

ifm electronic



Operating instructions
Compressed air meters

efector 300[®]

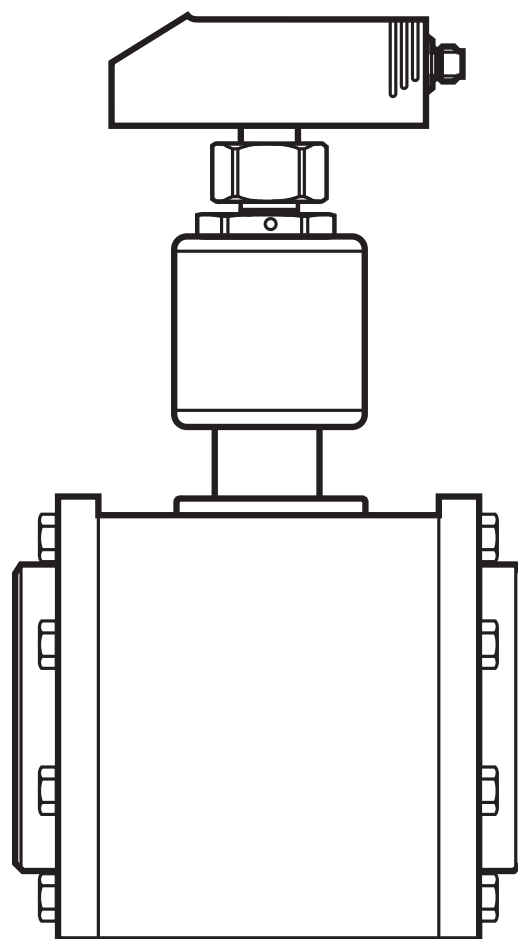
SDG082, SDG087

SDG102, SDG107

SDG152, SDG157

SDG202, SDG207

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1 Preliminary note

1.1 Symbols used

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



Important note

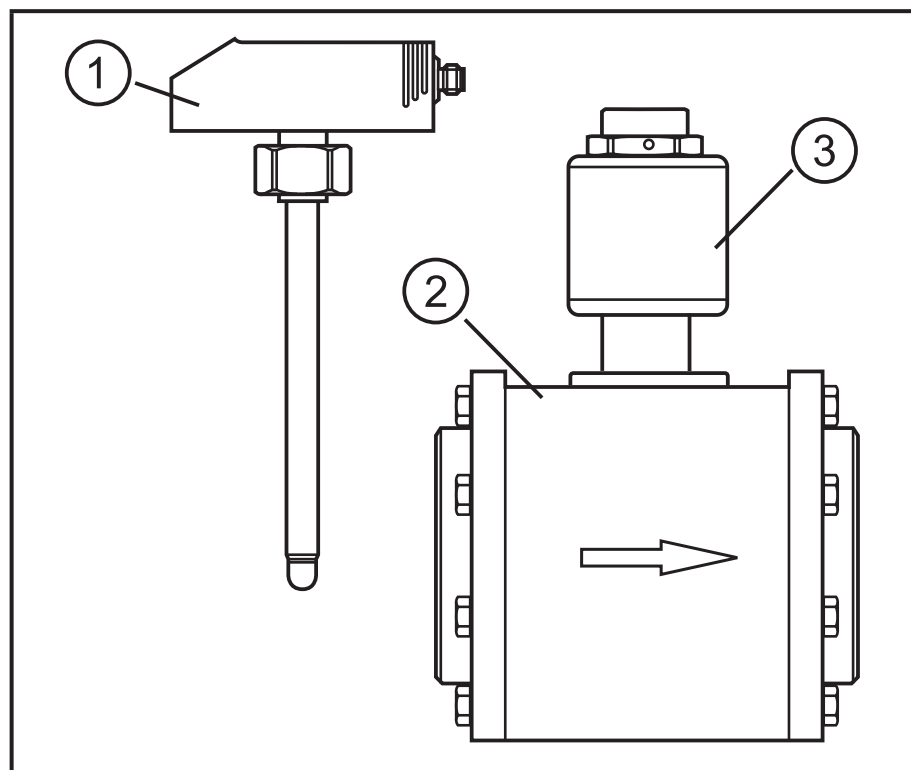
Non-compliance can result in malfunction or interference.

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.

- Ensure before mounting the components into or removing them from the compressed air system that the installation is at a standstill and no pressure is applied.
- 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 the device must only be used in media to which the wetted parts 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 result in a loss of the warranty claims.

3 Items supplied



1: flow sensor
 2: pipe section with
 quick-change fitting (3)

4 Functions and features

The unit monitors the standard volume flow of compressed air in industrial use. It detects the process categories volumetric flow quantity and consumed quantity. Application area: compressed air systems in industrial use.

All indications apply for standard volume flow to DIN ISO 2533, i.e. volume flow at 1013 hPa, 15 °C and 0 % relative air humidity.

The general operating conditions of compressed air equipment apply.

Pressure Equipment Directive (PED): Devices with a measuring section comply with art. 3 sec. (3) of the Directive 97/23/EC and are designed and manufactured for stable gases of the fluid group 2 in accordance with sound engineering practice.

5 Function

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5.1 Processing of the measured signals

- The unit displays the current process values.
- It generates 2 output signals according to the parameter setting.
OUT1 2 selection options parameter setting
switching signal for volumetric flow limit values (→ 10.2.1)
or pulse sequence for quantity meter (→ 10.3.1)
OUT2: 3 selection options
switching signal for volumetric flow limit values (→ 10.2.2)
or pulse sequence for quantity meter (→ 10.3.2)
or analogue signal for volumetric flow quantity (→ 10.2.3)

5.2 Volumetric flow monitoring

The flow is monitored by a calorimetric measuring system.

- 2 switching signals for volumetric flow limit values can be provided (output 1 and output 2). Switching functions → 5.4.
- An analogue signal which is proportional to the volumetric flow (4...20 mA) can be provided on output 2. Analogue function → 5.5.

5.3 Consumed quantity monitoring (totalizer function)

The unit has an internal quantity meter which continuously totals the volumetric flow. The sum corresponds to the current consumed quantity since the last reset.

- Output 1 and output 2 can be configured as pulse output.
Output 1 / output 2 provide a counting pulse each time when the value set in [ImPS] is reached (→ 10.3).
- The current meter reading can be displayed.
- In addition the value before the last reset is stored. This value can also be displayed.

The meter saves the totalled consumed quantity every 10 minutes. After a power failure

this value is available as the current meter reading. If a time-controlled reset is set, the elapsed time of the set reset interval is also stored. So the possible data loss can be maximum 10 minutes.

The meter can be reset as follows:

- Manual reset (→ 10.3.3.)
- Time-controlled automatic reset (→ 10.3.3.)
- Reset after overflow (→ 10.3.4)

5.4 Volumetric flow monitoring / 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:

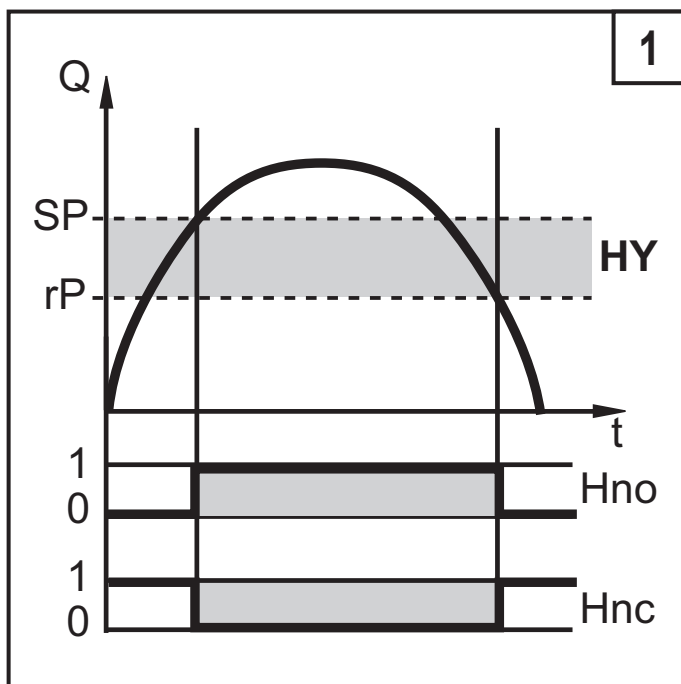
- Hysteresis function / normally open (figure 1): [OUx] = [Hno].
- Hysteresis function / normally closed (figure 1): [OUx] = [Hnc].

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

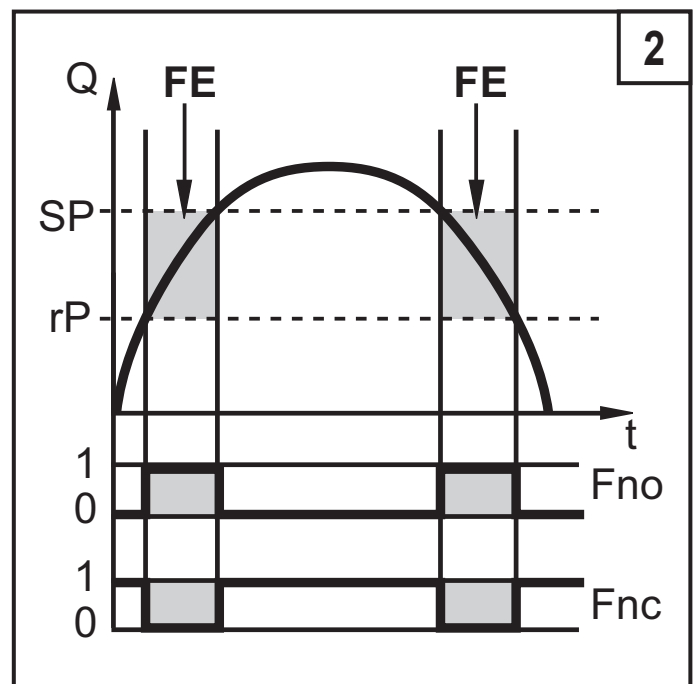
- Window function / normally open (fig. 2): [OUx] = [Fno].
- Window function / normally closed (figure 2): [OUx] = [Fnc].

The width of the window can be set by means of the difference between SPx and rPx.

SPx = upper value, rPx = lower value.



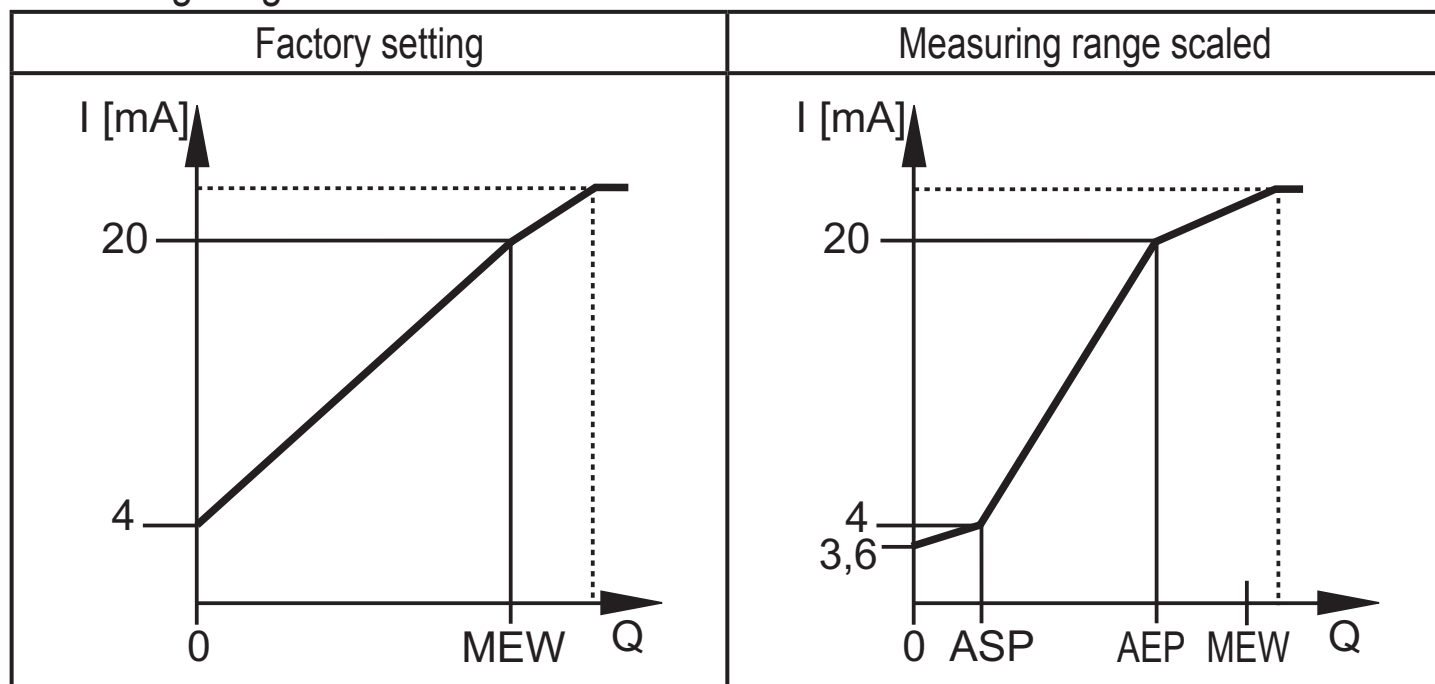
HY = hysteresis; FE = window



5.5 Volumetric flow monitoring / analogue function

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

Minimum distance between [ASP] and [AEP] = 25 % of the final value of the measuring range.



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:

Volumetric flow above the measuring range: output signal > 20 mA.

Volumetric flow below the measuring range: output signal between 3.6 and 4 mA.

6 Installation



- The rules and regulations for the installation and operation of compressed air equipment must be observed.
- Ensure that no pressure is applied to the installation during mounting.

6.1 Installation location



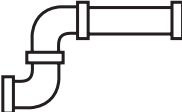
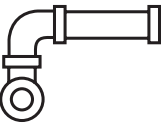

- Behind the cold dryer / near the load.
- If compressed air is fed into the main pipe through parallel pipes, the unit should be mounted in the main pipe.
- Installation after the maintenance unit is also possible (if oil is used for the loads, the units must be mounted before the oiler).
- Ensure sufficient clear space (min. 120 mm) for installation and removal of the sensor.

6.2 Installation conditions

To meet the specified measurement accuracy, the defined inlet and outlet pipe lengths must be adhered to:

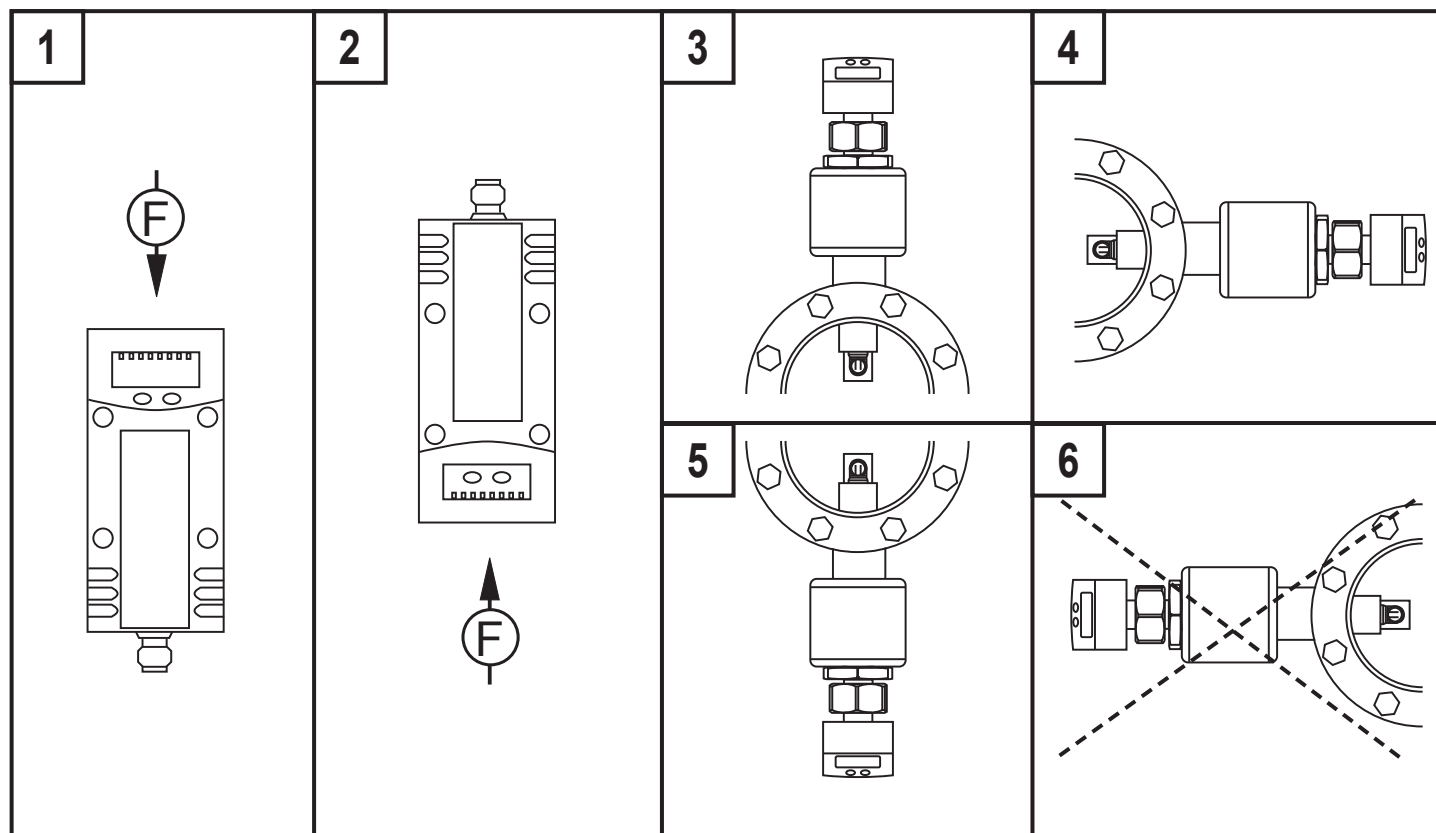
- Inlet pipe length: 15 x pipe diameter.
- Outlet pipe length: 5 x pipe diameter.

In case of disturbances on the inflow side additional calming sections (B) are recommended.

	changes of the pipe diameter	$B = 5 \times \text{pipe diameter (D)}$
	90° elbow	$B = 5 \times \text{pipe diameter (D)}$
	two 90° elbows, one plane	$B = 10 \times \text{pipe diameter (D)}$
	two 90° elbows, two planes	$B = 15 \times \text{pipe diameter (D)}$
	valve, slide	$B = 35 \times \text{pipe diameter (D)}$

6.3 Installation position

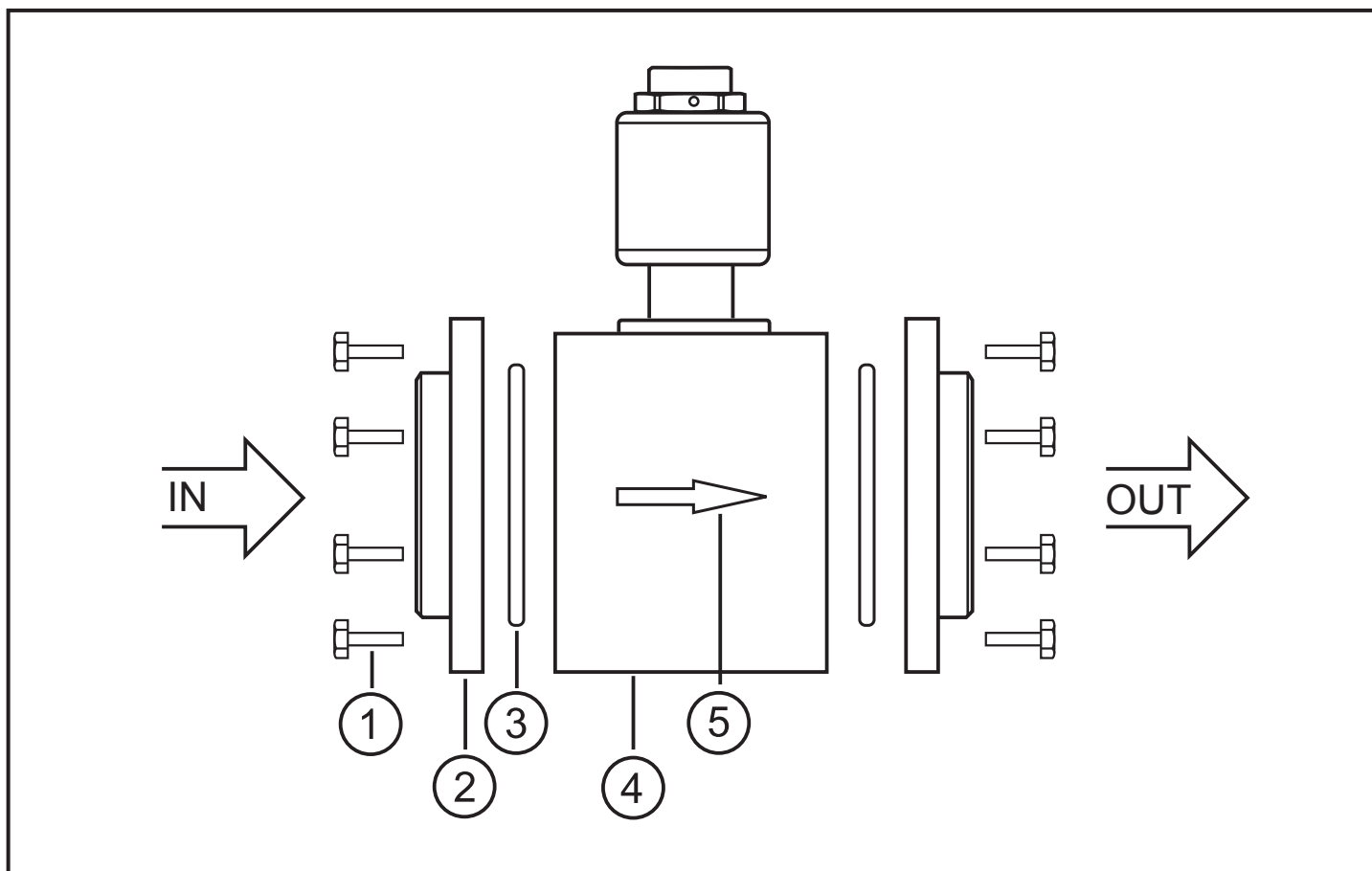
- Permitted installation positions: pipe length vertical, any position (fig. 1, 2), pipe length horizontal, unit vertical (fig. 3, 4), unit on side, pipe length left (fig. 5).
- Avoid the installation position in fig. 6 (unit on side, pipe length right). If the flow rate is low, the specified measurement accuracy cannot be adhered to.



F = flow direction

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6.4 Install the pipe section into the pipe



- ▶ Loosen the screws (1) on the flanges, remove the flanges (2) from the measuring section (4).
- ▶ Remove the seals (3) from the flange slots.
- ▶ Weld the flanges into the pipe.



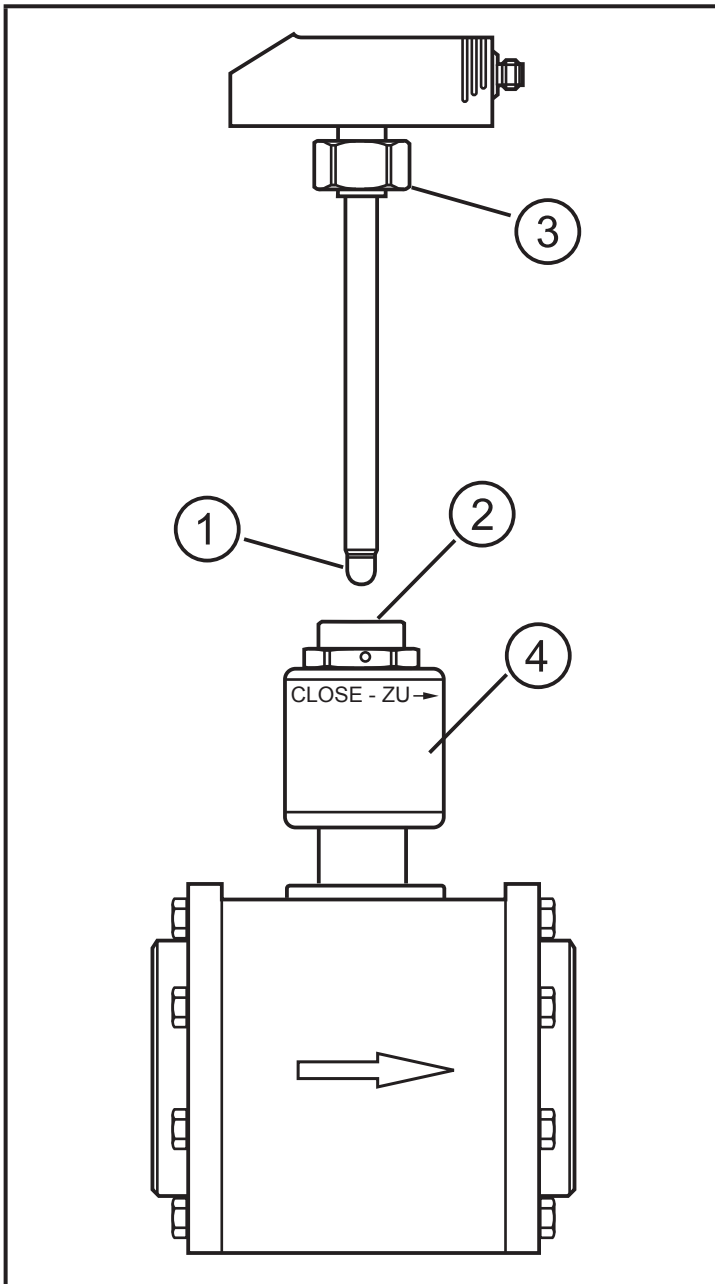
The welding operation must be carried out by authorised personnel.
The flanges must be welded without distortion.

In order to prevent a dissimilar metal weld, pipe and flange must be of the same material.

After welding

- ▶ Let the pipe and flanges cool down.
- ▶ Remove any welding residues from the welding seams. Especially the inner surface of the pipe should be free from burrs so that the measurement accuracy is not impaired.
- ▶ Insert the seals into the flange slots. Note: The slot must be clean and free from welding residues.
- ▶ Insert the measuring length so that the flow direction and the arrow (5) show in the same direction.
- ▶ Insert the screws and tighten.

6.5 Insert the sensor into the quick-change fitting



- ▶ Manually turn the quick-change fitting (4) in the direction CLOSE - ZU until it stops.
- ▶ Remove the protective cover from the measuring probe of the sensor (1).
- ▶ Insert the sensor into the quick-change fitting.
- ▶ Align the sensor: parallel to the pipe section, connector in the direction of the arrow on the pipe section. In this position the sensor clips into place and is secured against twisting.
- ▶ Manually tighten the coupling nut (3) of the sensor.
- ▶ Before set-up: manually turn the quick-change fitting (4) in the direction OPEN - AUF until it stops.

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7 Electrical connection



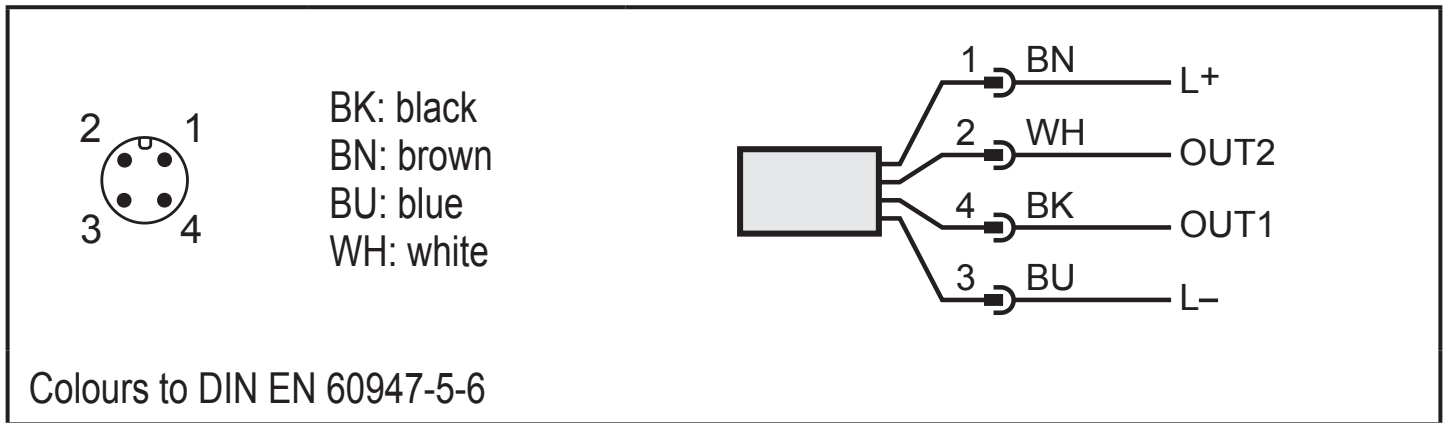
The unit must be connected by a qualified electrician.

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

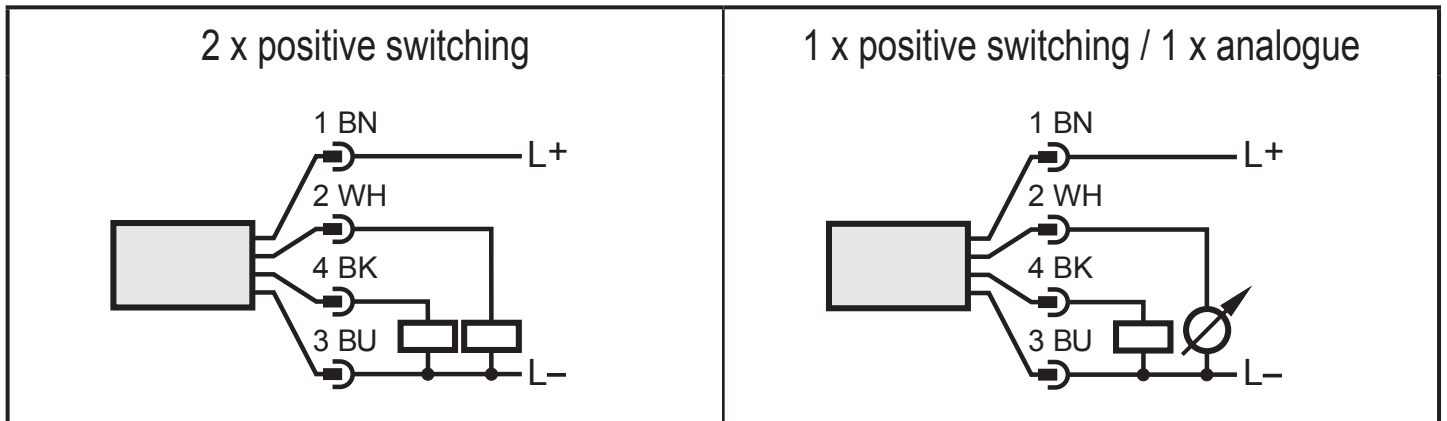
Voltage supply according to EN 50178, SELV, PELV.

► Disconnect power.

► Connect the unit as follows:

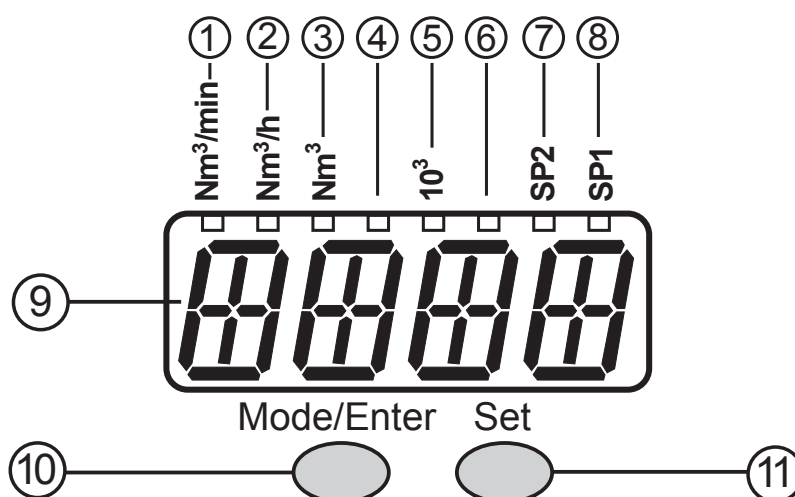


Sample circuits:



Pin 1	L+
Pin 3	L-
Pin 4 (OUT1)	<ul style="list-style-type: none"> • Switching signal: limit values for volumetric flow • Pulse signal: 1 pulse every time the defined volumetric flow quantity is reached. • Switching signal: quantity meter reached preset value
Pin 2 (OUT2)	<ul style="list-style-type: none"> • Switching signal: limit values for volumetric flow • Pulse signal: 1 pulse every time the defined volumetric flow quantity is reached. • Analogue signal for volumetric flow quantity • Analogue signal for temperature

8 Operating and display elements



1 to 8: Indicator LEDs

- LED 1 = current volumetric flow in standard cubic metres (Nm^3/min).
- LED 2 = current volumetric flow in standard cubic metres/hour (Nm^3/h).
- LED 3 = current consumed quantity since the last reset in standard cubic metres (Nm^3).
- LED 3 flashing = consumed quantity before the last reset in standard cubic metres (Nm^3).
- LED 3 and 5 = current consumed quantity since the last reset in 10^3 standard cubic metres.
- LED 3 and 5 flashing = consumed quantity before the last reset in 10^3 standard cubic metres.
- LED 4 = not used.
- LED 6 = not used.
- LED 7, LED 8 = switching state of the corresponding output.

9: Alphanumeric display, 4 digits

- Display of the current volumetric flow quantity in Nm^3/min (for setting [Uni] = [Lmin]).
- Display of the current volumetric flow quantity in Nm^3/h (for setting [Uni] = [nm3h]).
- Display of the meter reading in Nm^3 (for setting [Uni] = [nm3]).
- Display of the parameters and parameter values.

10: Mode/Enter button

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

11: Set pushbutton

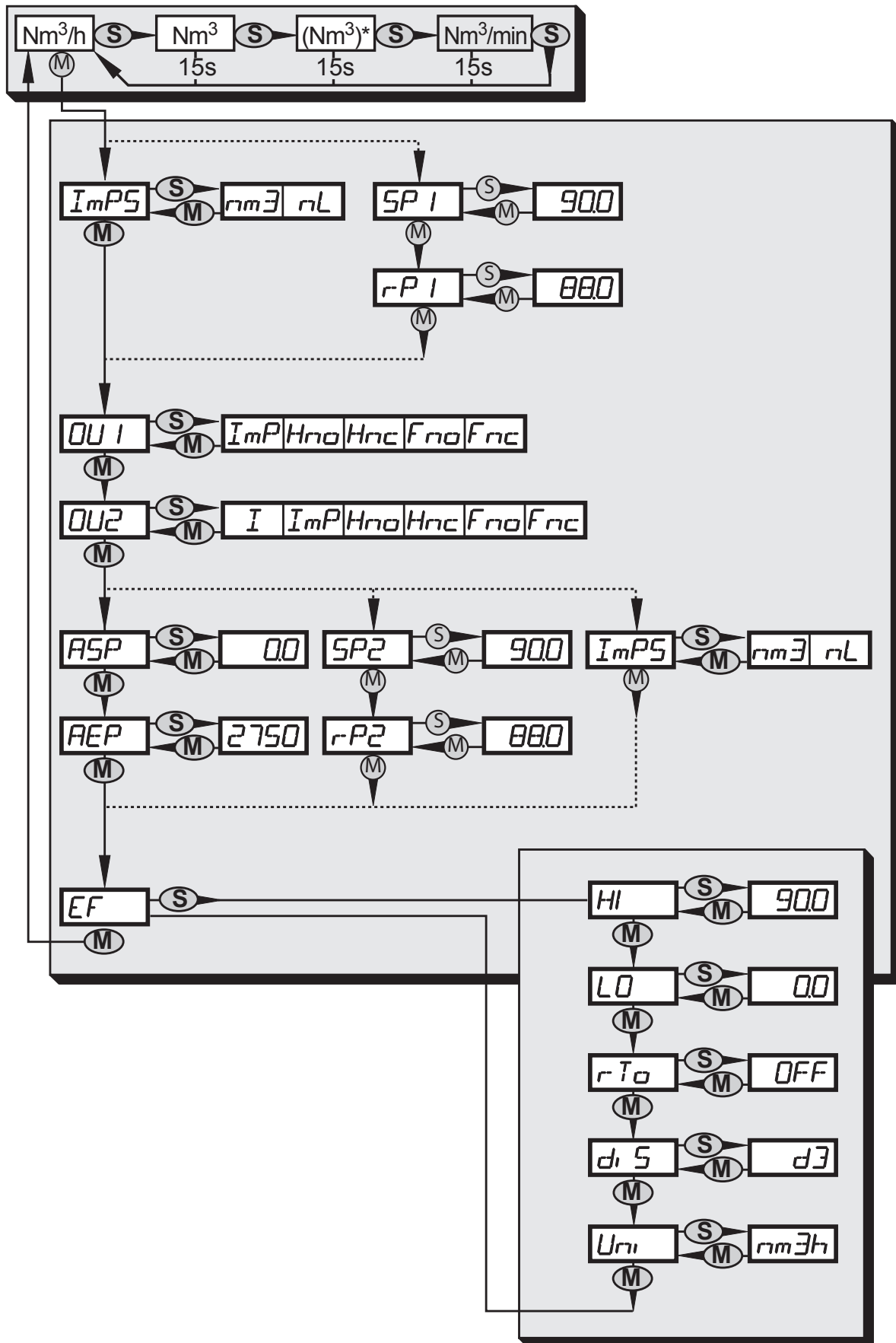
- Setting of the parameter values (scrolling by holding pressed; incrementally by pressing once).
- Change of the display unit in the normal operating mode (Run mode).



For units $\geq \text{DN150}$ the displayed totaliser value has to be multiplied by the factor 1000.

9 Menu

9.1 Menu structure



(M) = [Mode/Enter] / (S) = [Set]

Nm³= current meter reading in Nm³

(Nm³)* = stored meter reading in Nm³

9.2 Explanation of the menu

ImPS	Pulse value (consumed quantity at which 1 pulse is delivered).
SP1/rP1	Upper / lower limit value for the volumetric flow at which OUT1 switches.
OU1	Output function for OUT1: - Switching signal for the limit values: hysteresis function or window function, either normally open or normally closed. - Pulse for quantity meter.
OU2	Output function for OUT2: - Switching signal for the limit values: hysteresis function or window function, either normally open or normally closed. - Pulse for quantity meter - Analogue signal: 4...20 mA.
SP2/rP2	Upper / lower limit value at which OUT2 switches.
ASP	Analogue start value for volumetric flow.
AEP	Analogue end value for volumetric flow.
EF	Extended functions / opening of menu level 2.
HI / LO	Maximum / minimum value memory for volumetric flow.
rTo	Counter reset: manual reset / time-controlled reset.
diS	Update rate and orientation of the display.
Uni	Unit of measurement: volumetric flow quantity in standard cubic metres / minute or in standard cubic metres / hour or consumed quantity (meter reading) in standard cubic metres.

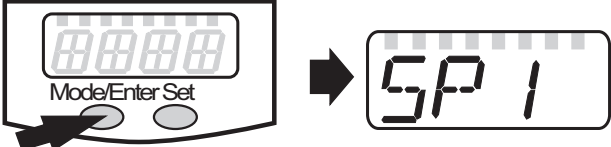
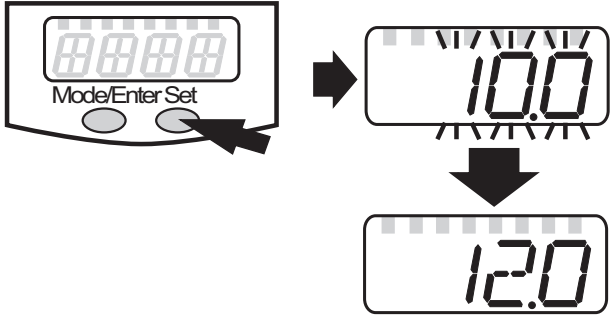
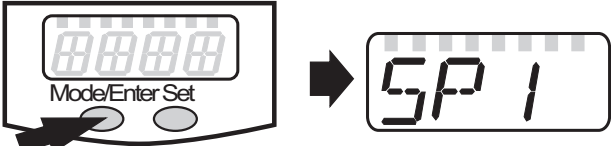
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10 Parameter setting

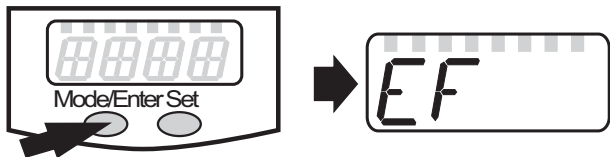
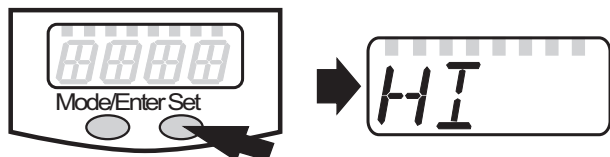
During parameter setting the unit remains in the operating mode. It continues its monitoring function with the existing parameters until the parameter setting has been completed.

10.1 General parameter setting

3 steps must be taken for each parameter setting:

1	Select parameter ► Press [Mode/Enter] until the requested parameter is displayed.	
2	Setting of the parameter value ► 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.	
	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	Acknowledge parameter value ► Press [Mode/Enter] briefly. > The parameter is displayed again. The new setting value is stored.	
Setting of other parameters ► Start again with step 1.		
Finishing the 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.		

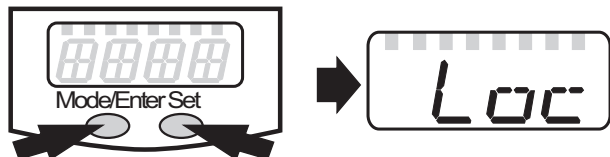
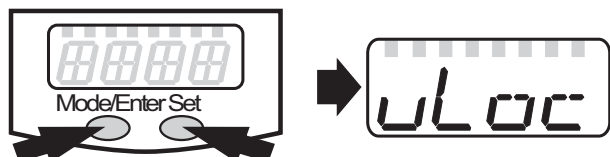
- Change from menu level 1 to menu level 2:

<ul style="list-style-type: none"> Press [Mode/Enter] until [EF] is displayed. 	
<ul style="list-style-type: none"> Press [Set] briefly. The first parameter of the submenu is displayed (here: [HI]). 	

- Locking / unlocking

The unit can be locked electronically to prevent unintentional settings.

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<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. 	
During operation: [LOC] is briefly displayed if you try to change parameter values.	
<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.

10.2 Settings for volumetric flow monitoring

10.2.1 Settings for limit value monitoring with OUT1

<ul style="list-style-type: none"> Select [OU1] and set the switching function: <ul style="list-style-type: none"> [Hno] = hysteresis function/NO, [Hnc] = hysteresis function/NC, [Fno] = window function/NO, [Fnc] = window function/NC. Select [SP1] and set the value at which the output switches. Select [rP1] and set the value at which the output switches off. 	
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10.2.2 Settings for limit value monitoring with OUT2

<ul style="list-style-type: none"> ▶ Select [OU2] and set the switching function: <ul style="list-style-type: none"> - [Hno] = hysteresis function/NO, - [Hnc] = hysteresis function/NC, - [Fno] = window function/NO, - [Fnc] = window function/NC. ▶ Select [SP2] and set the value at which the output switches. ▶ Select [rP2] and set the value at which the output switches off. 	OU2 SP2 r-P2
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10.2.3 Setting the analogue value for volumetric flow

<ul style="list-style-type: none"> ▶ Select [OU2] and set the function: <ul style="list-style-type: none"> - [I] = current signal proportional to volumetric flow (4...20 mA). ▶ Select [ASP] and set the value at which the minimum value is provided. ▶ Select [AEP] and set the value at which the maximum value is provided. 	OU2 ASP AEP
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10.3 Settings for consumed quantity monitoring

10.3.1 Settings for quantity monitoring via pulse output on OUT1

<ul style="list-style-type: none"> ▶ Select [OU1] and set [ImP]. ▶ Select [ImPS] and set the volumetric flow quantity at which 1 pulse is provided. 2 settings can be selected: <ul style="list-style-type: none"> - [nl] = 1 pulse per standard litre. - [nm3] = 1 pulse per standard cubic metre. 	OU 1 ImPS
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10.3.2 Settings for quantity monitoring via pulse output on OUT2

<ul style="list-style-type: none"> ▶ Select [OU2] and set [ImP]. ▶ Select [ImPS] and set the volumetric flow quantity at which 1 pulse is provided. 2 settings can be selected: <ul style="list-style-type: none"> - [nl] = 1 pulse per standard litre. - [nm3] = 1 pulse per standard cubic metre. 	OU2 ImPS
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10.3.3 Settings for program-controlled counter reset

<ul style="list-style-type: none"> ▶ Select [rTO] and continue with a) or b). <p>a) Reset the meter manually:</p> <ul style="list-style-type: none"> ▶ Press [SET] until [rES.T] is displayed, then briefly press [Mode/Enter]. <p>b) Enter the value for time-controlled reset</p> <ul style="list-style-type: none"> ▶ Press [Set] until the requested value is displayed (intervals from 1 hour to 8 weeks), then briefly press [Mode/Enter]. 	r-To
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10.3.4 Deactivation of the counter reset

<ul style="list-style-type: none"> ▶ Select [rTo] and set [OFF]. The meter is only reset after overflow (= factory setting). 	r-To
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10.4 User settings (optional)

10.4.1 Setting of the standard unit of measurement

<div>▶ Select [Uni] and set the unit of measurement</div> <div><div>- [Lmin] = volumetric flow quantity in standard cubic metres / minute.</div><div>- [nm3h] = volumetric flow quantity standard cubic metres / hour.</div><div>- [nm3] = consumed quantity (meter reading) in standard cubic metres.</div></div>	<div>Unit</div>
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10.5 Service functions

10.5.1 Reading of the min/max values for the volumetric flow

<div>▶ Select [HI] or [LO], briefly press [Set].</div> <div>[HI] = maximum value, [LO] = minimum value.</div> <div>Delete memory:</div> <div>▶ Select [HI] or [LO].</div> <div>▶ Press [Set] and keep it pressed until [----] is displayed.</div> <div>▶ Press [Mode/Enter] briefly.</div> <div>It makes sense to delete the memories as soon as the unit operates under normal operating conditions for the first time.</div>	<div>HI</div> <div>LO</div>	UK
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11 Operation

- ▶ Before set-up: manually turn the quick-change fitting (4) in the direction OPEN
- AUF until it stops.

Correct operation and compliance with the measurement accuracy can only be ensured if the environmental conditions specified in the "Technical data" are adhered to. Ensure that the maximum pressure range, measuring range and permitted operating temperature are not exceeded.

After power on and expiry of the power-on delay time (approx. 0.5 s) the unit is in the Run mode (= normal operating mode). It carries out its measurement and evaluation functions and generates output signals according to the set parameters.

- Operating indications → chapter 8 Operating and display elements.
- During the power-on delay time the outputs are switched as programmed: ON for NO function (Hno / Fno), OFF for NC function (Hnc / Fnc).
- If output 2 is configured as analogue output, the output signal is at the final value of the measuring range during the power-on delay time.

11.1 Reading of the set parameters

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

11.2 Changing the display unit in the Run mode

- ▶ Press [Set] briefly in the Run mode. Press the pushbutton to move to the next display unit.
- > The unit displays the current measured value for approx. 15 s, the corresponding LED lights.

11.3 Error indications

[SC1]	Short circuit in OUT1.*
[SC2]	Short circuit in OUT2.*
[SC]	Short circuit in both outputs.*
[OL]	Measured value > 120 % of the final value of the measuring range.
[Err]	Flashing: error in the measuring probe.

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

11.4 General operating conditions

- From time to time check the measuring probes visually for build-up.
Removal of the sensor:
 - ▶ Manually turn the quick-change fitting in the direction of CLOSE - ZU until it stops.
 - ▶ Slowly loosen the coupling nut of the sensor, let out the remaining air.
 - ▶ Pull out the sensor from the quick-change fitting (→ figure in 6.5).
- If necessary, clean them at regular intervals. To do so, use a suitable cleaning liquid (e.g. alcoholic solution).
- Avoid mechanical damage to the measuring probes.

12 Technical data and scale drawing

Technical data and scale drawing at www.ifm.com.