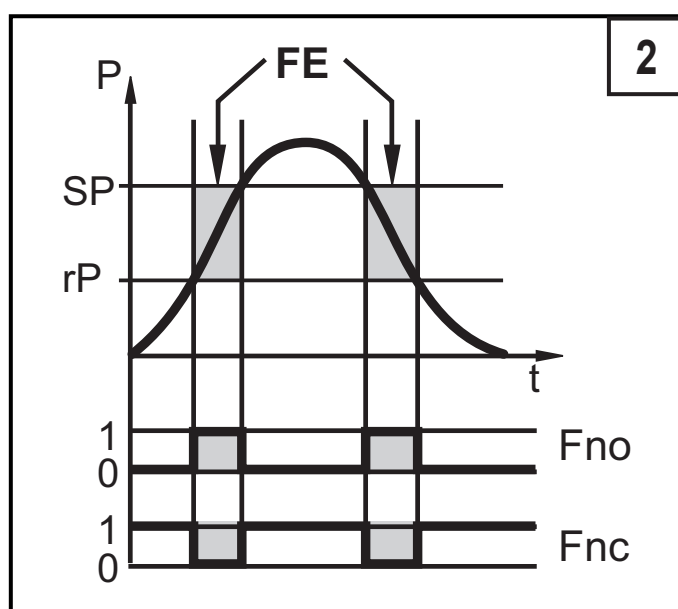
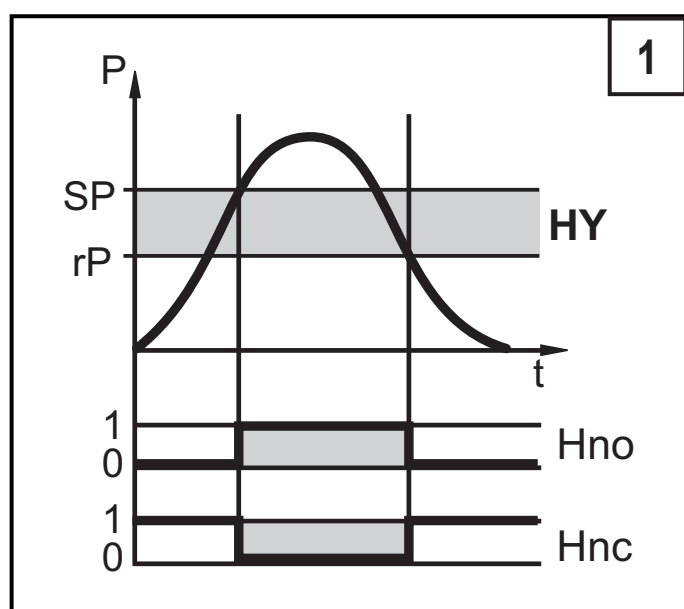
- Hysteresis function / normally open: [OU1] = [Hno] (→ fig. 1).
- Hysteresis function / normally closed: [OU1] = [Hnc] (→ fig. 1).

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.

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

4.3 Analogue function

The analogue output can be configured.

[OU2] defines whether the measuring range is provided as 4...20 mA ([OU2] = [I]), or 0...10 V ([OU2] = [U]). Analogue measuring range for PN004A = 0...10 bar.

5 Installation



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

- ▶ Insert the unit in a G $\frac{1}{4}$ process connection.
- ▶ Tighten firmly.

6 Electrical connection



The unit must be connected by a qualified electrician.

