ifm electronic

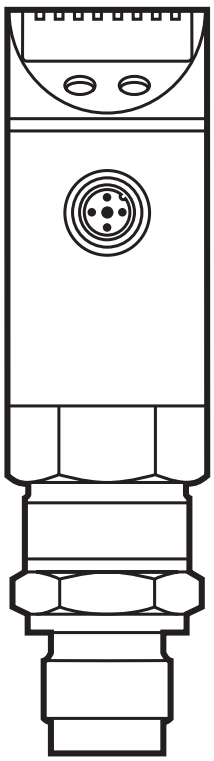
CE

Operating instructions
Combined pressure sensor

efectorsoo

PY2033

UK



80010149 / 00 05 / 2014

Contents

1 Preliminary note

1.1 Symbols used

▶ Instructions

> Reaction, result

[…] Designation of keys, buttons or indications

→ Cross-reference

Important note
Non-compliance can result in malfunction or interference.

UK

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.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application. That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.
- In order to guarantee the correct condition of the device for the operating time it is necessary to use the device only for media to which the wetted materials are sufficiently resistant (→ Technical data).
- The responsibility whether the measurement devices are 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 results in a loss of the warranty claims.

3 Functions and features

The unit monitors the system pressure of machines and installations.

Applications

Type of pressure: relative pressure

Order no.	Measuring range		Permissible overpressure		Bursting pressure	
	bar	PSI	bar	PSI	bar	PSI
PY2033	-1...25	-14.5...362.5	100	1450	200	2900

MPa = bar ÷ 10 / kPa = bar × 100

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!

4 Function

4.1 Evaluation

- 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	• Switching signal for system pressure limit value. • Analogue signal for system pressure (4...20 mA or 0...10 V).

4.2 Switching function

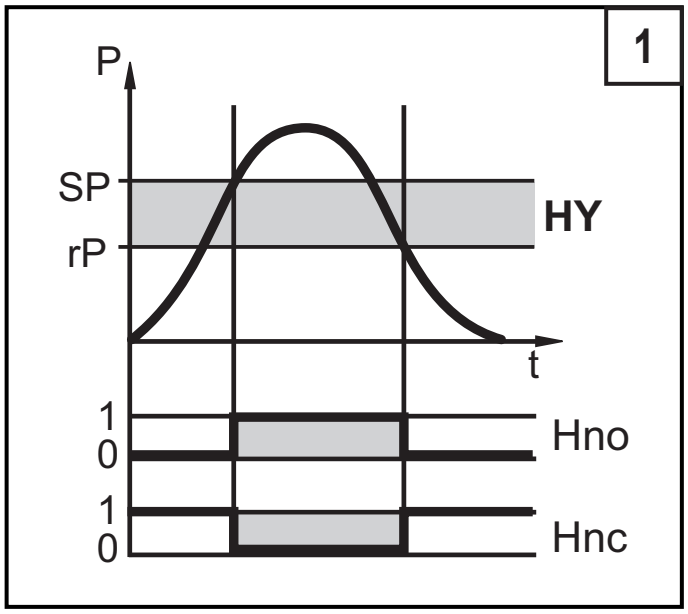
OUTx changes its switching state if it is above or below the set switching limits (SPx, rPx). The following switching functions can be selected:

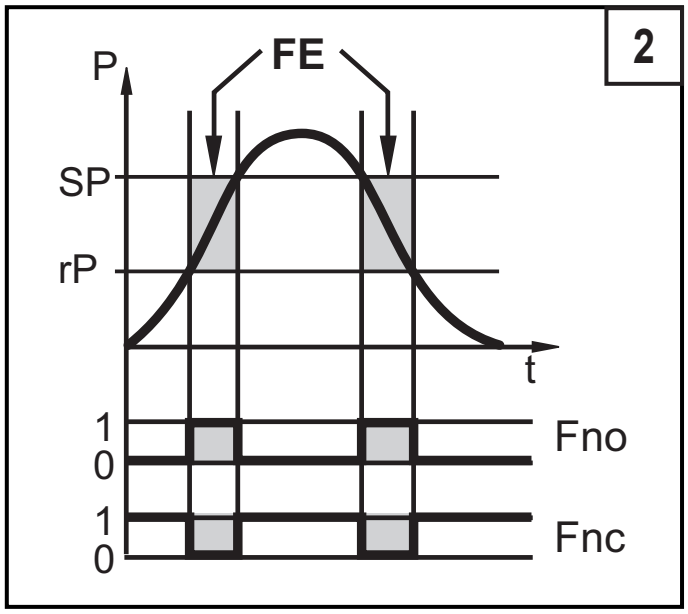
- Hysteresis function / normally open: [OUx] = [Hno] (→ fig. 1).
- Hysteresis function / normally closed: [OUx] = [Hnc] (→ fig. 1).

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

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

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





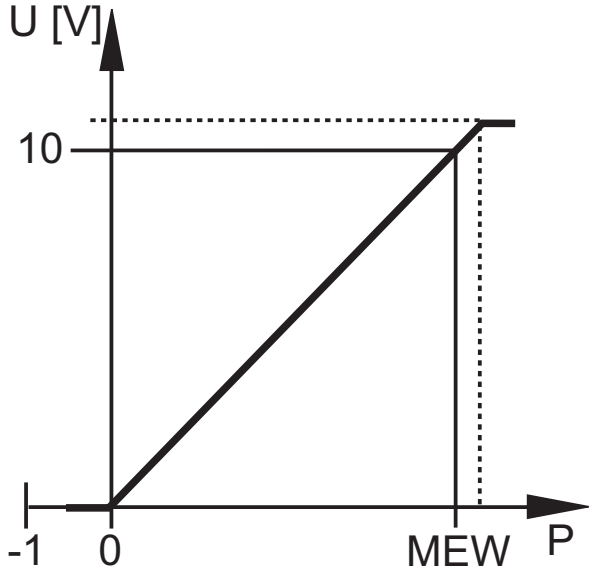
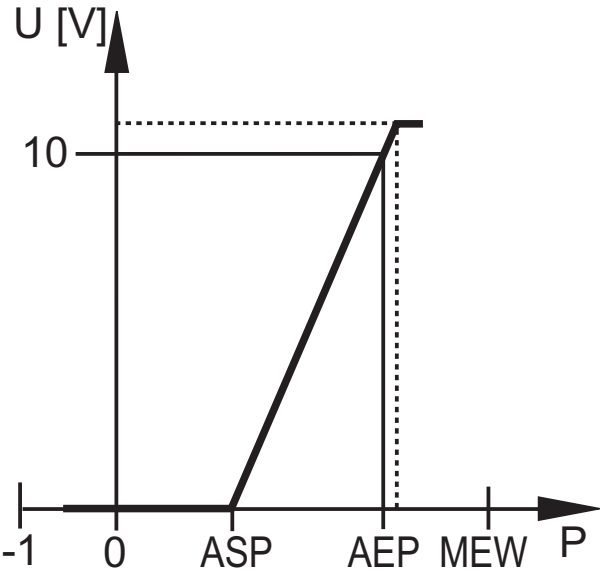
P = system pressure; HY = hysteresis; FE = window

4.3 Analogue function

- [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 [ASP] determines at which measured value the output signal is 4 mA or 0 V.
- Analogue end point [AEP] determines at which measured value the output signal is 20 mA or 10 V.

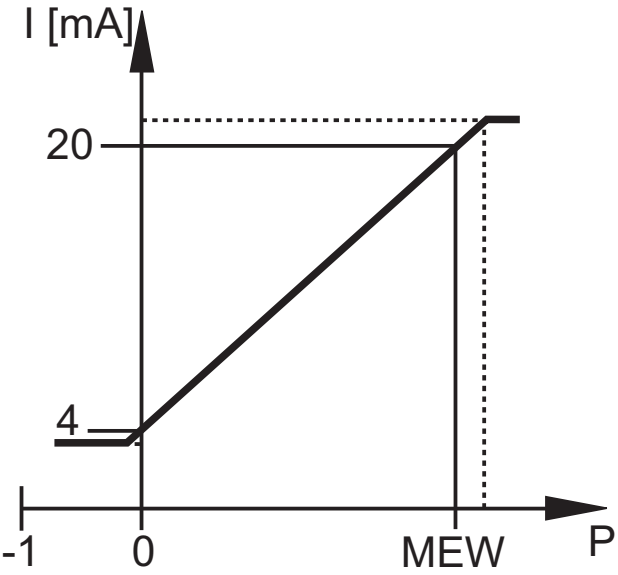
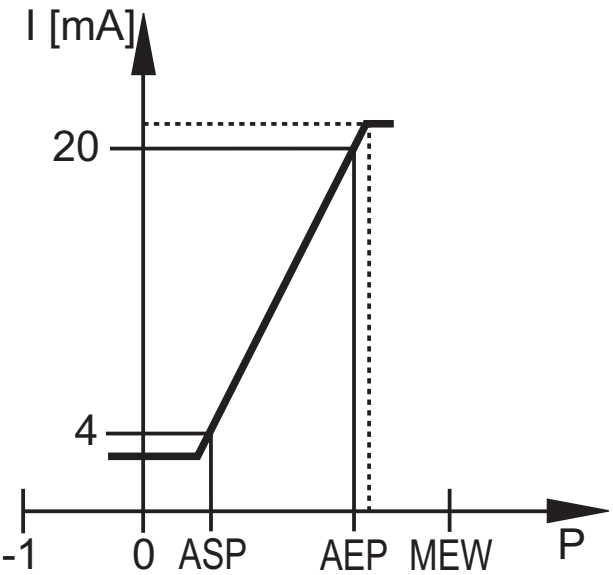
Minimum distance between [ASP] and [AEP] = 25 % of the span.

Voltage output 0 ... 10 V

Factory setting	Measuring range scaled
	

P = system pressure, MEW = final value of the measuring range
In the set measuring range the output signal is between 0 and 10 V.
It is also indicated:
System pressure above the measuring range: output signal > 10 V.

Current output 4...20 mA

Factory setting	Measuring range scaled
	

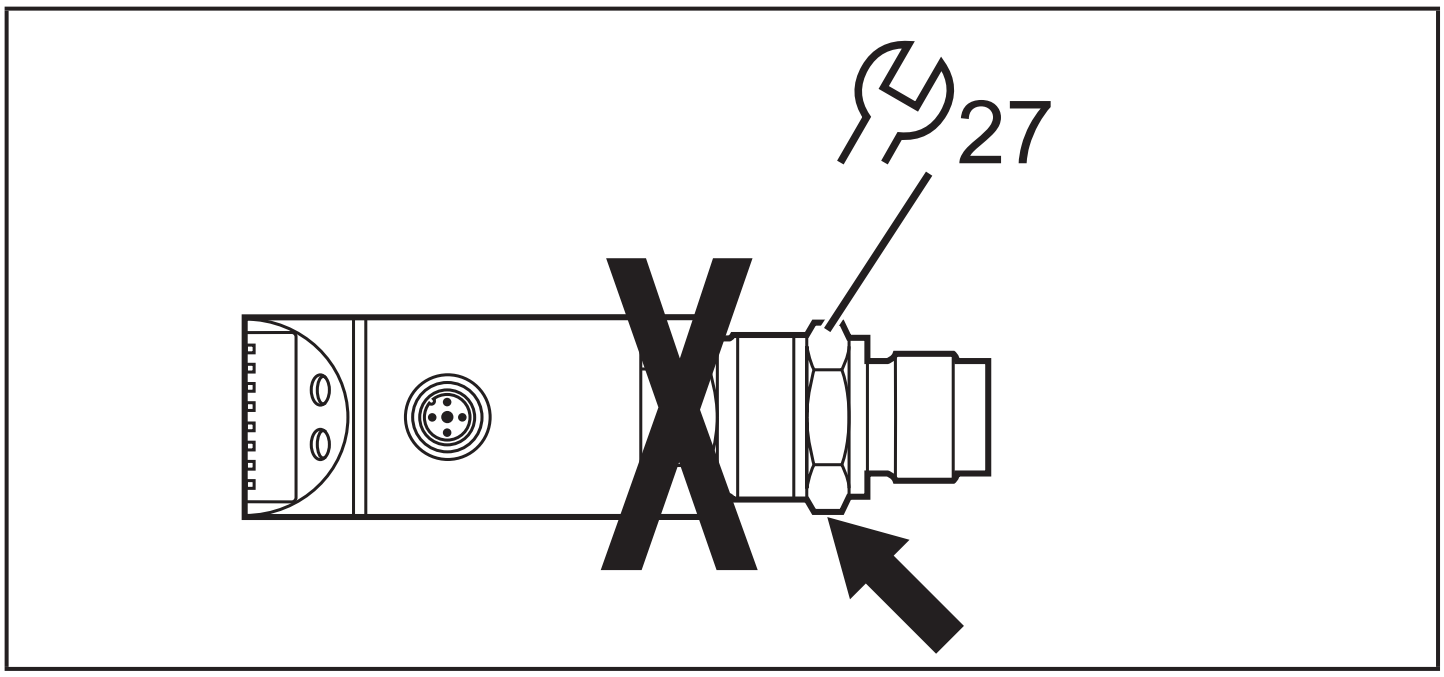
P = system pressure, MEW = final value of the measuring range
In the set measuring range the output signal is between 4 and 20 mA.
It is also indicated:

- System pressure above the measuring range: output signal > 20 mA.
- System pressure below the measuring range: 4...3.8 mA.

5 Installation

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

- ▶ Insert the unit in a G½ process connection.
- ▶ Tighten firmly. Recommended tightening torque: 25…35 Nm.

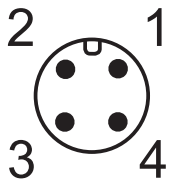


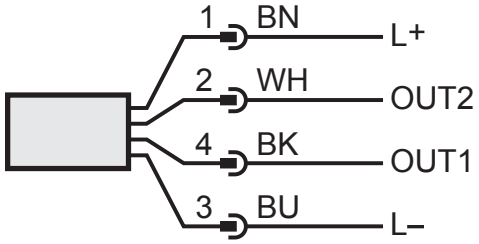
6 Electrical connection

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.

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

Core colours	
BK	black
BN	brown
BU	blue
WH	white

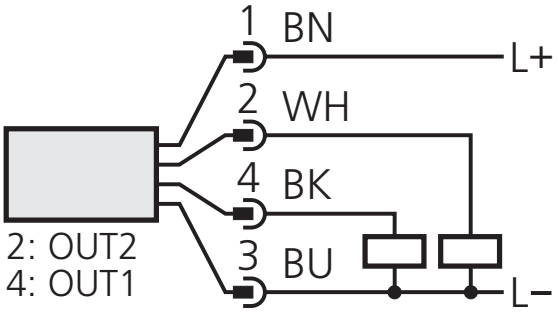




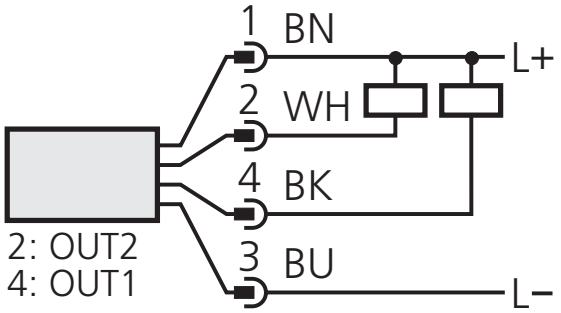
OUT1: Switching output
OUT2: Switching output / analogue output
Colours to DIN EN 60947-5-6

Example circuits

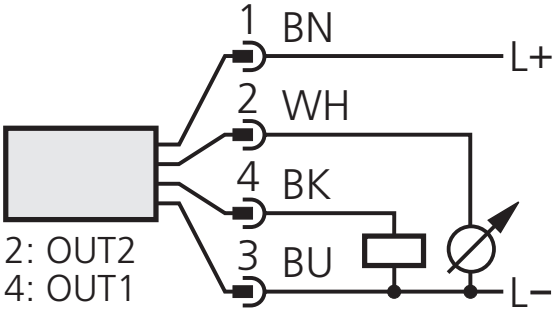
2 x positive switching



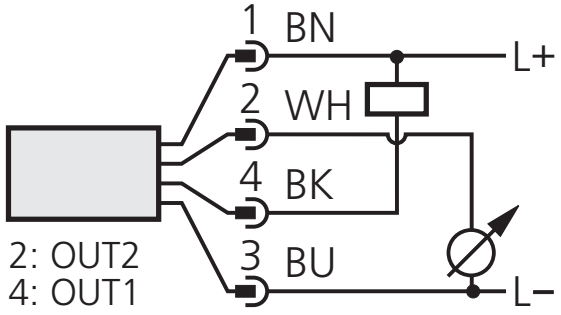
2 x negative switching



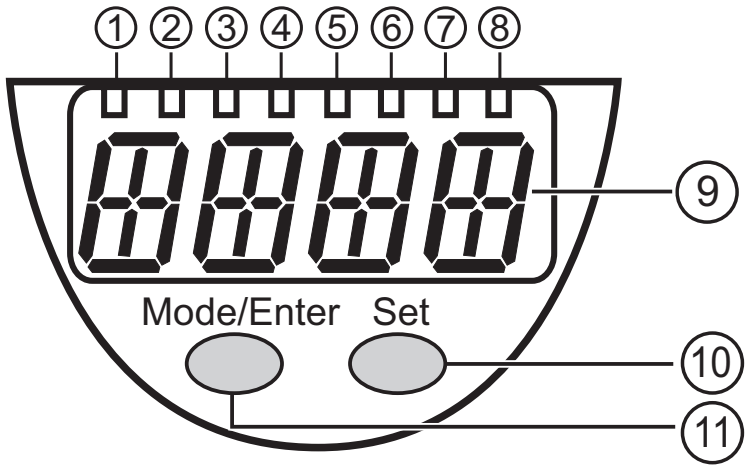
1 x positive switching / 1 x analogue



1 x negative switching / 1 x analogue



7 Operating and display elements



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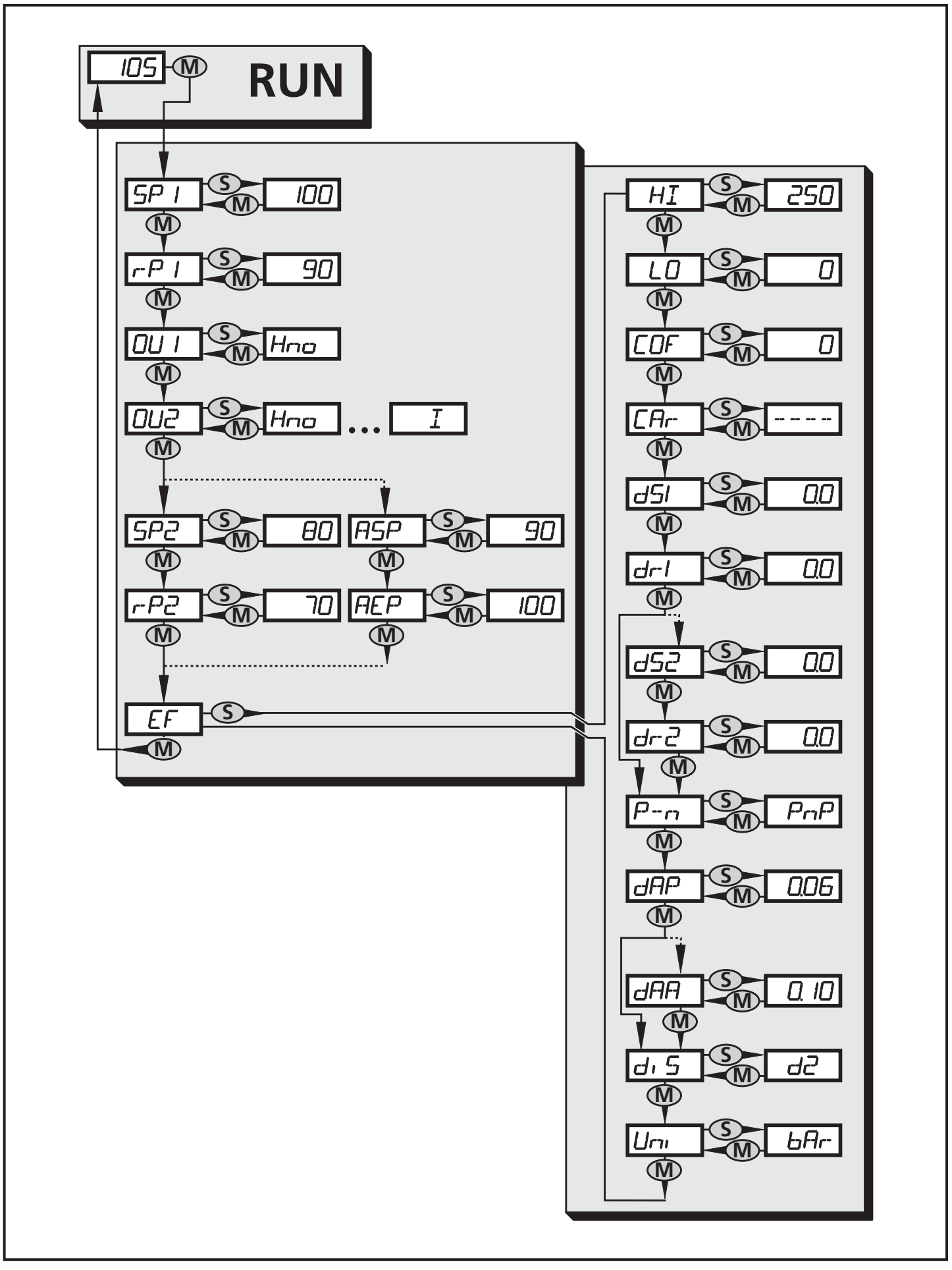
1 to 8: indicator LEDs
- LED 1 to LED 6 = system pressure in the unit of measurement which is indicated on the label. - For units with 3 adjustable units of measurement, LEDs 4 to 6 are not used, - for units with 4 adjustable units of measurement, LEDs 5 and 6 are not used. - LED 7, LED 8 = switching status of the corresponding output.
9: Alphanumeric display, 4 digits
- Display of the current system pressure. - Indication of the parameters and parameter values.
10: Set button
- Setting of the parameter values (scrolling by holding pressed; incremental by pressing once).
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

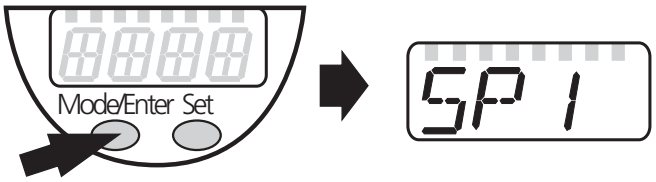
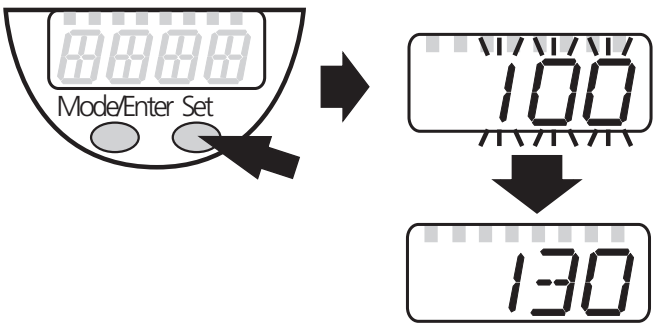
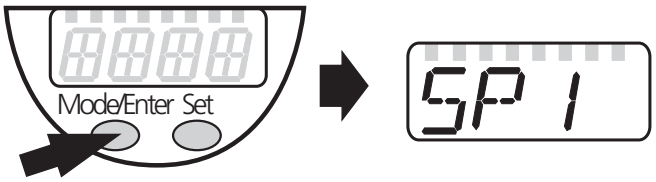
SP1/rP1	Upper / lower limit value for system pressure at which OUT1 switches.
SP2/rP2	Upper / lower limit value for system pressure at which OUT2 switches.
OU1	Output function for OUT1: • Switching signal for the pressure limit values: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc].
OU2	Output function for OUT2: • Switching signal for the pressure limit values: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc]. • Analogue signal for the current system pressure: 4...20 mA [I] or 0...10 V [U].
ASP	Analogue start point for system pressure: Measured value at which 4 mA / 0 V are provided.
AEP	Analogue end point for system pressure: Measured value at which 20 mA / 10 V are provided.
EF	Extended functions / opening of menu level 2.
HI	Maximum value memory for system pressure.
LO	Minimum value memory for system pressure.
COF	Zero-point calibration.
CAr	Reset of the zero-point calibration.
dS1/dS2	Switch-on delay for OUT1 / OUT2.
dr1/dr2	Switch-off delay for OUT1 / OUT2.
P-n	Output logic: pnp / npn.
dAP	Damping for the switching outputs.
dAA	Damping for the analogue output.
diS	Update rate and orientation of the display.
Uni	Standard unit of measurement for system pressure.

9 Parameter setting

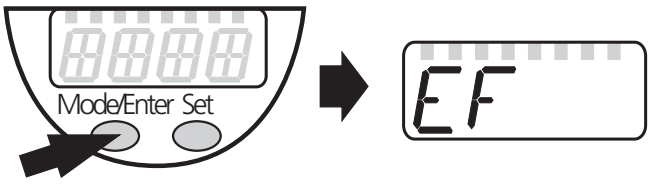
During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameters until the parameter setting has been completed.

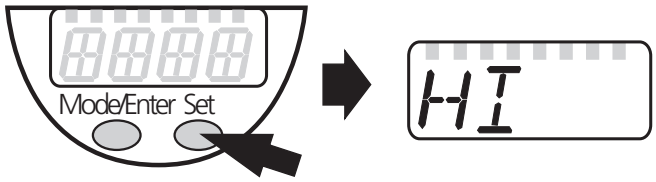
9.1 Parameter setting in general

3 steps must be taken for each parameter setting:

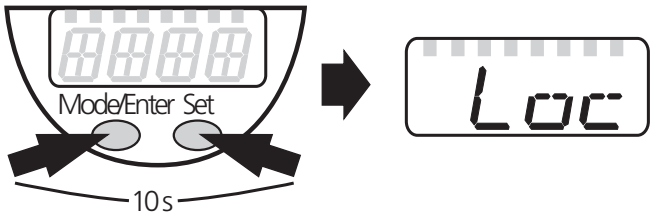
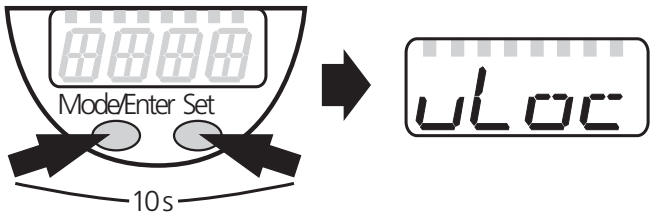
1	**Select parameter** ▶ Press [Mode/Enter] until the requested parameter is displayed.	
2	**Set parameter value** ▶ Press and hold [Set]. > Current setting value of the parameter flashes for 5 s. > After 5 s: setting value is changed: incrementally by pressing the button once or continuously by keeping the button pressed.	
	Numerical values are incremented continuously. For reducing the value: let the display move to the maximum setting value. Then the cycle starts again at the minimum setting value.	
3	**Acknowledge parameter value** ▶ Briefly press [Mode/Enter]. > The parameter is displayed again. The new setting value is saved.	
Set other parameters ▶ Start again with step 1.		
Finish parameter setting ▶ Press [Mode/Enter] several times until the current measured value is displayed or wait for 15 s. > The unit returns to the operating mode.		

- Change from menu level 1 to menu level 2:

▶ Press [Mode/Enter] until [EF] is displayed.	

▶ Briefly press [Set]. > The first parameter of the submenu is displayed (here: [HI]).	

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

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

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 the output function

▶ Select [OU1] and set the function: [Hno] = hysteresis function/normally open, [Hnc] = hysteresis function/normally closed, [Fno] = window function/normally open, [Fnc] = window function/normally closed.	OU1
▶ Select [OU2] and set the function: [Hno] = hysteresis function/normally open, [Hnc] = hysteresis function/normally closed, [Fno] = window function/normally open, [Fnc] = window function/normally closed, [I] = current signal proportional to the pressure 4…20 mA, [U] = voltage signal proportional to the pressure 0...10 V.	OU2

9.2.2 Set switching limits

▶ Select [SP1] / [SP2] and set the value at which the output is set.	
▶ Select [rP1] / [rP2] and set the value at which the output is reset. rPx is always smaller than SPx. The unit only accepts values which are lower than the value for SPx.	

9.2.3 Scaling of the analogue value

▶ Select [ASP] and set the value at which 4 mA / 0 V is provided.	
▶ Select [AEP] and set the value at which 20 mA / 10 V is provided. Minimum distance between ASP and AEP = 25 % of the final value of the span (scaling factor 4).	

9.3 User settings (optional)

9.3.1 Set unit of measurement for the system pressure

▶ Select [Uni] and set the unit of measurement: [bAr] [MPA] [PSI]	

9.3.2 Configuration of the display

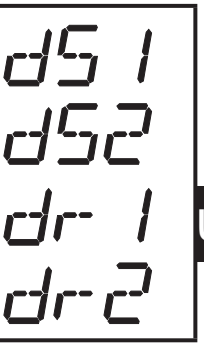
▶ Select [diS] and set the update rate and orientation of the display: [d1]: update of the measured values every 50 ms. [d2]: update of the measured values every 200 ms. [d3]: update of the measured values every 600 ms. [Ph]: display of the pressure peaks remains for a short time (peak hold). [rd1],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

9.3.3 Zero-point calibration

▶ 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.	

Zero-point calibration reset: ▶ Press [Mode/Enter] until [CAr] is displayed. ▶ Press and hold [Set] until [----] is displayed. ▶ Briefly press [Mode/Enter].	

9.3.4 Set delay for the switching outputs

[dS1] / [dS2] = switch-on delay for OUT1 / OUT2. [dr1] / [dr2] = switch-off delay for OUT1 / OUT2. ▶ Select [dS1], [dS2], [dr1] or [dr2] and set a value between 0.1 and 50 s (at 0.0 the delay time is not active).	

9.3.5 Set output logic for the switching outputs

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

9.3.6 Set damping for the switching outputs

▶ Select [dAP] and set a value between 0.01 and 4.00 s; (at 0.00 [dAP] is not active). dAP value = response time between pressure change and change of the switching status in seconds. [dAP] influences the switching frequency: f_{max} = 1 ÷ 2dAP.	

9.3.7 Set damping for the analogue output

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

9.4 Service functions

9.4.1 Read min/max values for the system pressure

▶ Select [HI] or [LO], briefly press [Set]. [HI] = maximum value, [LO] = minimum value. Delete memory: ▶ Select [HI] or [LO]. ▶ Press and hold [Set] until [----] is displayed. ▶ Briefly press [Mode/Enter].	

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 → chapter 7 Operating and display elements.

10.1 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.

10.2 Fault indications

[OL]	Overload pressure (measuring range exceeded)
[UL]	Underload pressure (below measuring range)
[SC1]	Short circuit in OUT1*
[SC2]	Short circuit in OUT2*
[SC]	Short circuit in both outputs*

*The output concerned is switched off as long as the short circuit exists.
These messages are displayed even if the display is switched off.

10.3 Setting ranges

		SP1 / SP2		rP1 / rP2		ASP		AEP		ΔP
		min	max	min	max	min	max	min	max	
PY2033	bar	-0.80	25.00	-0.90	24.90	-1.00	18.75	5.25	25.00	0.05
	PSI	-11.5	362.5	-13.0	361.0	-14.5	272.0	76.0	362.5	0.5
	MPa	-0.08	2.50	-0.09	2.49	-0.10	1.88	0.53	2.50	0.01

ΔP = step increment

11 Factory setting

	Factory setting	User setting
SP1	25 % VMR*	
rP1	23 % VMR*	
OU1	Hno	
OU2	I	
SP2	75 % VMR*	
rP2	73 % VMR*	
ASP	0	
AEP	100 % VMR*	
COF	0	
dS1	0.0	
dr1	0.0	
dS2	0.0	
dr2	0.0	
P-n	PnP	
dAP	0.06	
dAA	0.10	
diS	d2	
Uni	bAr	

* = the indicated percentage of the final value of the measuring range of the corresponding sensor is set in bar.
MEW = final value of the measuring range

More information at www.ifm.com