ifm electronic

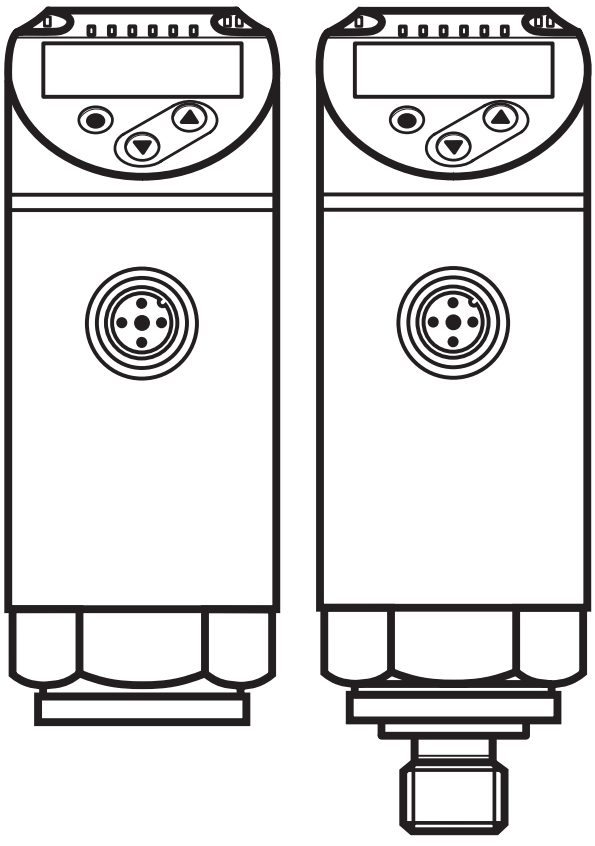
CE

Operating instructions
Electronic pressure sensor

efectorsoo

PN3xxx

UK



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Contents

UK

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 > 25 bar the note 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		Static pressure resistance (max. permissible pressure) *)		Bursting pressure	
	bar	psi	bar	psi	bar	psi
Pressure sensors with internal thread G¼						
PN3160	0...600	0…8700	800	11580	2500	36250
PN3070	0...400	0…5800	800	11580	1700	24650
PN3071	0...250	0…3620	500	7250	1100	15950
PN3092**	0...100	0…1450	300	4350	650	9400
PN3093**	0...25	0…362	150	2175	350	5075
PN3094**	-1...10	-14.5…145	75	1085	150	2175
PN3096	0...2.5	0…36.2	20	290	50	725
PN3097	0...1	0…14.5	10	145	30	450
PN3129	-1...0	-14.5...0	20	290	50	725
Pressure sensors with external thread G¼						
PN3560	0...600	0…8700	800	11580	2500	36250
PN3570	0...400	0...5800	800	11580	1700	24650
PN3571	0...250	0...3620	500	7250	1100	15950
PN3592**	0...100	0...1450	300	4350	650	9400
PN3593**	0...25	0...362	150	2175	350	5075
PN3594**	-1...10	-14.5...145	75	1085	150	2175
PN3596	0...2.5	0...36.2	20	290	50	725
PN3597	0...1	0...14.5	10	145	30	450
PN3529	-1...0	-14.5...0	20	290	50	725

*) With static overload pressure or max. 100 million pressure cycles.
**) Use devices with a measuring range ≥ 250 bar for gas applications > 25 bar!

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

Avoid static and dynamic overpressure exceeding the specified pressure resistance 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!

Pressure Equipment Directive (PED):
The units comply with article 3, section (3) of the Directive 97/23/EC and are designed and manufactured for "non-superheated liquids" of group 2 fluids in accordance with the sound engineering practice.

Restriction for stable gases according to PED → 2 Safety instructions.

4 Function

- The unit displays the current system pressure.
- It generates output signals according to the operating mode and the parameter setting.
- Parameter setting via ifm's parameter setting software.
  Accessories → www.ifm.com.

4.1 Communication, parameter setting, evaluation

OUT1 (pin 4)	• Switching signal for system pressure limit value
OUT2 (pin 2)	• Analogue signal 4...20 mA / 0...10 V