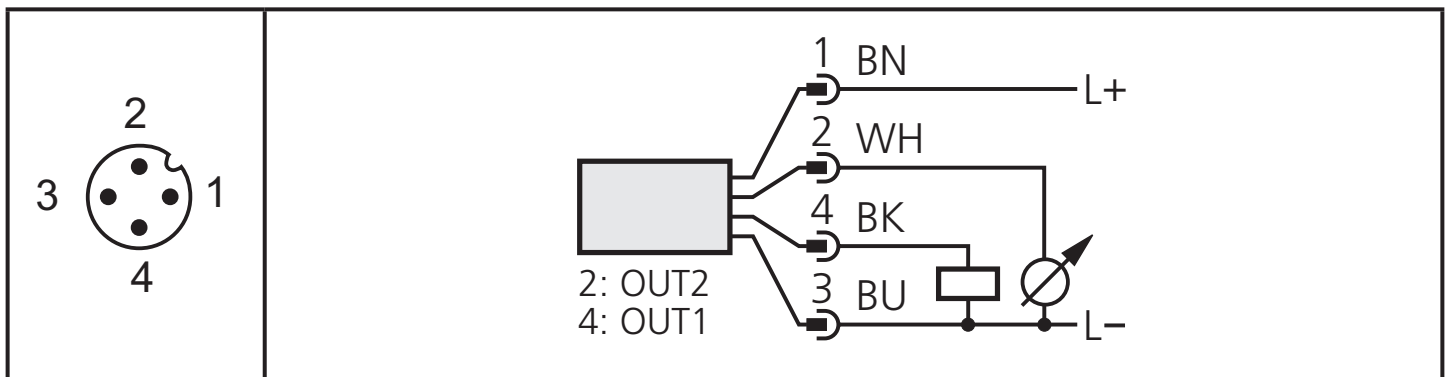
The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply to EN 50178, SELV, PELV.

For the scope of validity cULus:

The unit shall be supplied from an isolating source and protected by an overcurrent device. The „limited voltage“ requirements according to UL508 must be complied with.

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

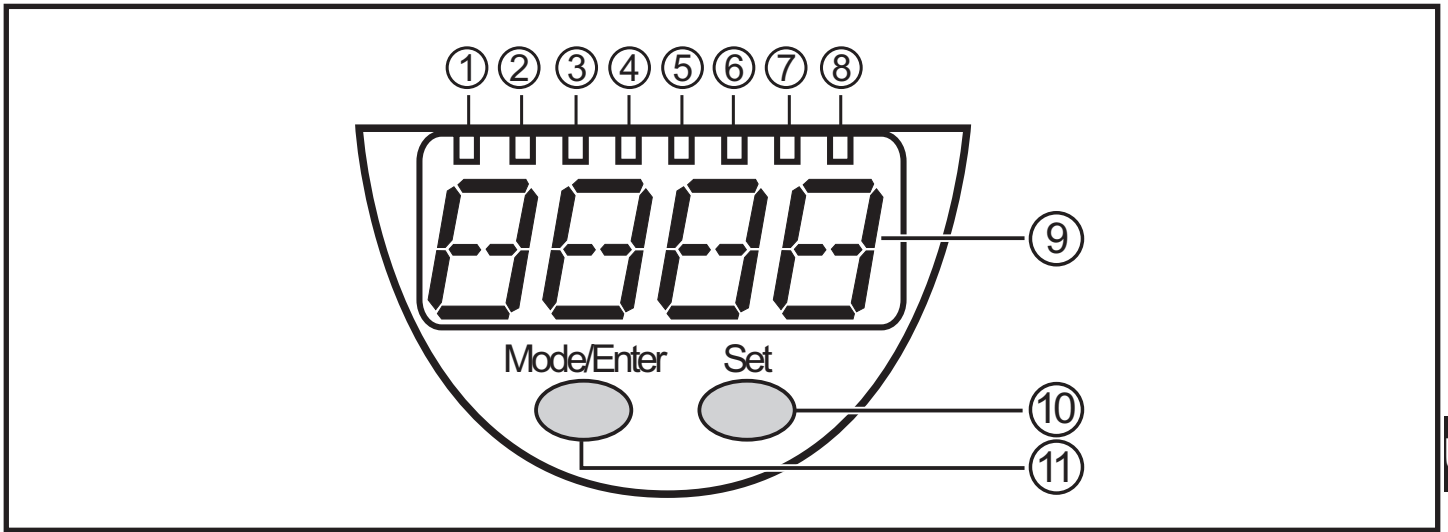


Pin 1	Ub+
Pin 3	Ub-
Pin 4 (OUT1)	Binary switching output pressure monitoring.
Pin 2 (OUT2)	Analogue output for system pressure.

Core colours of ifm sockets:

1 = BN (brown), 2 = WH (white), 3 = BU (blue), 4 = BK (black)

7 Operating and display elements



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1 to 8: Indicator LEDs

- LED 1 to LED 4 = system pressure in the unit of measurement which is indicated on the label.
- LED 4 not used for units with 3 adjustable units of measurement.
- LEDs 5 to 7: not used.
- LED 8 = switching status OUT1 (lights if output 1 is switched).

9: Alphanumeric display, 4 digits

- Indication of the current system pressure.
- Indication of the parameters and parameter values.

10: Set button

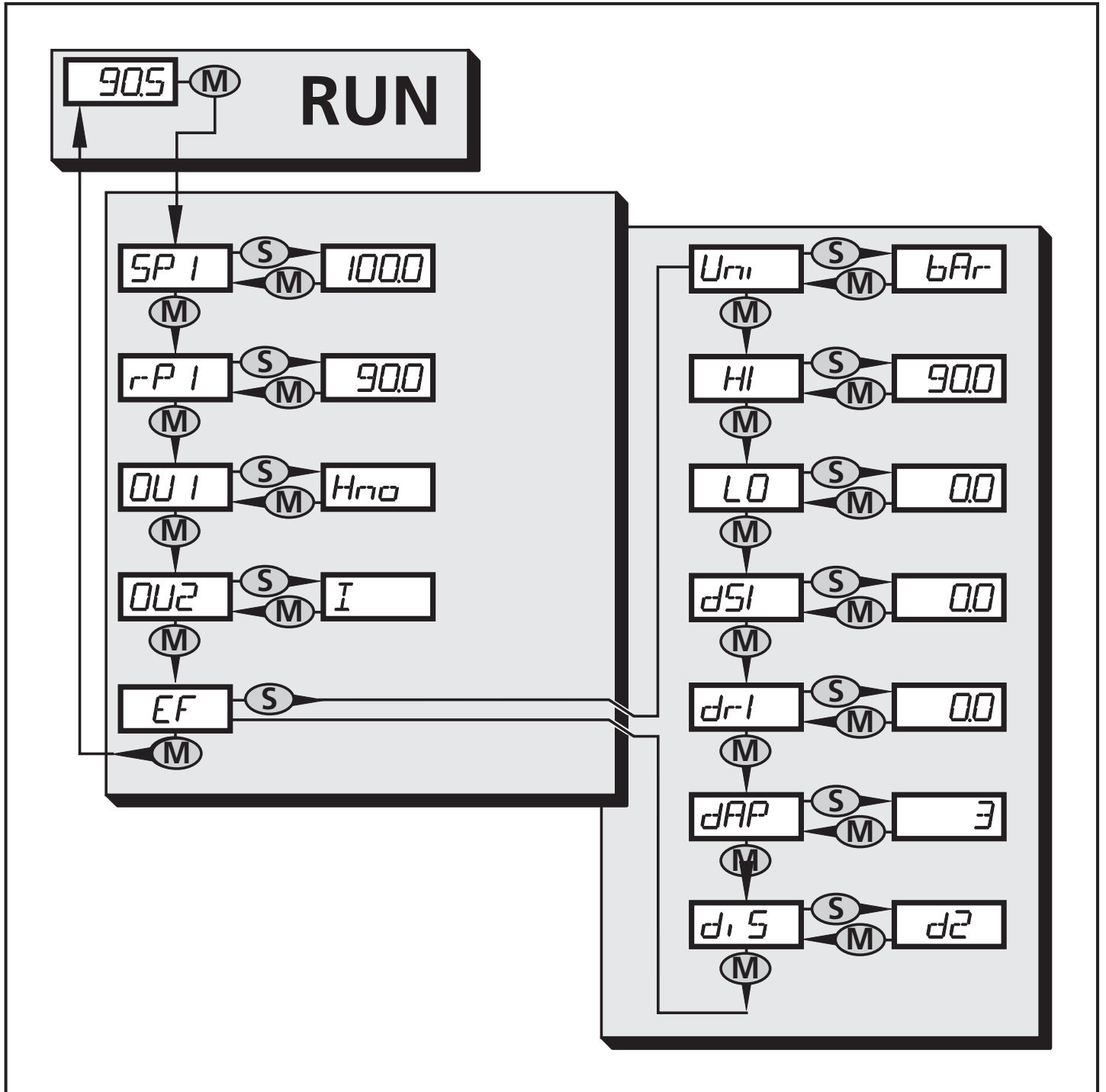
- Setting of the parameter values (scrolling by holding pressed, incrementally by pressing briefly).