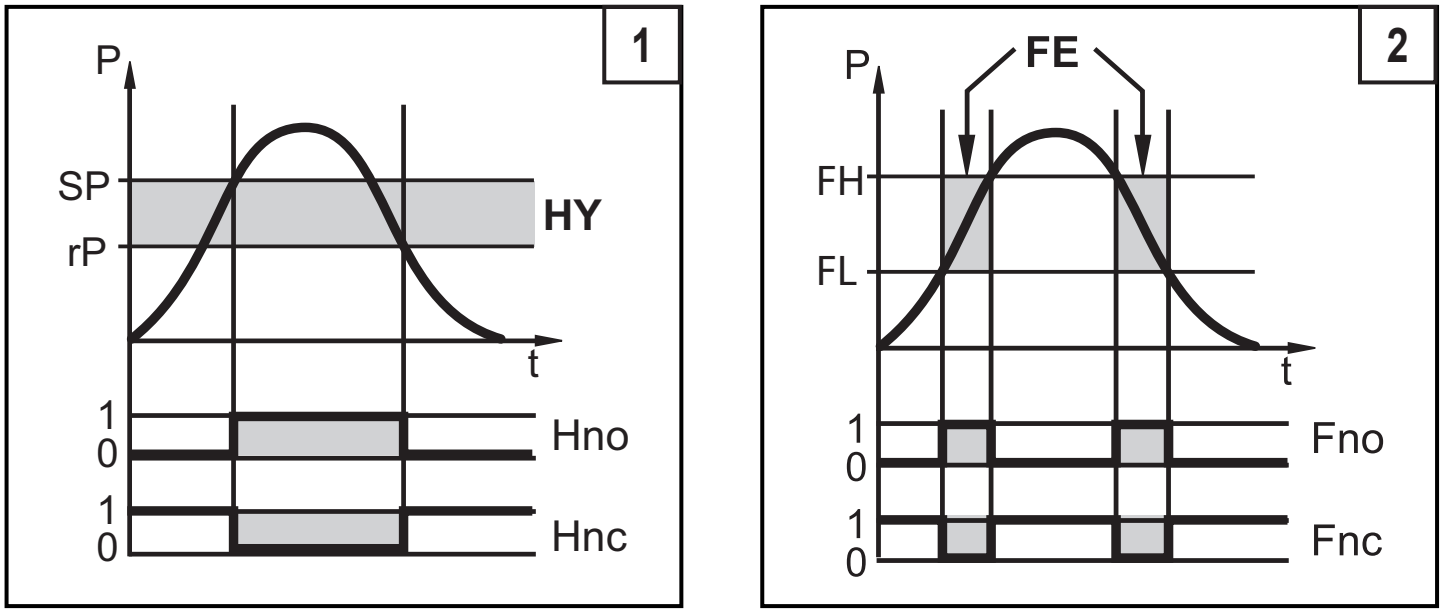
4.2 Switching function

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).
  The hysteresis defined remains even if SPx is changed again.
- 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 FH1 and FL1. FH1 = upper value, FL1 = lower value.



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

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]).

PN3094 und PN3594:
Analogue signal 4...20 mA / 0...10 V corresponds to the measuring range 0...10 bar.
Negative pressure values cannot be represented via the analogue output for the indicated units.

5 Installation

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

▶ Insert the unit in a G¼ (to DIN EN ISO 1179-2) process connection.

▶ Tighten firmly. Recommended tightening torque:

Pressure range in bar	Tightening torque in Nm
-1...400	25...35
600	30...50
Depends on lubrication, seal and pressure load!	

6 Electrical connection

The unit must be connected by a qualified electrician.

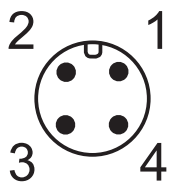
The national and international regulations for the installation of electrical equipment must be adhered to.

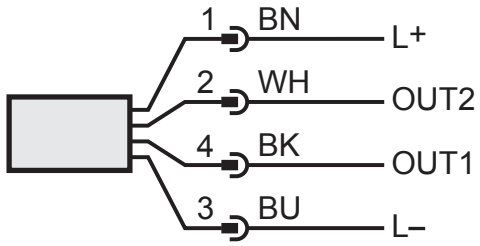
Voltage supply according to EN 50178, SELV, PELV.

▶ Disconnect power.

▶ Connect the unit as follows:

Core colours	
BK	black
BN	brown
BU	blue
WH	white





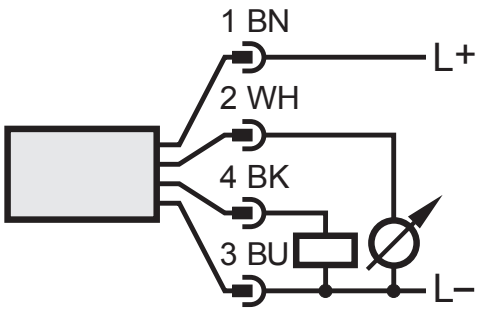
OUT1: Switching output

OUT2: Analogue output

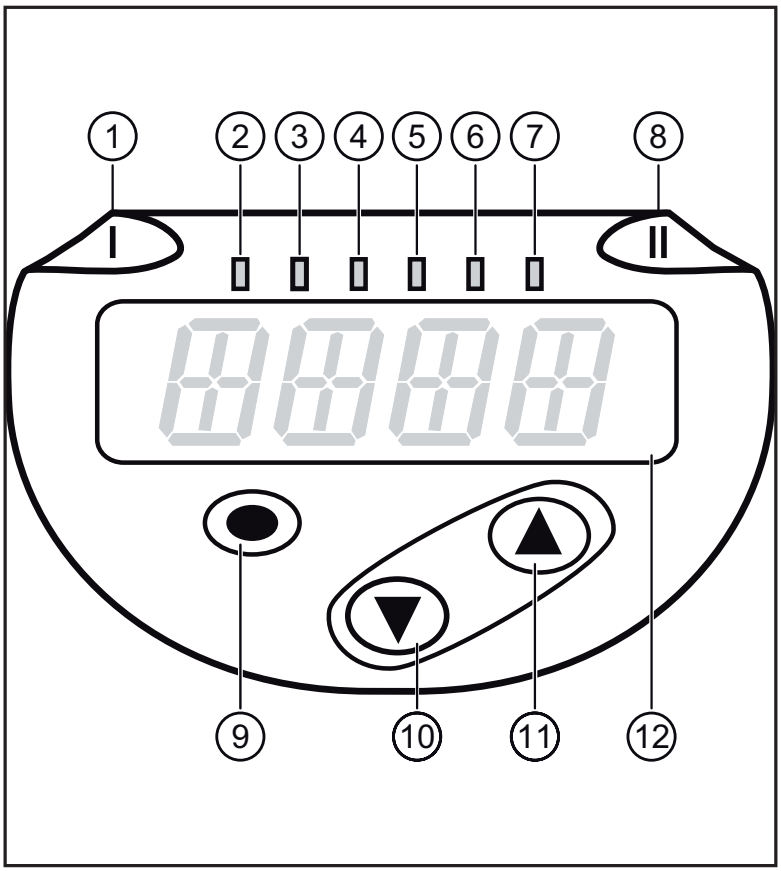
Colours to DIN EN 60947-5-2

Example circuit

1 x positive switching / 1 x analogue



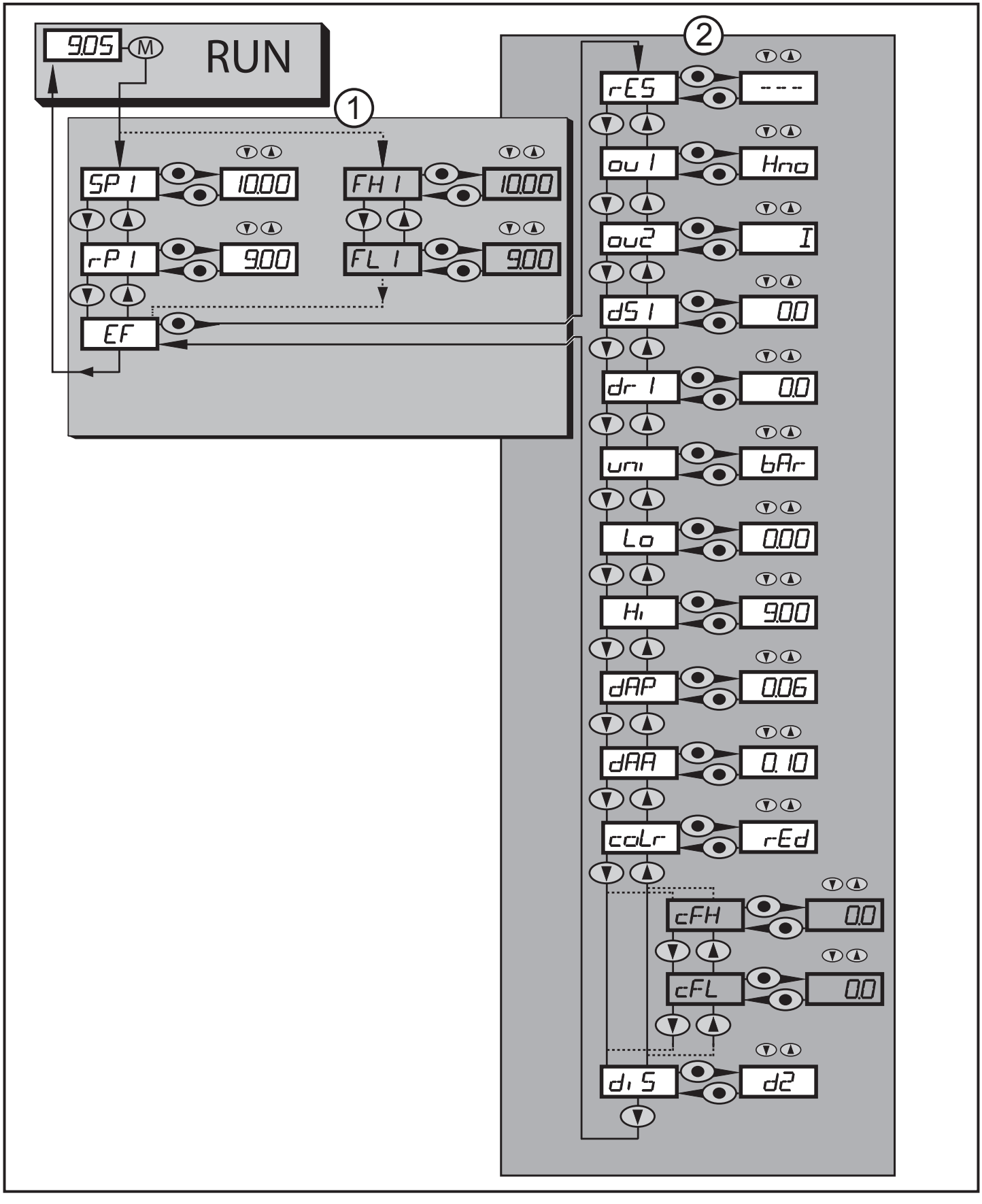
7 Operating and display elements



1 to 8: Indicator LEDs	
LED 1	Switching status OUT1 (lights when output 1 is switched).
LED 8	No function
LEDs 2 - 7	System pressure in the indicated unit of measurement.
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. - 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.

8.2 Explanation of the menu

8.2.1 Explanation of the menu level 1

SP1/rP1	Upper / lower limit value for system pressure at which OUT1 switches with hysteresis setting. SP1/rP1 is displayed if the parameter [Hno] or [Hnc] for OUT1 was set in the extended functions "EF" menu.