11: Mode/Enter button

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

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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Analogue signal for the current system pressure: 4...20 mA [I] or 0...10 V [U].
EF	Extended functions / opening of menu level 2.
Uni	Standard unit of measurement for system pressure.
HI	Maximum value memory for system pressure.
LO	Minimum value memory for system pressure (only PN004A and PN009A).
dS1	Switch-on delay for OUT1 .
dr1	Reset delay for OUT1.
dAP	Damping for OUT1.
diS	Update rate and orientation of the display.


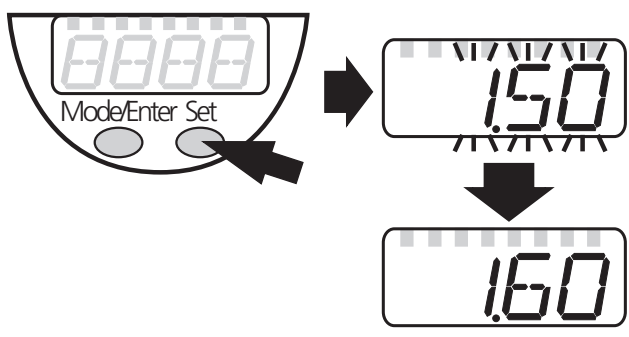
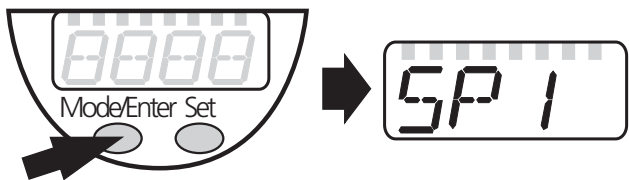
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9 Parameter setting

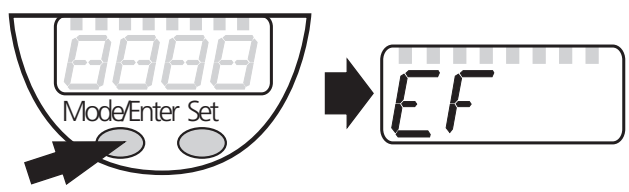
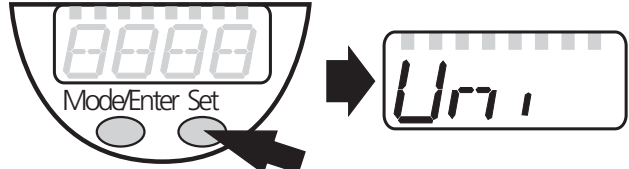
During parameter setting the unit remains in the operating mode. It continues its monitoring function with the existing parameters until the parameter setting has been completed.

9.1 General parameter setting

3 steps must be taken for each parameter setting:

<p>1</p>	<p>Parameter selection</p> <ul style="list-style-type: none"> ▶ Press [Mode/Enter] until the requested parameter is displayed . 	
<p>2</p>	<p>Setting of the parameter value</p> <ul style="list-style-type: none"> ▶ Press [Set] and keep it pressed. > Current setting value of the parameter flashes for 5 s. > After 5 s: Setting value is changed: incrementally by pressing the button once or continuously by keeping the button pressed. 	
<p>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.</p>		
<p>3</p>	<p>Acknowledgement of the parameter value</p> <ul style="list-style-type: none"> ▶ Press [Mode/Enter] briefly. > The parameter is displayed again. The new setting value is stored. 	
<p>Setting of other parameters</p> <ul style="list-style-type: none"> ▶ Start again with step 1. 		
<p>Finishing the parameter setting</p> <ul style="list-style-type: none"> ▶ Press [Mode/Enter] several times until the current measured value is displayed or wait for 5 s. > The unit returns to the operating mode. 		

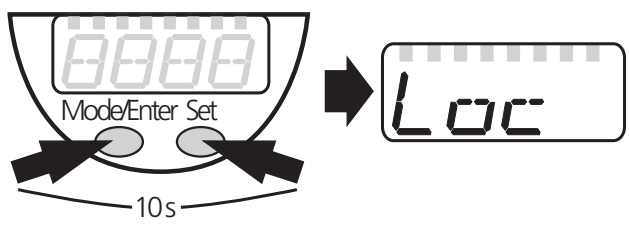
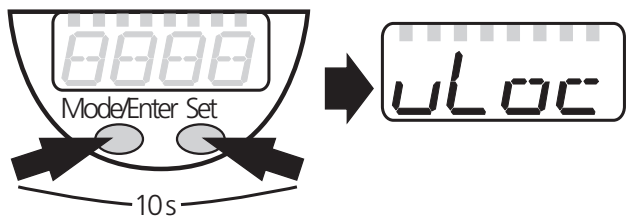
- Change from menu level 1 to menu level 2:

<ul style="list-style-type: none"> ▶ Press [Mode/Enter] until [EF] is displayed . <p>If the submenu is protected with an access code, "Cod1" flashes in the display.</p> <ul style="list-style-type: none"> ▶ Press [Set] and keep it pressed until the valid code no. is displayed. ▶ Press [Mode/Enter] briefly. <p>On delivery by ifm electronic: no access restriction.</p>	
<ul style="list-style-type: none"> ▶ Press [Set] briefly. > The first parameter of the sub-menu is displayed (here: [Uni]). 	

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- Locking / unlocking

The unit can be locked electronically to prevent unintentional settings.

<ul style="list-style-type: none"> ▶ Make sure that the unit is in the normal operating mode. ▶ Press [Mode/Enter] + [Set] for 10 s. > [Loc] is displayed. 	
<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"> ▶ Press [Mode/Enter] + [Set] for 10 s. > [uLoc] is displayed. 	

On delivery: unlocked.

- Timeout:

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

9.2 Configuration of the display (optional)

<p>▶ Select [Uni] and set the unit of measurement: [bAr], [MPa], [PSI], [inHg], for PN007A and PN009A in addition [inHg].</p>	<i>Uni</i>
<p>▶ Select [diS] and set the update rate and orientation of the display:</p> <ul style="list-style-type: none">- [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.- [rd1], [rd2], [rd3]: display as for d1, d2, d3; rotated by 180°.- [OFF]: the display is switched off in the operating mode.	<i>d1 5</i>

9.3 Configuration of output 1

9.3.1 Setting of the output function

<p>▶ Select [OU1] and set the function:</p> <ul style="list-style-type: none">- [Hno] = hysteresis function / normally open,- [Hnc] = hysteresis function / normally closed,- [Fno] = window function / normally open,- [Fnc] = window function / normally closed.	<i>OU 1</i>
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9.3.2 Setting of the switching limits

<p>▶ Select [SP1] and set the value at which the output switches.</p>	<i>SP 1</i>
<p>▶ Select [rP1] and set the measured value at which the output switches off. rP1 is always smaller than SP1. The unit only accepts values which are lower than SP1.</p>	<i>rP 1</i>

9.4 Configuration of output 2

<p>▶ Select [OU2] and set the analogue function:</p> <ul style="list-style-type: none">- [I] = current signal proportional to the pressure 4...20 mA,- [U] = voltage signal proportional to the pressure 0...10 V.	<i>OU2</i>
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9.5 User settings (optional)

9.5.1 Setting of the delay time for OUT1

<p>[dS1] = switch-on delay. [dr1] = switch-off delay for OUT1 / OUT2. ► Select [dS1] or [dr1] and set a value between 0.1 and 50 s (at 0.0 the delay time is not active).</p>	
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9.5.2 Setting of the damping for OUT1

<p>► Select [dAP] and set a value. dAP value = response time between pressure change and change of the switching status in milliseconds. The value for dAP defines the switching frequency (f) of the output, the following fixed values can be set:</p> <table border="1"> <tr> <td>dAP</td> <td>3</td> <td>6</td> <td>10</td> <td>17</td> <td>30</td> <td>60</td> <td>125</td> <td>250</td> <td>500</td> </tr> <tr> <td>f [Hz]</td> <td>170</td> <td>80</td> <td>50</td> <td>30</td> <td>16</td> <td>8</td> <td>4</td> <td>2</td> <td>1</td> </tr> </table>	dAP	3	6	10	17	30	60	125	250	500	f [Hz]	170	80	50	30	16	8	4	2	1	
dAP	3	6	10	17	30	60	125	250	500												
f [Hz]	170	80	50	30	16	8	4	2	1												

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9.6 Service functions

9.6.1 Reading of the min/max values for system pressure

<p>► Select [HI] or [LO], briefly press [Set]. [HI] = maximum value, [LO] = minimum value. Delete memory: ► Select [HI] or [LO]. ► Press [Set] and keep it pressed until [----] is displayed. ► Press [Mode/Enter] briefly. [LO] is available only for PN004A and PN009A.</p>	
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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.

Operating indications → 7 Operating and display elements.

10.1 Reading of the set parameters

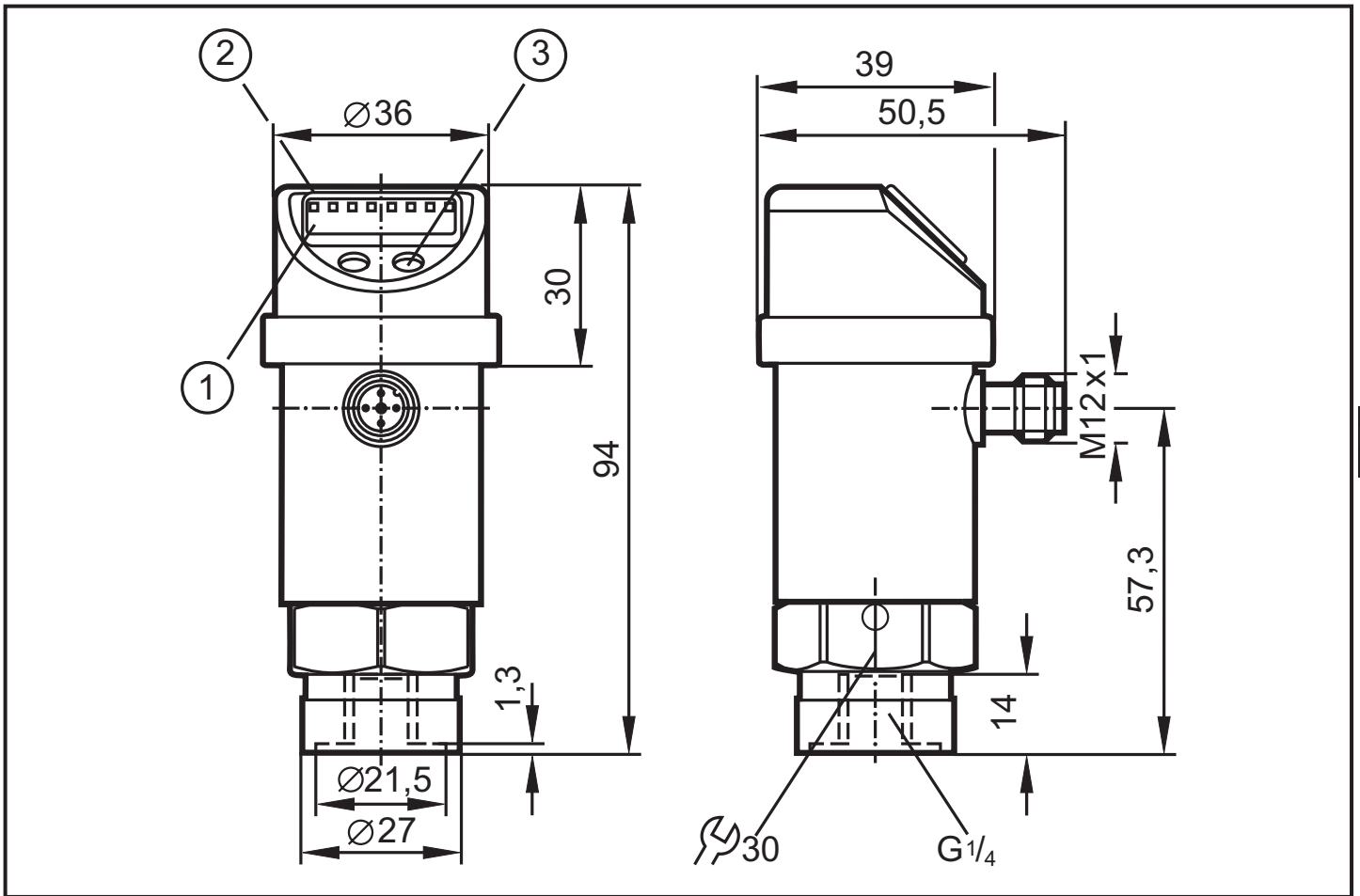
- ▶ Press [Mode/Enter] until the requested parameter is displayed.
- ▶ Press [Set] briefly.
- > The unit displays the corresponding parameter value for about 15 s. After another 15 s the unit returns to the Run mode.