FHx/FLx	Upper / lower limit value for system pressure at which OUT1 switches with window setting. FH1/FL1 appears when the parameter [Fno] or [Fnc] was set for OUT1 in the menu Extended Functions "EF".
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: • 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: • Analogue signal for the current system pressure: 4...20 mA [I] or 0...10 V [U]
dS1	Switch-on delay for OUT1.
dr1	Switch-off delay for OUT1.
uni	Standard unit of measurement for system pressure (display): [bAr] / [mbar] / [MPA] / [kPA] / [PSI] / [inHG].
Lo	Minimum value memory for system pressure.
Hi	Maximum value memory for system pressure.
dAP	Damping of the measured signal.
dAA	Damping for the analogue output
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.

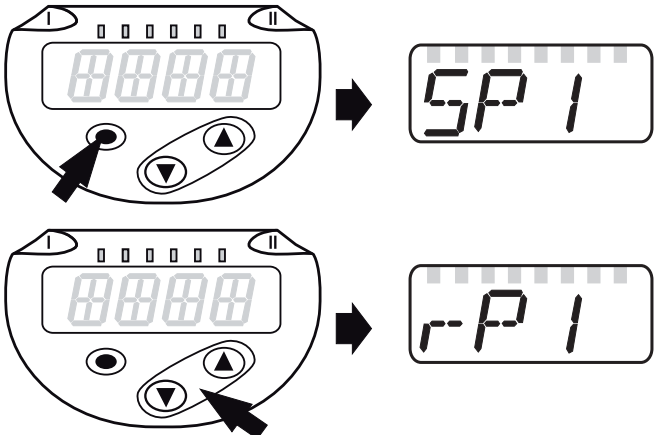
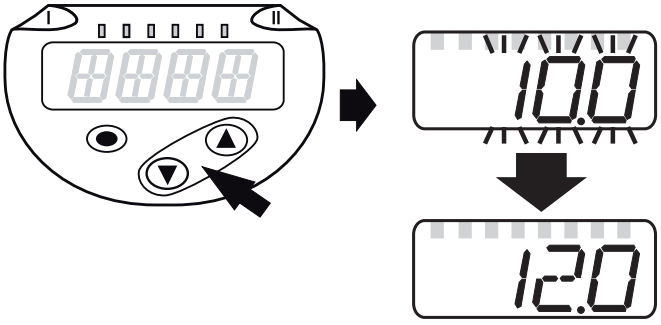
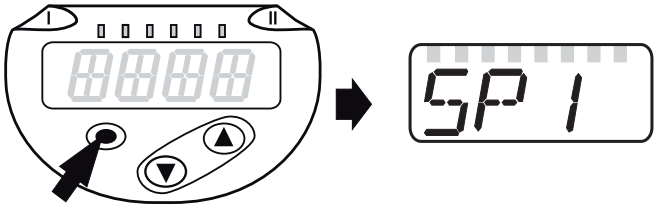
9 Parameter setting

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:

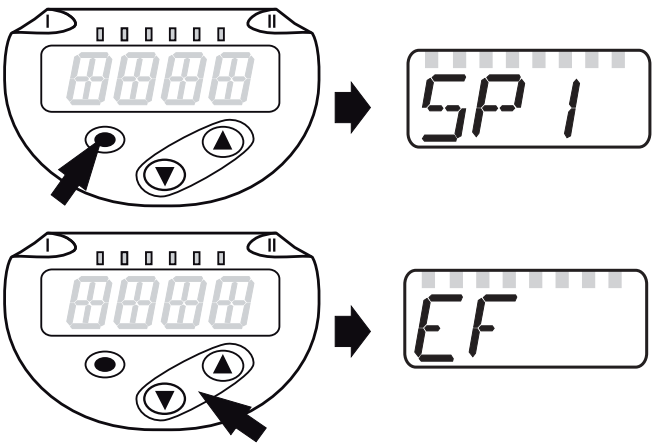
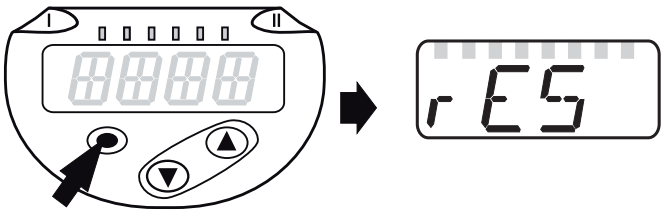
<table>
<tr><td>1</td><td>Select parameter
▶ Press [●] to get to the menu.

▶ Press [▲] or [▼] until the requested parameter is displayed.</td><td>  </td></tr>
<tr><td rowspan="2">2</td><td>Set parameter value
▶ Press [●] to edit the selected parameter.
▶ press [▲] or [▼] for at least 1 s.
> After 1 s: setting value is changed: incrementally by pressing the button once or continuously by keeping the button pressed.</td><td>  </td></tr>
<tr><td colspan="2">Numerical values are incremented continuously with [▲] or decremented with [▼].</td></tr>
<tr><td>3</td><td>Acknowledge parameter value
▶ Briefly press [●].
> The parameter is displayed again. The new setting value is saved.</td><td>  </td></tr>
<tr><td colspan="3">Set other parameters
▶ Press [▲] or [▼] until the requested parameter is displayed.</td></tr>
<tr><td colspan="3">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.</td></tr>
</table>

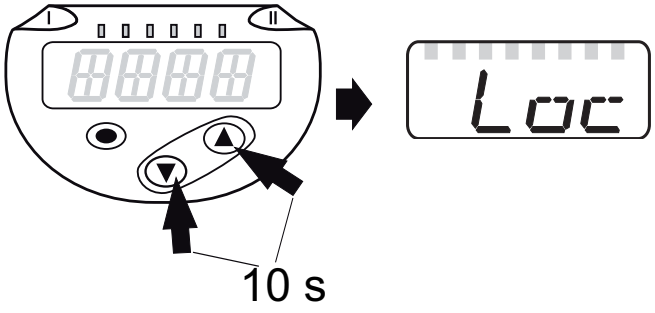
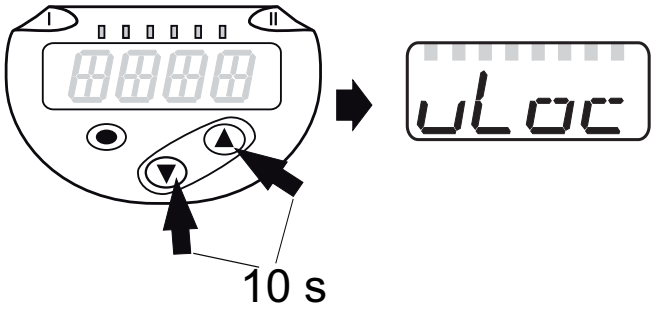
If [C.Loc] is displayed when attempting to change a parameter value, a change is made via a parameter setting software at the same time (temporary locking).

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. ▶ Press [▼] until [EF] is displayed	
▶ Press [●]. > The first parameter of the submenu is displayed (here: [rES]).	

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

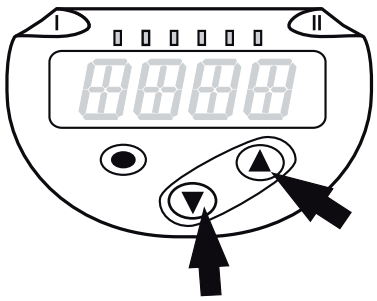
▶ Make sure that the unit is in the normal operating mode. ▶ Press [▲] + [▼] simultaneously for 10 s. > [Loc] is displayed.	
During operation: [Loc] is briefly displayed if you try to change parameter values.	
For unlocking: ▶ Make sure that the unit is in the normal operating mode. ▶ Press [▲] + [▼]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

On delivery: not locked.

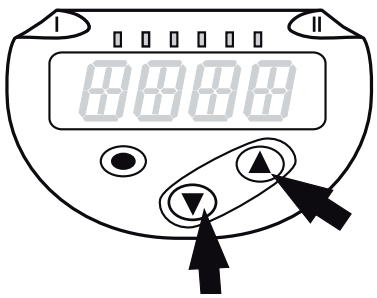
- Timeout:

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

- Leaving the menu level

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

9.2 Configure display (optional)

▶ Select [Uni] and set the unit of measurement: - [bAr], [mbAr], - [MPA], [kPA], - [PSI], - [inHG] The selectable units of measurement depend on the respective unit.	
▶ 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. - [rd1], [rd2], [rd3]: display as for d1, d2, d3; rotated by 180°. - [OFF] = The measured value display is deactivated in the Run mode. The LEDs remain active even if the display is deactivated. Error messages are displayed even if the display is deactivated.	
Even with unsteady pressure characteristics [d1] provides optimum readability; the corresponding algorithms are stored.	

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9.3 Set output signals

9.3.1 Set output functions

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

9.3.2 Define switching limits for the hysteresis function

▶ [ou1] must be set as [Hno] or [Hnc]. ▶ Select [SP1] and set the value at which the output switches.	
▶ Select [rP1] and set the value at which the output is reset. rP1 is always smaller than SP1. The unit only accepts values which are lower than SP1.	

9.3.3 Define switching limits for the window function

▶ [ou1] must be set as [Fno] or [Fnc]. ▶ Select [FH1] and set the upper limit value.	FH 1
▶ Select [FL1] and set the lower limit value. FL1 is always lower than FH1. The unit only accepts values which are lower than the value for FH1.	FL 1

9.4 User settings (optional)

9.4.1 Set delay for the switching outputs

[dS1] = switch-on delay for OUT1. [dr1] = switch-off delay for OUT1 ▶ Select [dS1] or [dr1] and set a value between 0 and 50 s (at [0] the delay time is not active).	dS 1 dr 1
For this unit the parameters [dS1] und [dr1] for the set and reset points are designed strictly to the VDMA guideline.	

9.4.2 Set damping for the switching signal

▶ Select [dAP] and set a damping constant in seconds (τ value: 63 %); Setting range 0.000...4.000 s.	dAP

9.4.3 Set damping for the analogue output

▶ Select [dAA] and set a value between 0.01...4.00 s (at 0.00 [dAA] is not active). dAA value = response time between pressure change and change of the output signal in seconds.	dAA

9.4.4 Read min/max values for the system pressure

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

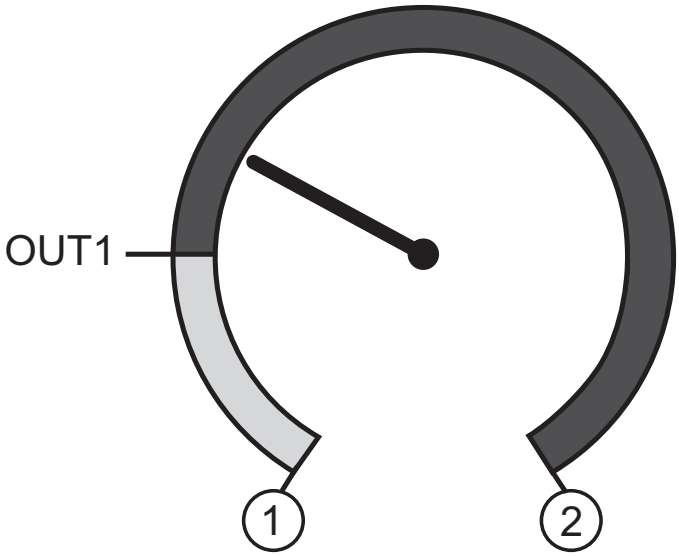
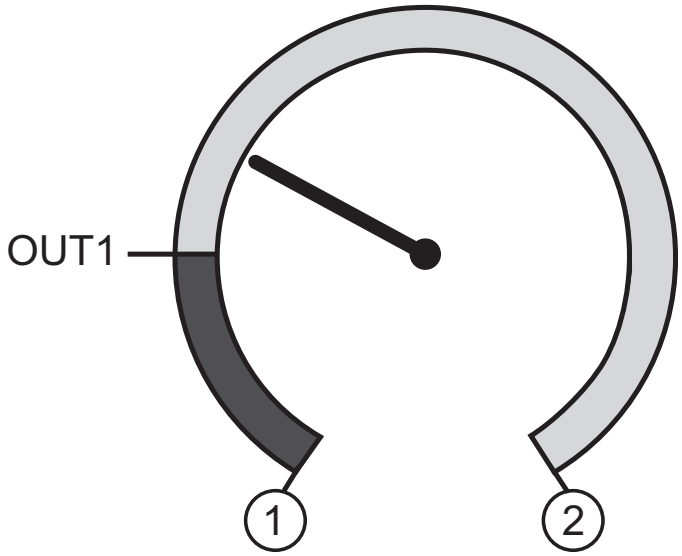
9.4.5 Reset all parameters to factory setting

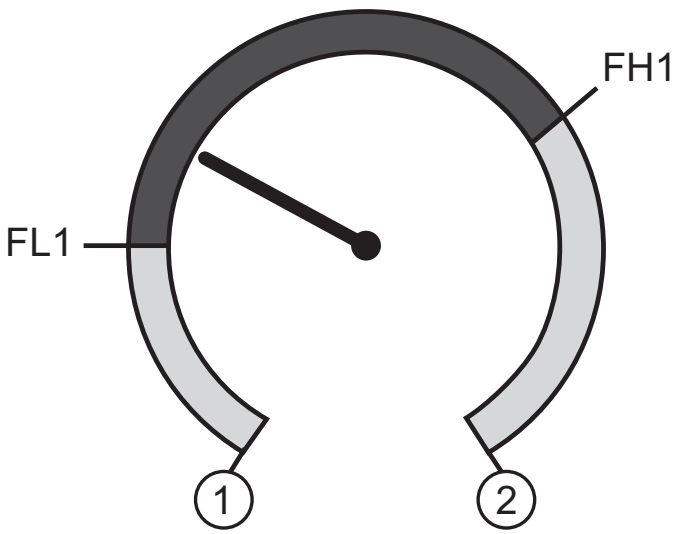
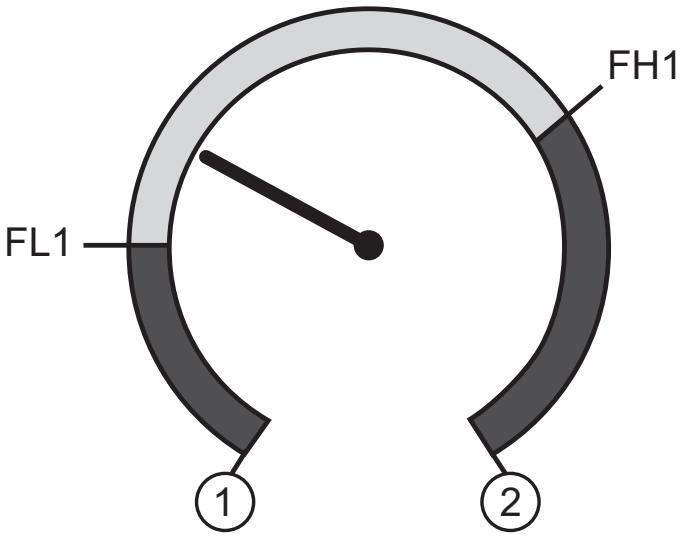
▶ Select [rES]. ▶ Press [●]. ▶ Press and hold [▲] or [▼] until [----] is displayed. ▶ Briefly press [●]. We recommend noting down your own settings before carrying out a reset (→ 12 Factory setting).	rES

9.4.6 Set colour change of the display

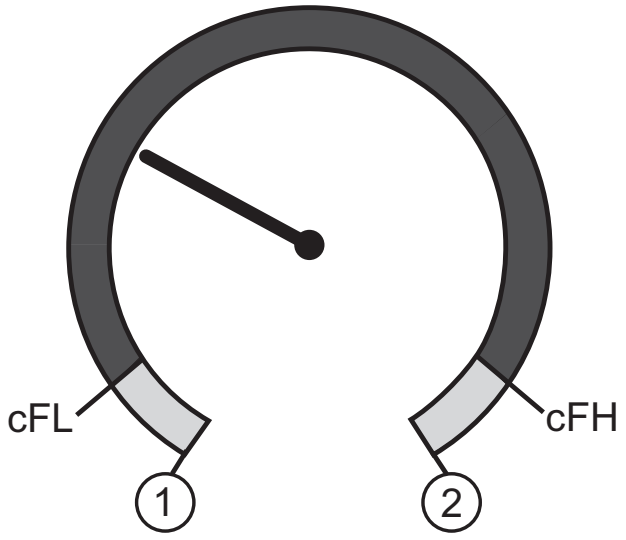
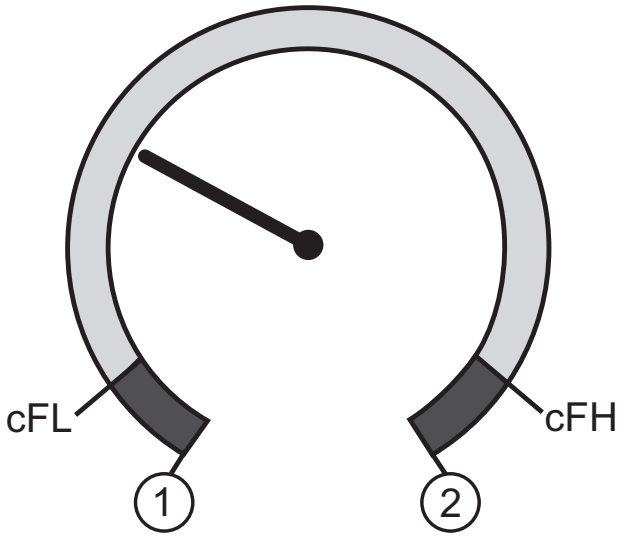
▶ Select [coLr] and set the function: - [rEd] = display colour red (independent of the measured value). - [GrEn] = display colour green (independent of the measured value). - [r1ou] = display colour red when OUT1 switches. - [G1ou] = display colour green when OUT1 switches. - [[r-cF] = Display colour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

9.4.7 Graphical depiction of the colour change of the display

Display colour change with parameter **[r1ou]**, mode **hysteresis function**	Display colour change with parameter **[G1ou]**, mode **hysteresis function**
	
Measured value > switch point OUT1; Display = red	Measured value > switch point OUT1; Display = green

Display colour change with parameter **[r1ou]**, mode **window function**	Display colour change with parameter **[G1ou],** mode **window function**
	
Measured value between FL1 and FH1; Display = red	Measured value between FL1 and FH1; Display = green

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

Display colour change with parameter **[r-cF]** .	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.

Operating indicators → 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	Corrective measures
none			Supply voltage too low.	▶ Check / correct the supply voltage.
SC1	flashes		Excessive current at switching output OUT1 *).	▶ Check switching output OUT1 for short-circuit or excessive current; remove the fault.
C.Loc			Parameter setting via pushbuttons locked, parameter setting via parameter setting software (→ 9.1)	▶ Wait for parameter setting via parameter setting software to end.
S.Loc			Setting buttons locked via parameter software. Parameter change is rejected (→ 9.1).	▶ Unlocking only possible via the parameter setting software.
OL			Process value too high. (measuring range exceeded)	▶ Check / reduce system pressure / select unit with corresponding measuring range.
UL			Process value too low (value below measuring range).	▶ Check / increase system pressure / select unit with corresponding measuring range.
Err flashes			Internal fault	▶ Contact the manufacturer

*) 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		ΔP
		min	max	min	max	
PN3160 PN3560	bar	4	600	2	598	2
	psi	40	8700	20	8680	20
	MPa	0.4	60	0.2	59.8	0.2
PN3070 PN3570	bar	4	400	2	398	2
	psi	40	5800	20	5780	20
	MPa	0.4	40	0.2	39.8	0.2
PN3071 PN3571	bar	2	250	1	249	1
	psi	40	3620	20	3600	20
	MPa	0.2	25	0.1	24.9	0.1
PN3092 PN3592	bar	1	100	0.5	99.5	0.5
	psi	10	1450	5	1445	5
	MPa	0.1	10	0.05	9.95	0.05
PN3093 PN3593	bar	0.2	25	0.1	24.9	0.1
	psi	4	362	2	360	2
	MPa	0.02	2.5	0.01	2.49	0.01
PN3094 PN3594	bar	-0.9	10	-0.95	9.95	0.05
	psi	-13.5	145	-14	144.5	0.5
	MPa	-0.09	1	0.095	0.995	0.005
PN3096 PN3596	bar	0.02	2.5	0.01	2.49	0.01
	psi	0.4	36.2	0.2	36	0.2
	kPa	2	250	1	249	1
PN3097 PN3597	mbar	10	1000	5	995	5
	psi	0.1	14.5	0.05	14.45	0.05
	kPa	1	100	0.5	99.5	0.5
	inHG	0.2	29.5	0.1	29.4	0.1

ΔP = step increment

		SP		rP		ΔP
		min	max	min	max	
PN3129 **PN3529**	mbar	-990	0	-995	-5	5
	psi	-14.4	0	-14.5	-0.05	0.05
	kPa	-99	0	-99.5	-0.5	0.5
	inHG	-29.3	0	-29.4	-0.1	0.1

ΔP = step increment

11.2 Further technical data

Further technical data and scale drawing at:
www.ifm.com → New search → Enter article number.

12 Factory setting

	Factory setting	User setting
SP1 / FH1	25% MEW ***	
rP1 / FL1	23% MEW ***	
ou1	Hno	
ou2	I	
dS1	0.0	
dr1	0.0	
dAP	0.06	
dAA	0.10	
uni	bAr / mbAr	
coLr	rEd	
cFH	MEW *	
cFL	MAW **	
diS	d2	

* = Final value of the measuring range (MEW)

** = Intitial value of the measuring range (MAW)

*** = The indicated percentage of the final value of the measuring range (MEW) of the respective sensor (for PN3xx9 the percentage of the measuring span) is set.

More information at www.ifm.com