10.2 Fault indication

[OL]	Overload pressure (measuring range exceeded).
[UL]	Underload pressure (below measuring range).
[SC1]	Short circuit in OUT1. The output is switched off as long as the short circuit exists.
[Err]	Flashing: internal fault

The messages SC1 and Err are shown even if the display is switched off.

11 Scale drawing



Dimensions in mm

- 1: display
- 2: LEDs
- 3: programming button

12 Technical data

Operating voltage [V]	18...36 DC ¹⁾
Current consumption [mA]	< 50
Current rating per switching output [mA]	250
Protected against reverse polarity and overload	up to 40 V
Short-circuit protection; integrated watchdog	
Voltage drop [V]	< 2
Power-on delay time [s]	0.3
Switching frequency [Hz]	max.170
Analogue output	4...20 mA / 0...10 V
Max. load current output [Ω]	500
Min. load with voltage output [Ω]	2000
Response time analog output [ms]	< 3

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Accuracy / deviations (in % of the span)	
- Set point accuracy	< ± 0.5
- Deviation of the characteristics	< ± 0.25 (BFSL) / < ± 0.5 (LS)
- Hysteresis	< 0.25
- Repeatability (in case of temperature fluctuations < 10 K).....	< ± 0.1
- Long-term stability (in % of the span per 6 months)	< ± 0.05
- Temperature coefficients (TEMPCO) in the compensated temperature range 0 ... 60 °C (in % of the span per 10 K)	
Greatest TEMPCO of the zero point / of the span	< ± 0.2 / < ± 0.2
Materials (wetted parts) . stainless steel (303S21); ceramics (99.9 % Al ₂ O ₃); FPM (Viton)	
Housing materials stainless steel (304S15); high-grade stainless steel (316 L); PC (Makrolon) PBT, (Pocan); PEI; FPM (Viton)	
Protection	IP 65 III
Shock resistance [g]	50 (DIN / IEC 68-2-27, 11 ms)
Vibration resistance [g]	20 (DIN / IEC 68-2-6, 10-2000 Hz)
Switching cycles min.	100 million
Operating temperature [°C]	-20...60
Medium temperature [°C]	-20...60
Storage temperature [°C].....	-40...100
EMC EN 61000-4-2 ESD:	4 / 8 KV
EN 61000-4-3 HF radiated:	10 V/m
EN 61000-4-4 Burst:	2 KV
EN 61000-4-5 Surge:	0.5 / 1 KV
EN 61000-4-6 HF conducted:	10 V

¹⁾to EN50178, SELV, PELV

BFSL = Best Fit Straight Line / LS = Limit Value Setting

12.1 Setting ranges

		SP1		rP1		ΔP
		min	max	min	max	
PN004A	bar	-0.90	10.00	-0.95	9.95	0.05
	PSI	-12	145	-13	144	1
	MPa	-0.090	1.000	-0.095	0.995	0.005
PN006A	bar	0.02	2.50	0.01	2.49	0.01
	PSI	0.4	36.2	0.2	36.0	0.2
	kPa	2	250	1	249	1

ΔP = increments

		SP1		rP1		ΔP
		min	max	min	max	
PN007A	mbar	10	1000	5	995	5
	PSI	0.2	14.5	0.1	14.4	0.1
	kPa	1.0	100.0	0.5	99.5	0.5
	inHg	0.3	29.5	0.2	29.4	0.1
PN009A	mbar	-990	0	-995	-5	5
	PSI	-14.3	0.0	-14.4	-0.1	0.1
	kPa	-99.0	0.0	-99.5	-0.5	0.5
	inHg	-29.2	0.0	-29.3	-0.2	0.1

ΔP = increments

13 Factory setting

	Factory setting	User setting
SP1	25% VMR*	
rP1	23% VMR*	
OU1	Hno	
OU2	I	
dS1	0,0	
dr1	0,0	
dAP	6	
diS	d2	
Uni	bAr / mbAr	

* = the indicated percentage of the final value of the measuring range (VMR) of the corresponding sensor in bar / mbar is set.

Technical data and further information at
www.ifm-electronic.com → Select your country → Data sheet direct: