HE 5411

Differential pressure measuring transducer
with limit signal

Operating Instructions

(Translation of Original German version)

HESCH
AUTOMATION

AXXERON
TECHNOLOGIES MEMBER

#340411 | Version 1.11

Imprint

AXXERON HESCH electronics GmbH
Boschstraße 8
31535 NEUSTADT
GERMANY
Phone: +49 5032 9535-0
Internet: www.hesch-automation.com
Email: info@hesch.de

Hanover District Court
Commercial Register 111184
VAT.-Id. No. DE813919106

General Management
Werner Brandis
Editor:
AXXERON HESCH electronics GmbH, Documentation Department

Copyrights

Document history

Date / Version	Description / Author
16.09.2019 / 1.0	First version / Bg
25.09.2019 / 1.1	Chapter 3: Basic accuracy and temperature drift removed for analogue output; Chapter 8.1: Adaptation of heading; Chapter 8.3: Steps 9 and 10 supplemented; Chapter 9: Note removed / Bg
15.01.2020 / 1.2	Chapter 3: free from silicone, cable diameter and mean times (MTBF, MTTF) added Chapter 11: new article number for USB/TTL adapter added / Bg
03.04.2020 / 1.3	Chapter 3: technical data for relay contact added / Bg
14.04.2020 / 1.4	Chapter 3: technical data for relay contact adapted and service interface added / Bg
12.05.2020 / 1.5	All 24 VDC devices can now be used in EX zone 2 as well, except for the devices with a measuring range of ±1.25 mbar (Sensirion sensor). Chapter 6.1 Electrical connections, Relay output (limit value): graphical explanation Chapter 8.5 Setting the measuring range: “mbar” changed to “pressure”. Bg
21.10.2020 / 1.6	Chapter 9.1 Parameter table: Damping and creep flow suppression added after software modification Chapter 10 Error messages: Error E.CAL, E. Sen. and E.Par added after software modifications / Bg
08.12.2020 / 1.7	Chapter 3 Technical data: sensor with ± 350 mbar measuring range added / Bg
08.06.2022 / 1.8	Optional electrical connections via M12 connector for 24 V DC devices: chapter 6.1.1 added / Bg
22.11.2022 / 1.9	Chapter 7 Display and Operating elements, chapter 10 Error messages: blinking green LED in case of wrong or faulty voltage supply added / Bg
08.03.2023 / 1.10	Validity of operating instructions for ATEX and Non-ATEX devices. / Bg
14.04.2023 / 1.11	HE 5411 Premium 19…36 V DC not for EX zone 2 / Bg

TABLE OF CONTENTS

1 Legal Provisions

Manufacturer

AXXERON HESCH electronics GmbH, Boschstraße 8, 31535 NEUSTADT, GERMANY

Intended use

- The HE 5411 differential pressure measuring transducer is a universal pressure transducer, mainly used in dedusting industry. It can also be used for measuring overpressure in clean rooms.
- The device can be operated within the operating and environmental conditions approved in these operating instructions without impairing its safety.
- The manufacturer is not liable for improper use and any resulting personal injury or material damage; the risk is borne solely by the user. Failure to comply with the above criteria for intended use will result in the expiry of the warranty and liability for the device.

Note!
The devices are available **with as well as without ATEX approval**. Please refer to *chapter 5 Device description,* to find out which device version (Lite, Basic, Premium) is approved for which EX zone.

Devices with a **measuring range of ± 1.25 mbar**, regardless of the device version, **are not ATEX approved**!

If you have ordered an ATEX-approved device, you must necessarily observe the safety instructions for explosion protection, the indication on the name plate as well as the information in *chapter 2.5 Device Identification.*

Personnel qualification

All work on the differential pressure measuring transducer may only be carried out by qualified electricians with sufficient knowledge in the field of electrical engineering.

Device Safety

The device has been built and tested according to VDE 0411 EN 61010-1 and has left the factory in a safety-related impeccable condition. The user must observe the mentioned instructions and warnings in this manual to keep this condition and to ensure a safe operation.

Declaration of conformity

The valid declaration of conformity is available in the download centre of our website https://www.hesch-automation.com/en/support/download-center/. Click on the tab **Declarations of Conformity** to select your device.

2 Safety Information

2.1 Symbols and Basic Safety Instructions

This chapter contains important safety regulations and notes. To protect against personal injury and material damage, it is necessary to read this chapter carefully before working with the device.

Symbols used

The following symbols are used in this manual. All safety instructions have a uniform structure.

Personal Injury Warning!
The severity of the danger is indicated by the respective signal word.

Explosive atmosphere warning sign!

High Voltage Warning!

Warning of material damage caused by electrostatic charge!

Property Damage Warning!

Note!
Identifies possible malfunctions and indicates optimum operating conditions.

2.2 Signal Words

DANGER!
Indicates an imminently hazardous *high* risk situation, which, if not avoided, will result in death or serious injury.

WARNING!
Indicates a potentially hazardous *medium* risk situation, which, if not avoided, could result in death or serious injury.

CAUTION!
Indicates a hazardous *low* risk situation, which, if not avoided, could result in minor or moderate injury.

2.3 Safety in the individual operating phases

When installing the device and during operation, the following safety instructions must be observed.

Danger of Electrocution!
Before working on the device, switch off all power supplies used. The electrical cables must be laid according to the respective national regulations (in Germany VDE 0100). The measuring lines must be laid separately from the mains leads.

Attention!
The device must never be put into operation despite visible damage.

Warning!
Ensure protection against short-circuiting in the supply circuit.

Attention!
During installation, commissioning, maintenance and troubleshooting, observe the accident prevention regulations applicable to your system, e.g. DGUV Regulation 3 "Electrical installations and equipment".

Attention!
Clean dirty contacts with oil-free compressed air or with spirit and a lint-free cloth.

Warning of material damage caused by electrostatic charge!
Observe the safety measures according to BS EN 61340-51/-3 to avoid electrostatic discharge!

Power Connection!
The electrical cables must be laid according to the respective national regulations (in Germany VDE 0100). The measuring lines must be laid separately from the mains leads.

Attention!
Cables must be inserted professionally into the housing through the cable glands.

Explosion Prevention! (for ATEX approved devices only!)
HE 5411 Lite, Basic with a supply voltage of 19…36 V DC are suitable for use in **explosion zones 2 and 22**, provided that the lid is closed.

HE 5411 Lite, Basic and Premium with a supply voltage of 100…240 V AC as well as Premium with 19…36 V DC are only suitable for use in **explosion zone 22**, provided that the lid is closed.

Devices with a **measuring range of ± 1.25 mbar** (regardless of the device version) do **not** have an ATEX certification and must not be used in potentially explosive areas.

Before opening the device, e.g. for parameter setting, it is absolutely necessary to ensure that no explosive environmental conditions, such as formation of dust or gas, exist.

Troubleshooting!
At the beginning of troubleshooting, all possible sources of faults on additional devices or supply lines (measuring lines, wiring, downstream devices) should be taken into consideration. If the fault is not found after checking these points, we recommend sending the device to the supplier.

Decommissioning!
Switch off the power supply on all poles if the device is to be decommissioned. Secure the device against unintentional operation!
If the device is connected to other devices and / or equipment, the effects must be considered and appropriate precautions taken before switching off.

2.4 Special regulations

Note!
Sealing bolts must be applied professionally to cable ducts that are not used.

2.5 Device Identification

Note!
The HE 5411 is available in three different designs. The corresponding device identification can be found on the name plate. Devices with a measuring range of ± 1.25 mbar (regardless of the device version) do **not** have an ATEX certification!

Note!
For the 24 V DC devices with M12 connector, the device identifications below are identical (*see chapter 6.1.1 Option: electrical connection via M12 connector (for 24 V DC devices only!)*

HE 5411 Lite	HE 5411 Basic	HE 5411 Premium
		

The devices are marked as follows:

	HE 5411 Lite 19…36 V DC	HE 5411 Basic 19…36 V DC	HE 5411 Premium 19…36 V DC	HE 5411 measuring range ± 1,25 mbar
With ATEX	UKCA CE Ex II3D Ex tc IIIC T135°C Dc IP65			—
	UKCA CE Ex II3G Ex nR IIC T4 Gc		—	—
Without ATEX	UKCA CE			UKCA CE

	HE 5411 Lite 100…240 V AC	HE 5411 Basic 100…240 V AC	HE 5411 Premium 100…240 V AC	HE 5411 measuring range ± 1,25 mbar
With ATEX	UKCA CE Ex II3D Ex tc IIIC T135°C Dc IP65			-
Without ATEX	UKCA CE			UKCA CE

⟨Ex⟩ II3D Ex tc IIIC T135°C Dc IP65		
II3D	Device category:	Use in Zone 22 for dust during normal operation
Ex	Denotes electrical equipment. Standards of the EN 60079-0ff. series have been applied.	
tc	Type of ignition protection:	Protection by housing
IIIC	Explosion group:	conductive dusts
T135°C	Temperature class:	maximum permissible surface temperature
Dc	Device protection level:	Use in Zone 22 for dust
IP65	Protection type:	dust-tight and protected against water jets

⟨Ex⟩ II3G Ex nR IIC T4 Gc		
II3G	Device category/ Ex. Atmosphere:	Use in Zone 2 for gas during normal operation
Ex	Denotes electrical equipment. Standards of the EN 60079-0ff. series have been applied.	
nR	Type of ignition protection:	Protection by restricted-breathing housing
IIC	Explosion group:	Certified for gases with an ignition power of <60µJ (e.g. hydrogen)
T4	Temperature class:	maximum permissible surface temperature (135°C)
Gc	Device protection level:	Use in zone 2 for gas

3 Technical Data

Electric supply	
Voltage	19…36 V DC or 100…240 V AC
Power consumption	Max. 2 W

Sensor system				
Measuring range (mbar)	± 1.25, ± 2.5, ± 5, ± 10, ± 25, ± 50, ± 100, ± 350, ± 1000 in accordance with the information on the name plate			
Max. differential pressure	Measuring range	± 1.25 mbar	< 1 bar	
		± 2.5 mbar	< 0.35 bar	
		± 5 mbar		
		± 10 mbar		
		± 25 mbar	< 0.5 bar	
		± 50 mbar	< 1 bar	
		± 100 mbar		
		± 350 mbar	< 5 bar	
		± 1000 mbar		
Medium	Air and dry, non-aggressive gases			
Measuring system	Thermal (Bypass Technology)	Piezoresistive	Piezoresistive	Piezoresistive
Measuring ranges (mbar)	± 1.25	± 2.5…± 10	± 25…± 100	± 350…± 1000
Basic accuracy	-	± 1.5 % FSO T = 25 °C	± 1.0 % FSO T = 25 °C	± 0.5 % FSO T = 25 °C
Total error	± 3 % FSO T = -20…85°C	± 2 % FSO T = 0…60°C	± 1.5 % FSO T = 0…60°C	± 1.0 % FSO T = 0…60°C
Pressure connection	Push-in bulkhead fittings for 6 mm hose – outer diameter (4 mm with reduction, *see chapter 11 Accessories*)			

Input / Output		
Analogue output:	0…10 V	0(4)…20 mA
Max. permissible load	RL ≥ 1 kΩ	RA ≤ 500 Ω
Relay output	1 changeover contact 250 VAC, 5 A as limit value relay	
Service interface	USB / TTL adapter HE 5851 required *(see chapter 11 Accessories)*	

FSO = Full Scale Output

Housing	
Type	Dust-tight polycarbonate housing
Dimensions	113 × 80 × 60 (W × H × D) 113 × 110 × 60 (W × H × D) incl. connection coupling
Protection type	IP 65
Mounting	Wall-mounted, vertical mounting position
Cable gland	1 × M20 × 1,5 N (for cable diameters 6-12 mm) with multiple sealing insert for 2 x cables Ø 6 mm

Climatic environmental conditions	
Storage	-20°…+60° C
Transport	-20°…+85° C
Operation	-20°…+55° C In EX zone: -20 °C…+40 °C
Relative air humidity	75% rel. humidity, no condensation

Air and creepage distances	
Pollution degree	2
Overvoltage category	II
Material group	IIIa
Rated voltage	< 150 V AC, ≤ 250 V AC
Test voltage (basic insulation):	1250 V AC, 1 min
Test voltage (added insulation):	3000 V AC, 1 min

Power connection	
Connection type	-push-in-spring connection -or **optionally** via M12 connector (for 24 V DC devices only)
Wire size	0.2 mm²…1.5 mm²
Flexible wire size	0.2 mm²…1.5 mm²
AWG[1] wire size / kcmil[2]	24…16
Flexible wire size with ferrule without plastic sleeve	0.2 mm²…1.5 mm²
Flexible wire size with ferrule with plastic sleeve	0.2 mm²…0.75 mm²

Extras	
Special characteristics	silicone free[3]

[1] American Wire Gauge
[2] Kilo Circular Mils
[3] Silicone is not used in the production process.

Mean Time Between Failures				
MTBF [a[4]]	Power supply 19…36 V DC without limit signal	Power supply 100…240 V AC without limit signal	Power supply 19…36 V DC with limit signal	Power supply 100…240 V AC with limit signal
Without display	545	167	-	-
With display	486	161	431	119

Mean Time to Dangerous Failure				
$MTTF_d$ [a]	Power supply 19…36 V DC without limit signal	Power supply 100…240 V AC without limit signal	Power supply 19…36 V DC with limit signal	Power supply 100…240 V AC with limit signal
Without display	1090	334	-	-
With display	972	322	862	238

[4] anno

4 Mounting

Note!
If you want to drill the device to the wall, *Figure 1* can be used as a drilling template.

The ambient temperature at the installation point must not exceed the permissible temperature for nominal use specified in the technical data. The special regulations for use in EX ATEX Zones must be observed (*see chapter 2.3 Safety in the individual operating phases*).

4.1 Dimensions

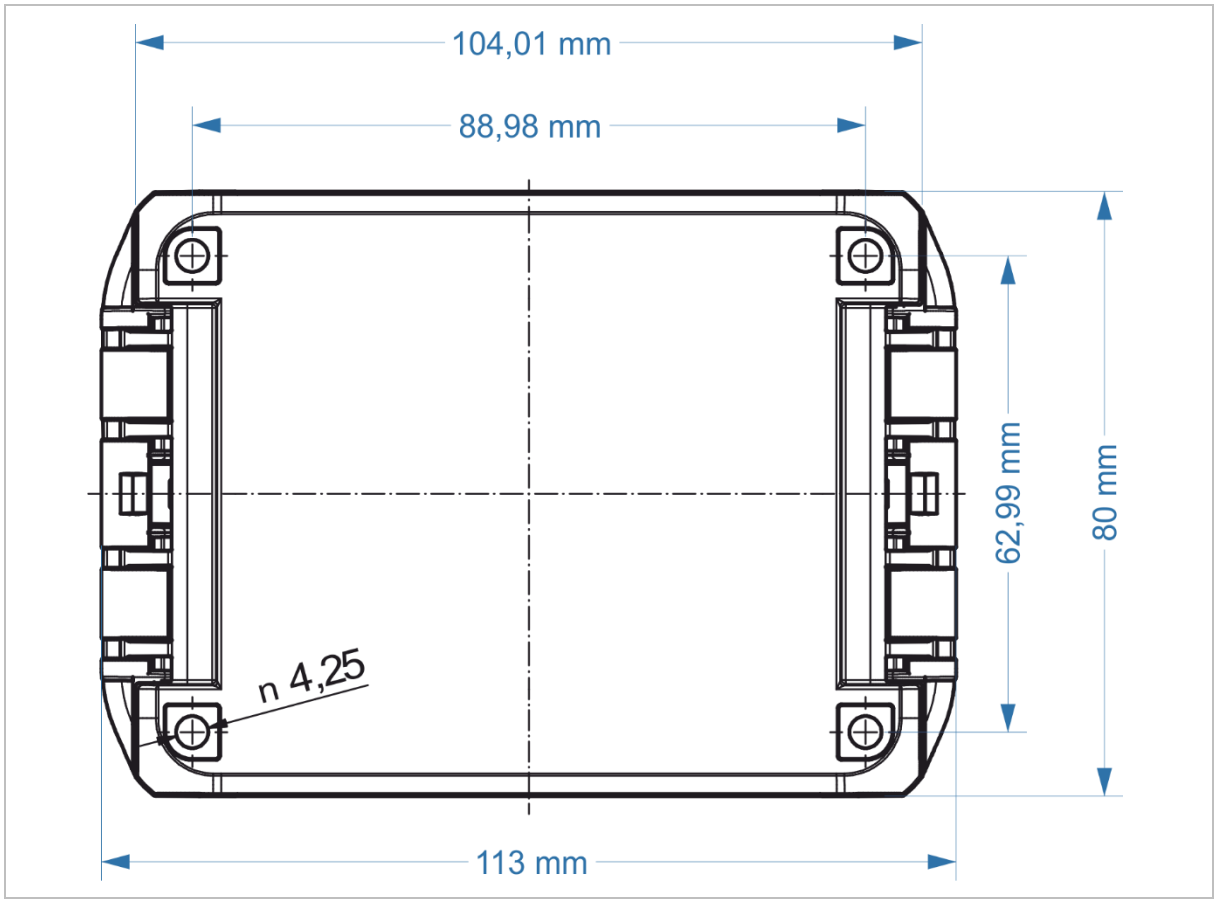


Figure 1. *Back of housing*

Scope of Delivery

- HE 5411 differential pressure measuring transducer
- Operating Instructions

Note!
Upon receipt, check the delivery for completeness and visible defects. In case of complaint, contact your responsible representative at AXXERON HESCH electronics GmbH immediately.

4.2 Opening the device

Opening and closing is performed by hinge technology without screws. A slit screwdriver is required to open the device. The screwdriver must be positioned at the intended position at the housing lid (*see Figure 2*).

Note!
Make sure to move the **screwdriver to the right** to open the hinge (*see Figure 2)*. If the screwdriver is moved to the left, the housing cover may be damaged.

The housing lid can be opened to the left up to an angle of 105°.
Optionally, the housing lid can be closed with 4 additional screws *(see chapter 11 Accessories*) in order to protect it from unauthorised access. For further information, please contact your service representative of AXXERON HESCH electronics GmbH.

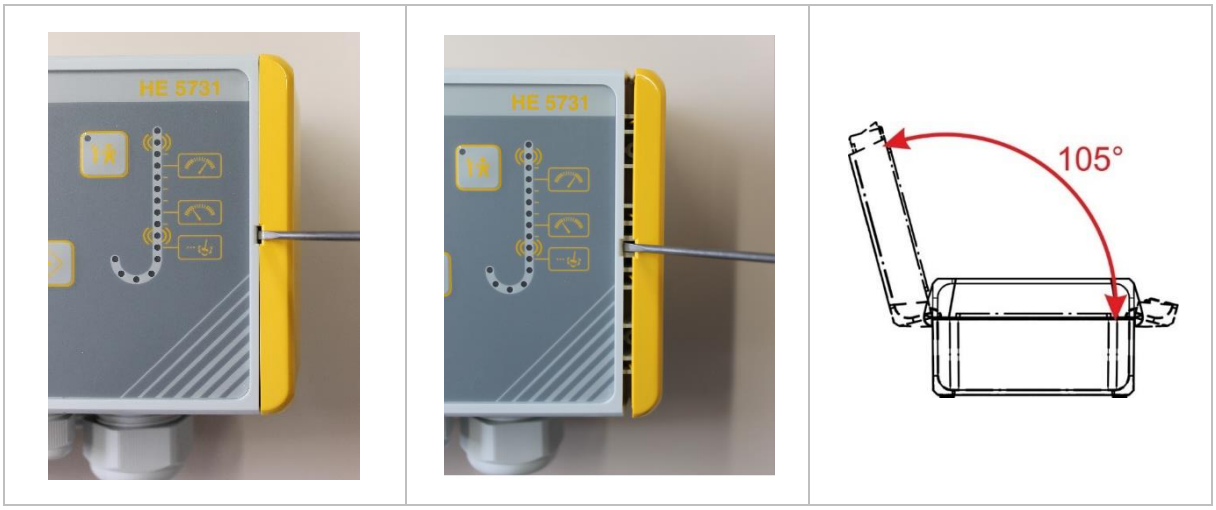


Figure 2. *Open the housing lid to the left (figure shows similar device)*

4.3 Mounting the device

Note!
If the device is to be drilled to the wall, *Figure 1* can be used as drilling template.

4 screws are required to fasten the device to the wall. (Not included in the scope of delivery!)

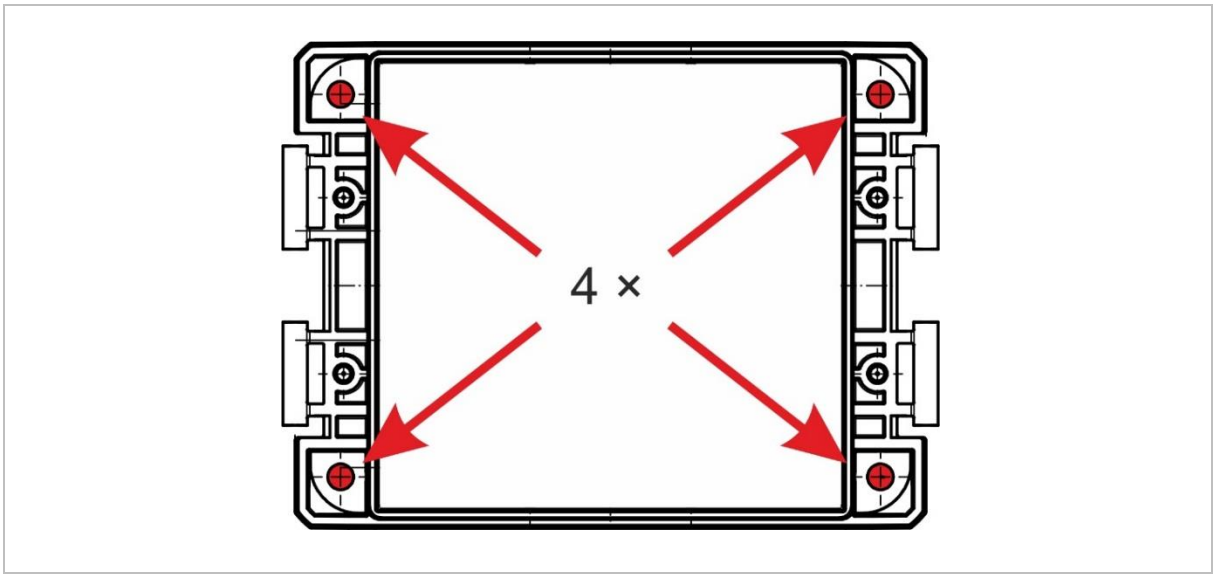


Figure 3. *Housing bottom*

Alternative: Fastening to the wall with wall brackets. (*see chapter 11 Accessories*)

5 Device description

The differential pressure measuring transducer records the differential, over- and negative pressure between two pressure inputs, and converts the measurement value into a linear or square-rooted output signal of 0(4)…20 mA or 0…10 V.
The 4-digit 7-segment display of the Basic and Premium version allows the indication of negative pressures.

5.1 Overview of device versions

5.1.1 HE 5411 Lite / Basic / Premium (with limit signal)

Figure 4. *From left to right: HE 5411 Lite, HE 5411 Basic, HE 5411 Premium*

Explosion Prevention! (for ATEX approved devices only!)
HE 5411 Lite, Basic with a supply voltage of 19…36 V DC are suitable for use in **explosion zones 2 and 22**, provided that the lid is closed.

HE 5411 Lite, Basic and Premium with a supply voltage of 100…240 V AC as well as Premium with 19…36 V DC are only suitable for use in **explosion zone 22**, provided that the lid is closed.

Devices with a **measuring range of ± 1.25 mbar** (regardless of the device version) do **not** have an ATEX certification and must not be used in potentially explosive areas.

Before opening the device, e.g. for parameter setting, it is absolutely necessary to ensure that no explosive environmental conditions, such as formation of dust or gas, exist.

Device versions with 19…36 V DC:

	HE 5411 Lite	HE 5411 Basic	HE 5411 Premium	HE 5411 measuring range ± 1.25 mbar
With ATEX	Zone 2 + 22	Zone 2 + 22	Zone 22	-
Without ATEX	x	x	x	x

Device versions with 100…240 V AC:

	HE 5411 Lite	HE 5411 Basic	HE 5411 Premium	HE 5411 measuring range ± 1.25 mbar
With ATEX	Zone 22	Zone 22	Zone 22	-
Without ATEX	x	x	x	x

Note!
Optionally, **all 24 V DC devices are available with an M12 connector** *(see chapter 6.1.1 Option: electrical connection via M12 connector (for 24 V DC devices only!)).*
The advantage of a device with M12 connector is that it is not necessary to open the device for electrical commissioning.

6 Electrical Commissioning

Danger of Electrocution!
Electrical installation must only be carried out when the power is disconnected.

Warning of material damage caused by electrostatic charge!
Observe the safety measures according to DIN EN 61340-51/-3 to avoid electrostatic discharge!

Property damage due to incorrect voltage supply!
The power supply must correspond to the voltage indicated on the nameplate.

Explosion Prevention! (for ATEX approved devices only!)
HE 5411 Lite, Basic with a supply voltage of 19…36 V DC are suitable for use in **explosion zones 2 and 22**, provided that the lid is closed.

HE 5411 Lite, Basic and Premium with a supply voltage of 100…240 V AC as well as Premium with 19…36 V DC are only suitable for use in **explosion zone 22**, provided that the lid is closed.

Devices with a **measuring range of ± 1.25 mbar** (regardless of the device version) do **not** have an ATEX certification and must not be used in potentially explosive areas.

Before opening the device, e.g. for parameter setting, it is absolutely necessary to ensure that no explosive environmental conditions, such as formation of dust or gas, exist.

Note!
Before commissioning, please note the information on the nameplate!

Note!
The cables must be connected professionally to the cable glands.

Note!
The temperature limitations specified for the use of the device must be complied with before and during operation.

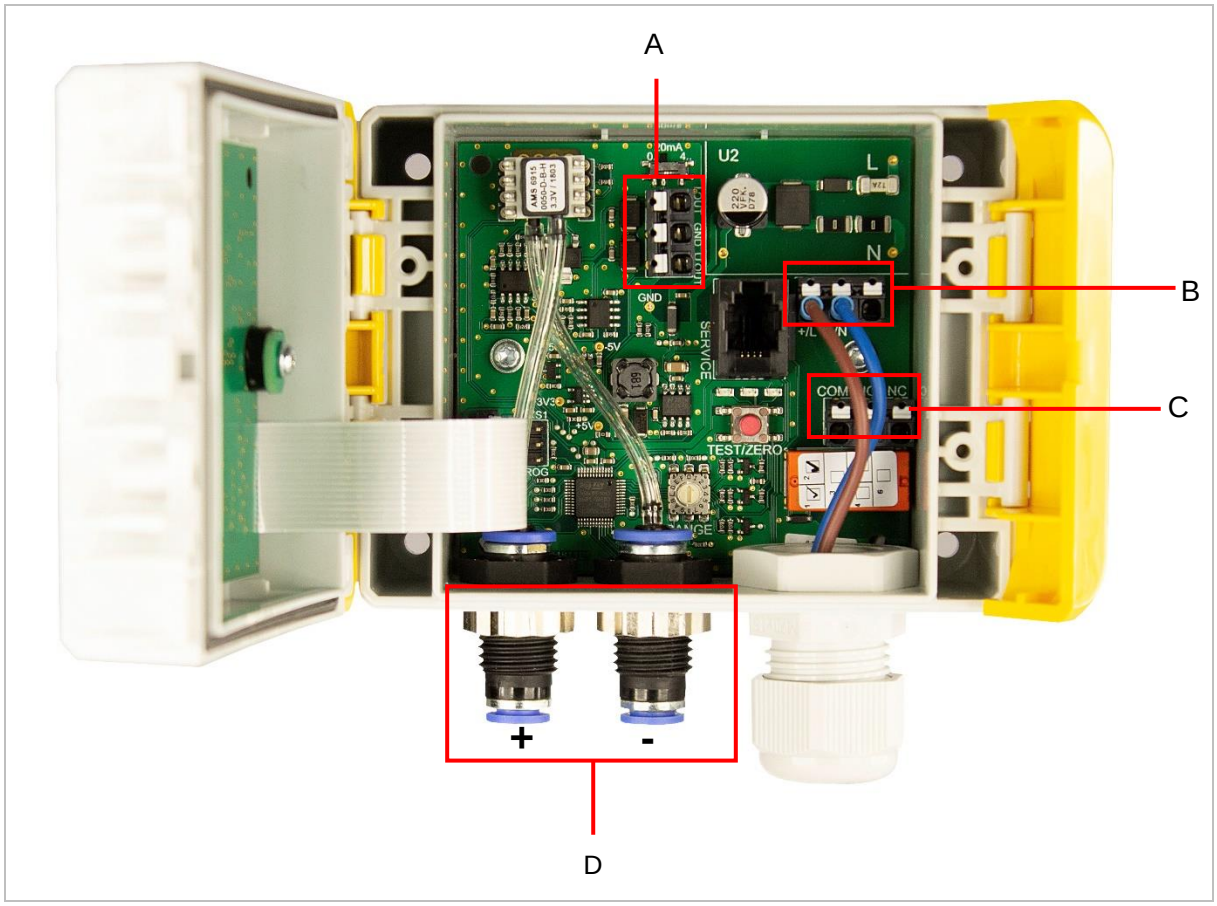
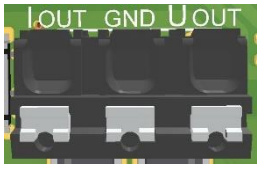
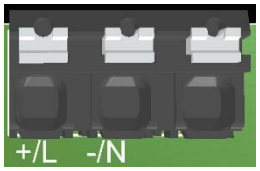
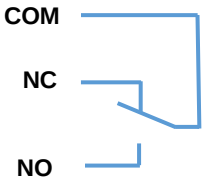
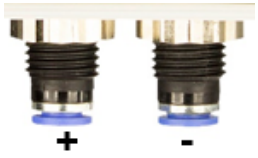


Figure 5. *Electrical connections HE 5411 with cable glands*

6.1 Electrical connections

<table>
<tr><th>Connections</th><th></th><th>Meaning</th></tr>
<tr><td> 
</td><td>A</td><td>Analogue output

I OUT Current output 0(4)…20 mA
GND Ground
U OUT Voltage output 0…10 V</td></tr>
<tr><td> 
</td><td>B</td><td>Supply voltage (Figure 5 shows 24 V DC device)
<table>
<tr><td>Connection</td><td>DC Signal Version</td><td>AC Signal Version</td></tr>
<tr><td>+/L</td><td>19…36 V DC</td><td>100…240 V AC</td></tr>
<tr><td>-/N</td><td>GND</td><td>N</td></tr>
</table></td></tr>
<tr><td> 
</td><td>C</td><td>Relay output (limit value)
 
</td></tr>
<tr><td> 
</td><td>D</td><td>Pressure inputs
The pressure inputs are to be connected with the shortest possible hoses. These hoses must be:
p+ (raw gas) larger than p- (pure gas)</td></tr>
</table>

6.1.1 Option: electrical connection via M12 connector (for 24 V DC devices only!)

Optionally to the regular connection procedure (*see chapter 6.1 Electrical connections*) **all 24 V DC devices** can also be electrically connected via an M12 connector.

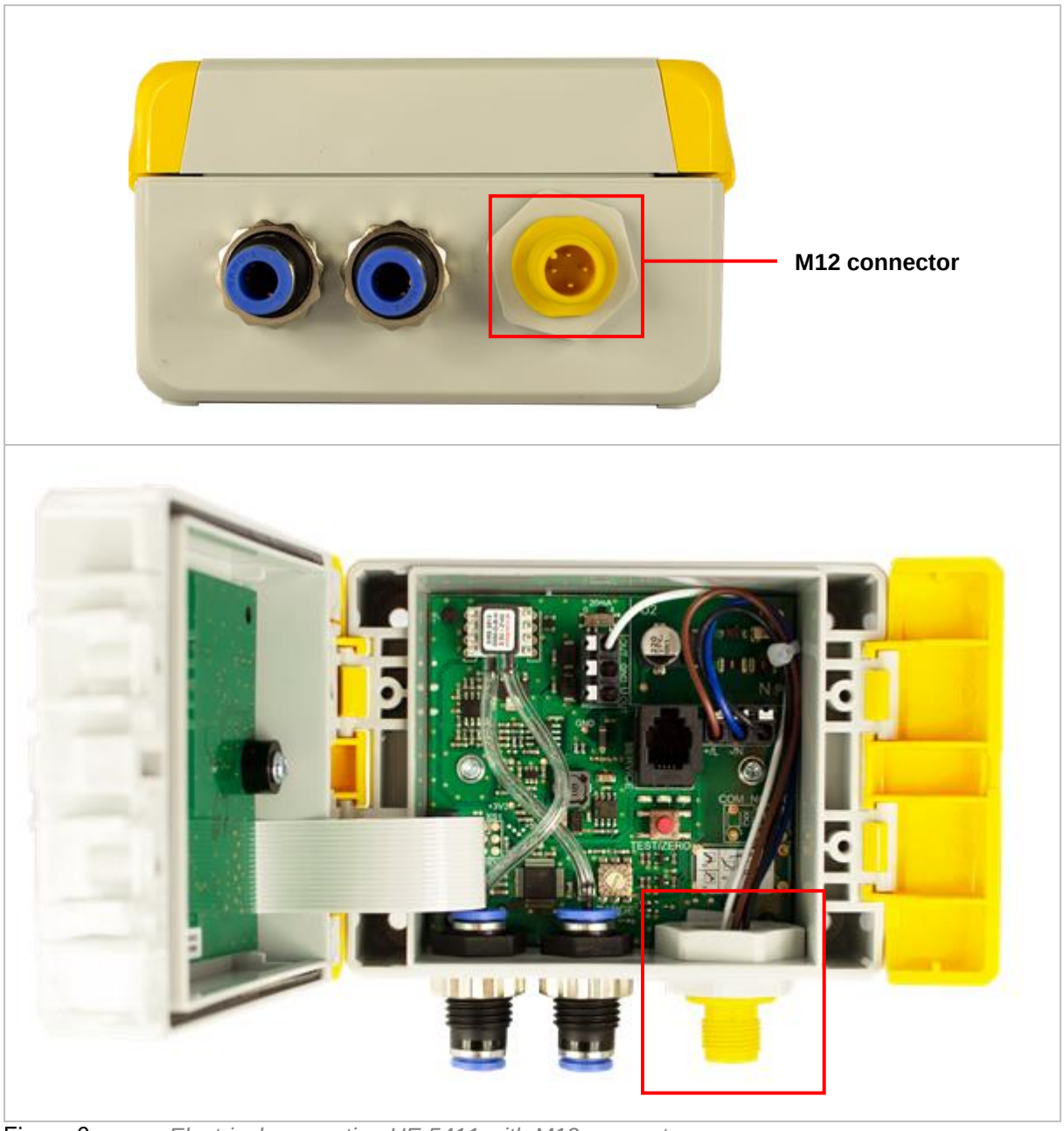


Figure 6. *Electrical connection HE 5411 with M12 connector*

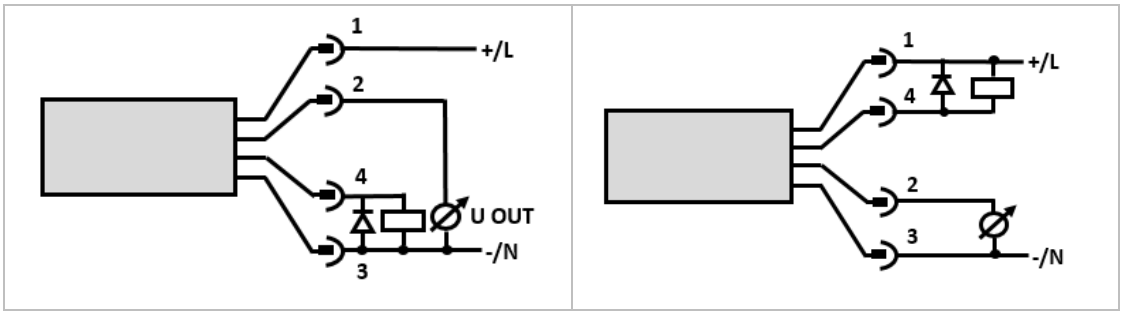


Figure 7. *Connection schemes with M12 connector*

Contact	Signal	Colour	Note
1	+24 V supply	Brown	
2	Analogue output 0(4)…20mA (Optional: 0…10V)	White	0…10 V: terminal XK3.1 0(4)…20 mA: terminal XK3.3
3	GND supply / analogue output	Blue	
4	Switch output (only for **Premium** devices) **Possible options:** opener / closer, +24V / GND	Black	Is put on terminal XK1.3 for **Lite** and **Basic** devices => NC

Material damage possible!
The flyback diode ⏚ **must** be connected at the relay ⊏⊐ to avoid overvoltage and thus a destroyed relay!

6.2 Mounting measuring hose onto pressure connection

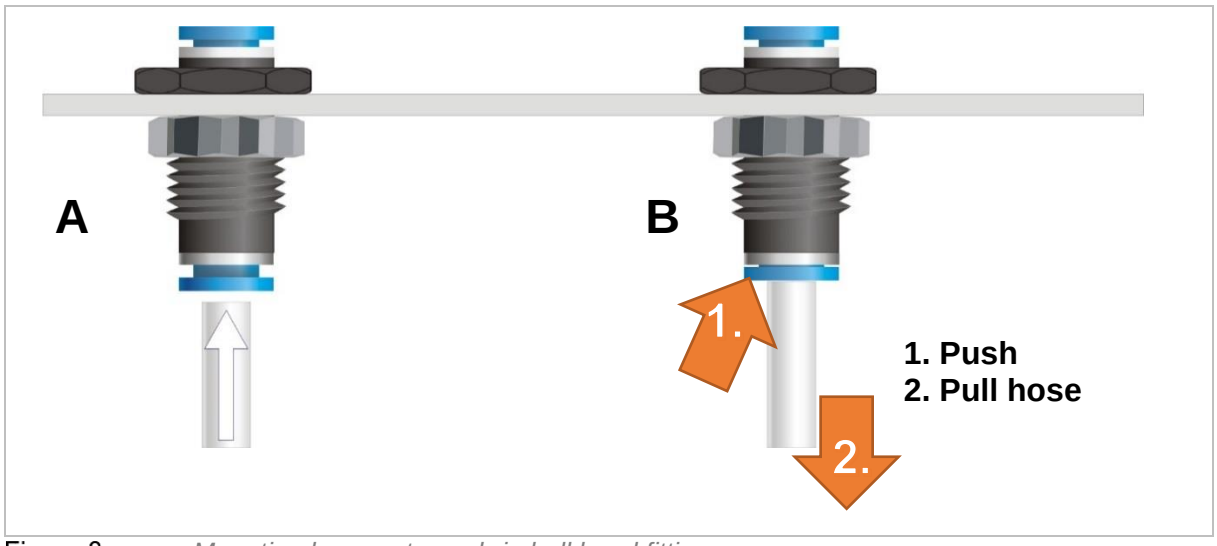


Figure 8. *Mounting hose onto push-in bulkhead fitting*

A Hose connection

Insert hose with 6 mm outer diameter into the connection.

B Hose disconnection

1. Press the blue retaining ring to open the lock.
2. Pull the hose out of the connection.

7 Display and Operating Elements

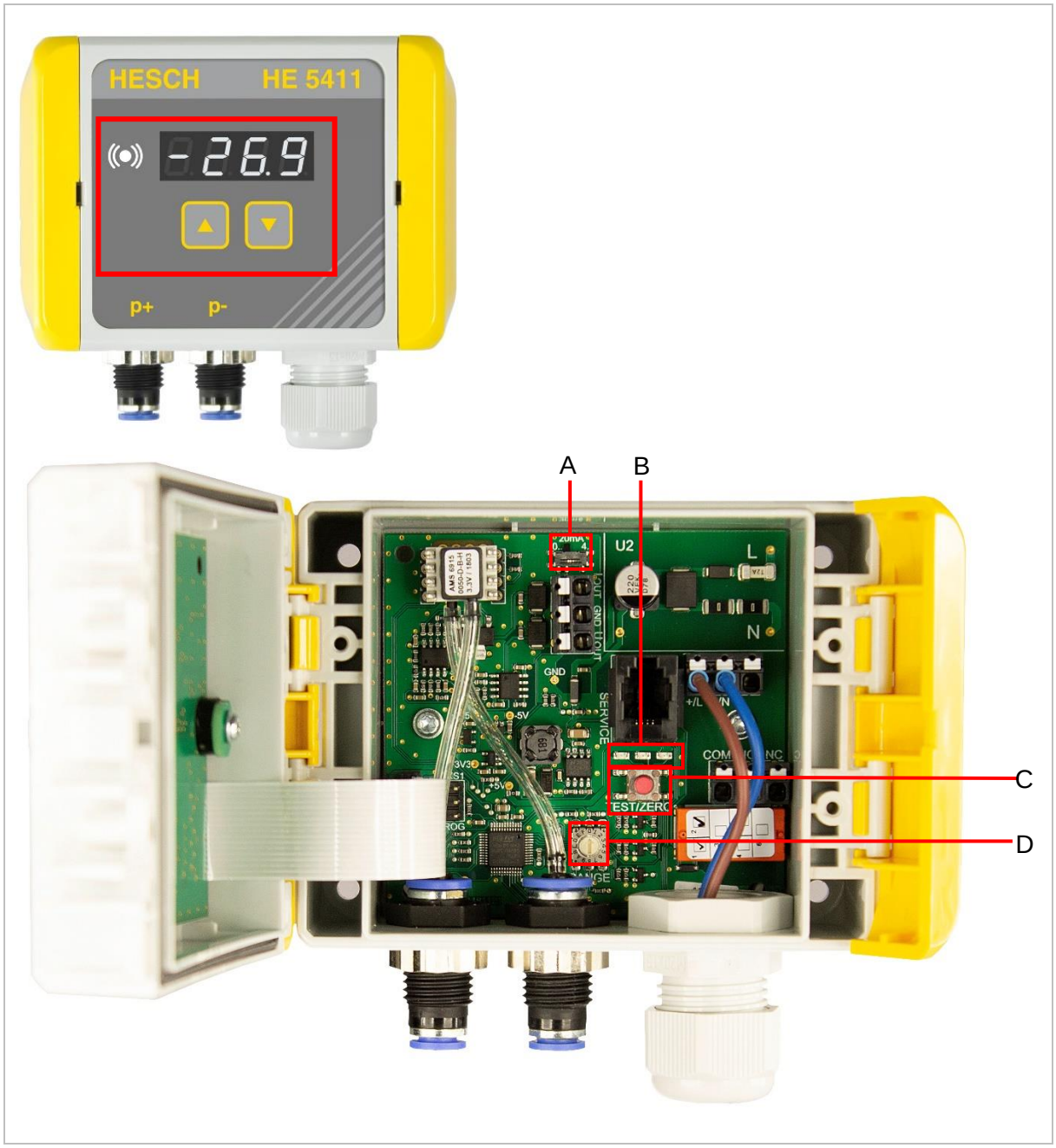
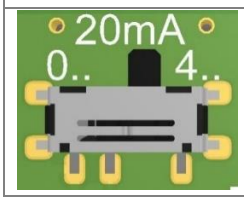
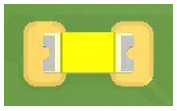
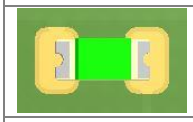
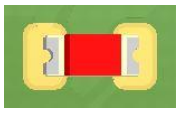
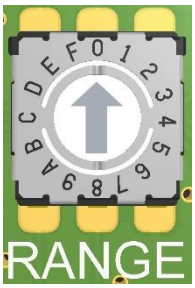


Figure 9. *HE 5411 Premium Display and Operating Elements (outside and inside)*

A 0(4)…20 mA switch
B LEDs
C Test button
D Rotary coding switch

Symbols/Displays		Meaning
		**UP key**: increase the displayed value
		**DOWN key:** decrease the displayed value
		**Limit LED (Premium only):** 3-coloured with colour change function for status indication
		**Display:** • Normal operation: current differential pressure • Parameter setting mode: Limit value set • Switch between the two with UP / DOWN keys
	**A**	**Slide switch:** possibility to switch the analogue output between • 0…20 mA (left) • 4…20 mA (right)
	**B**	**LEDs (from left to right)987**
		Flashes continuously **(o—o—o—o)** when the differential pressure is in the range of ± 10 % from the measuring range end value to the zero point. Flashes continuously **(o-o—o-o—o-o),** when an offset has been programmed.
		Lights up as soon as the supply voltage is present. Flashes when the supply voltage is wrong or faulty.
		Lights up when the differential pressure measured is ≥ the limit value set. Flashes when the device is in test mode.
	**C**	**TEST button:** for zeroing / test mode
	**D**	**Rotary coding switch:** 16 levels (0…F) to set the measuring range.

7.1 Limit LED (Premium only)

The limit LED serves as a status display for rising or falling pressure. This function is of particular advantage in the case of pressures around the set limit value, since the hysteresis can be read by means of the LED colours.

Note!
The limit relay hysteresis can only be set with the “EasyTool Controls” PC software, Version 4.0 or later. The factory setting of the hysteresis is 1 %.

7.1.1 “Limit threshold” mode

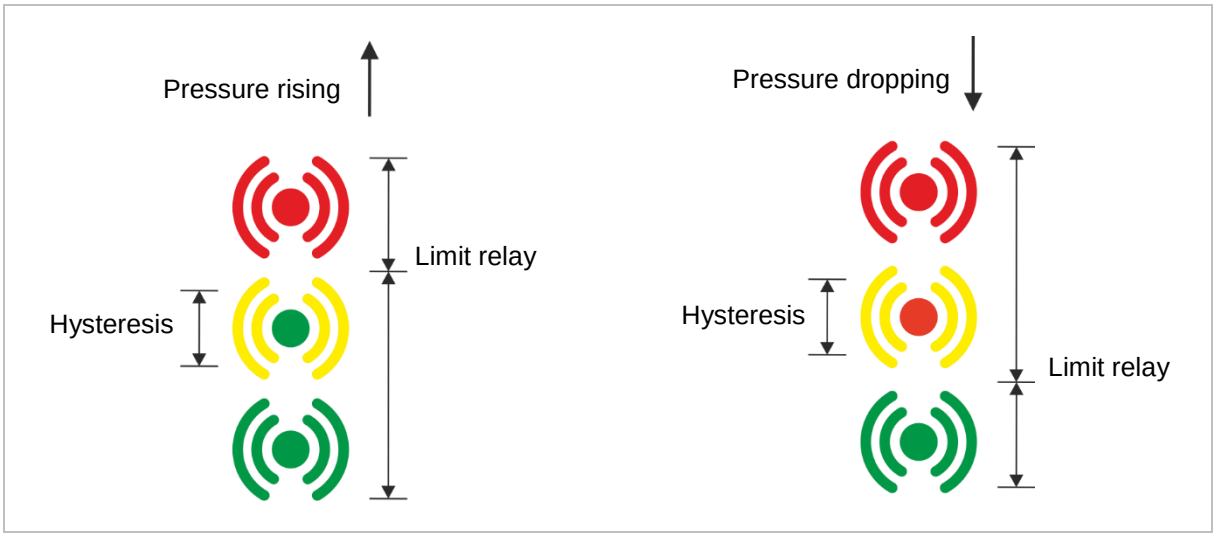


Figure 10. *Limit LED status display in “Limit threshold” mode*

LED	Meaning
	If the status display shows a single-colour green light, this means that the measured pressure is below the limit value and outside of the set hysteresis range.
	If the status display shows a green/yellow light, this means that the measured pressure is below the limit value and inside the set hysteresis range.
	If the status display shows a single-colour red light, this means that the measured pressure is over the limit value and outside of the set hysteresis range.
	If the status display shows a red/yellow light, this means that the measured pressure is over the limit value and inside the set hysteresis range.

7.1.2 “Limit window” mode

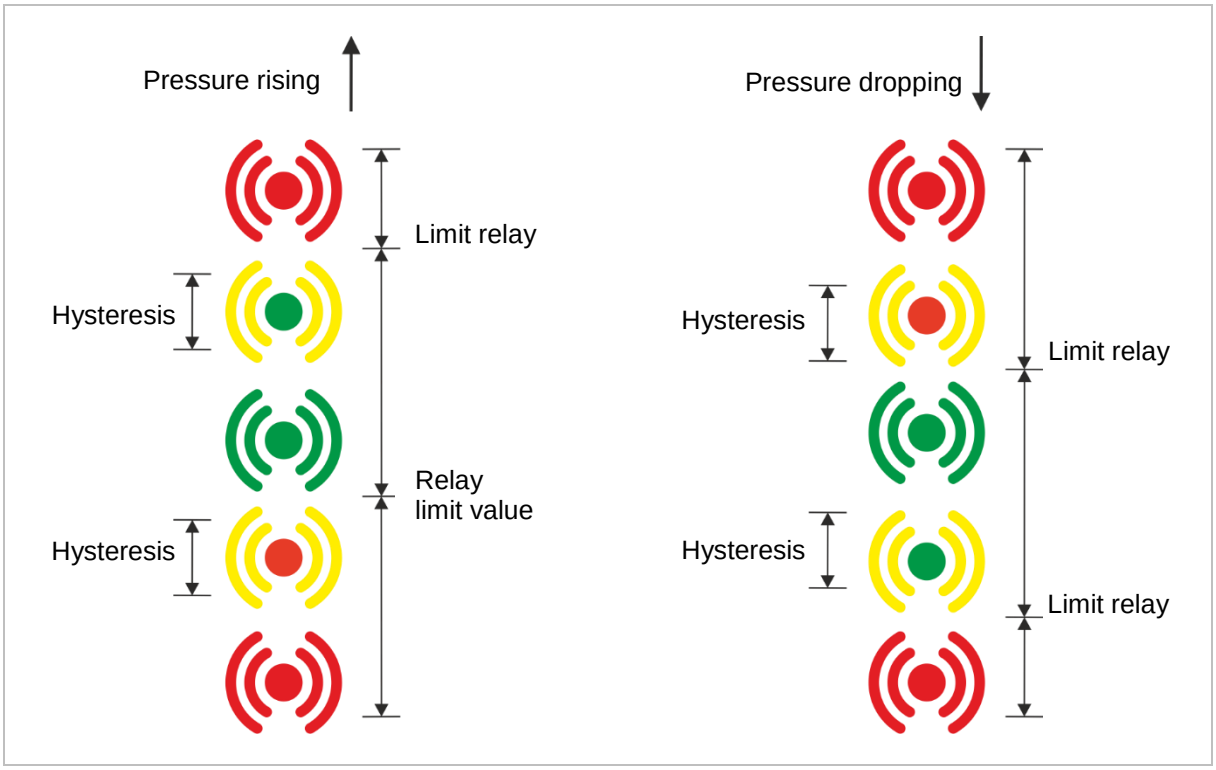


Figure 11. *Limit LED status display in “Limit window” mode*

LED	Meaning
	If the status display shows a single-colour green light, this means that the measured pressure is between the limit values and outside of the set hysteresis range.
	If the status display shows a green/yellow light, this means that the measured pressure is between the limit values and inside the set hysteresis range.
	If the status display shows a single-colour red light, this means that the measured pressure is over or under the limit values and outside of the set hysteresis range.
	If the status display shows a red/yellow light, this means that the measured pressure is over or under the limit values and inside of the set hysteresis range.

8 Operation

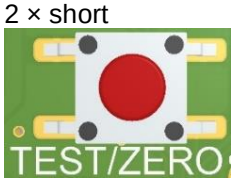
8.1 Offset for Zeroing

Note!
The device has been set to the correct value in the factory and does not need to be modified.

Explosion hazard!
This function must only be used outside of EX zones, since the housing must be opened under voltage. Before opening the housing, make sure that no explosive environmental conditions, such as dust, exist.

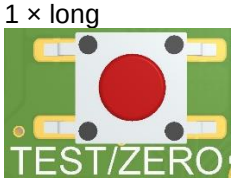
If a zeroing has to be done, a warm-up time of 30 minutes must be observed.

2 × short



1. Double clicking on the button will accept the current pressure at the pressure connections as 0 mbar (AUTO ZERO). The measured pressure must be in the range of ±10 % from the sensor measuring range to the zero point in order to achieve a successful zeroing.

1 × long



2. A long press on the button resets the offset with respect to the zeroing to 0 mbar.

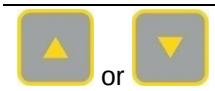
8.2 Offset for zeroing with device keypad (HE 5411 Premium)

Should a zeroing need to be carried out, a warm-up time of 30 minutes must be observed.

	1. Press keys UP and DOWN. The current pressure at the pressure connections will be accepted as the offset. The measured pressure must be in the range of ±10 % from the measuring range end value to the zero point in order to achieve a successful zeroing.
	2. “Zero” and the offset to be accepted flash alternately on the display.
	3. The UP key confirms acceptance.
	4. “Set” is shown briefly and the device goes into operation mode.
 or 	The offset will be set to 0 mbar.

8.3 Limit value parameter setting with device keypad (HE 5411 Premium)

1. The 7-segment display shows the current actual value.

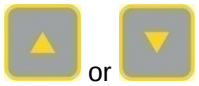


2. Hold the UP key pressed down for 3 seconds to edit the upper limit value.

   Hold the DOWN key pressed down for 3 seconds to edit the lower limit value.

3. PASS appears briefly on the display.

4. When the UP or DOWN key is released, you will be asked to enter the password.



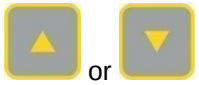
5. Enter the password using the UP or DOWN keys.

6. Keep both keys pressed to confirm the password.

   If you have entered the password correctly, continue with step 7.

If you have entered the wrong password, the display goes back to the actual value. Repeat steps 1. to 6.

The dot at the bottom right of the display is flashing.



7. Press the UP or DOWN key to set the upper and lower limit value.

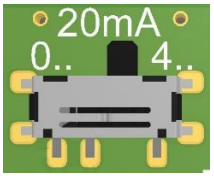
8. Keep both keys pressed simultaneously to save the set limit value.

   The set limit value flashes for 3 seconds.

9. If the **lower** limit value is set to the minimum value, the display shows OFF and the limit value is deactivated.

10. If the **upper** limit value is set to the maximum value, the display shows OFF and the limit value is deactivated.

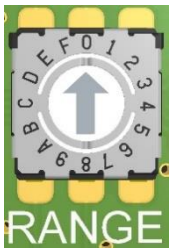
8.4 Analogue Output Setting



The analogue output can be selected between 0…20 mA or 4…20 mA with the slide switch.

- 0…20 mA (left)
- 4…20 mA (right)

8.5 Setting the measuring range



The measuring range is set with the rotary coding switch.
The different spreads depend on the full measuring range of the sensor used.

The following table shows the measuring ranges that can be set:

Position of rotary coding switch	Measurement range	Display
0	Set with the PC tool	
1	100 % bidirectional	pressure
2	80 % bidirectional	pressure
3	50 % bidirectional	pressure
4	100 % unidirectional	pressure
5	80 % unidirectional	pressure
6	50 % unidirectional	pressure
7	100 % bidirectional, square rooted	%
8	80 % bidirectional, square rooted	%
9	50 % bidirectional, square rooted	%
A	100 % unidirectional, square rooted	%
B	80 % unidirectional, square rooted	%
C	50 % unidirectional, square rooted	%
D	Free (100 % bidirectional)	pressure
E	Free (100 % bidirectional)	pressure
F	Free (100 % bidirectional)	pressure

8.6 Test Mode

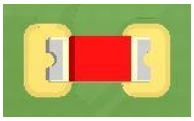
The transmission of the analogue signal can be tested in Test Mode.

Explosion hazard!
This function must only be used outside of EX Zones, since the housing must be opened under voltage. Before opening the housing, make sure that no explosive environmental conditions, such as dust or gas, exist.

1 × short

1. Pressing the “TEST” button once switches the analogue outputs to 50 % (10/12 mA or 5 V).

2. The Mode ends by itself after 300 s, and the analogue outputs display the current measured pressure again. The countdown from 300 s to nought and the word “TEST” are shown alternately on the 7-segment display.



3. The red LED flashes!

4. Pressing the “TEST” button again ends the Mode immediately, before the countdown from 300 s is over.

9 Parameter setting with Service PC

The “EasyTool Controls” software from Version 4.x is required to set the parameters with a service PC.
The USB/TTL adapter required for that purpose is available from HESCH *(see chapter 11 Accessories)*. The program allows a configuration to be saved, or a saved configuration to be established again.

Note!
The limit relay hysteresis can only be set with the “EasyTool Controls” PC software, from version 4.x. The factory setting of the hysteresis is 1 %.

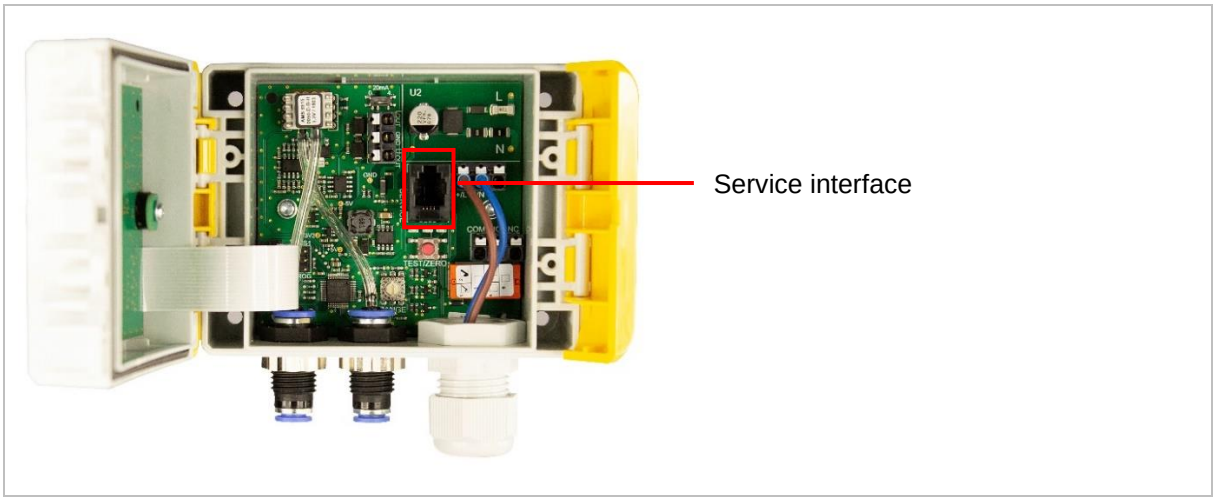


Figure 12. *HE 5411 Service interface in the housing*

1. Connect the PC to the operating unit via USB cable.
2. Start “EasyTool Controls”.
3. Choose the correct interface on the “Settings” menu.
4. Documents or data can now be transferred.

9.1 Parameter Table

Sensor Min. = Base measuring range start
Sensor Max. = Base measuring range end

Note!
The basic measuring range is indicated on the name plate!

Note!
Please note that, when setting the measuring range start and end, the difference between the two must not be less than 25% of the base measuring range!

Parameter	Adjustment range	Default setting	Unit
Input signal			
Damping (time constant T) • The damping is implemented as a first-order low-pass. • It affects the measured value and stabilizes a fluctuating input signal (*see Figure 13*) • Approx. 99 % of the end value are reached, after the fivefold time, set via the parameter 'Damping' (*see Figure 14*) • The higher the damping value, the slower does the output signal respond.	0.00…60.00	2	s
Offset • This parameter can also be set on the device itself. (*see chapter 8.1 and chapter 8.2)*	-10%…+10% from base measuring range end	0.00	mbar
Measuring range start • The measuring range start indicates the pressure at which an output signal of 0% is displayed.	Sensor Min…Sensor Max	Base measuring range start	
Measuring range end • The measuring range end indicates the pressure at which an output signal of 100% is displayed.	Sensor Min…Sensor Max	Base measuring range end	

Parameter	Adjustment range	Default setting	Unit
Characteristic line • If the parameter “Characteristic line” is on the table, the characteristic line can be defined with the parameters “Base Output Signal 1”, “Base Output Signal 1” and “Base Output Signal 30”, “Base Output Signal 30”.	linear, square-rooted, table		
Base Output Signal 1	0…100		%
Base Input Signal 1	Sensor Min…Sensor Max		mbar
…			
Base Output Signal 30	0…100		%
Base Input Signal 30	Sensor Min…Sensor Max		mbar
Number of bases	2…30		

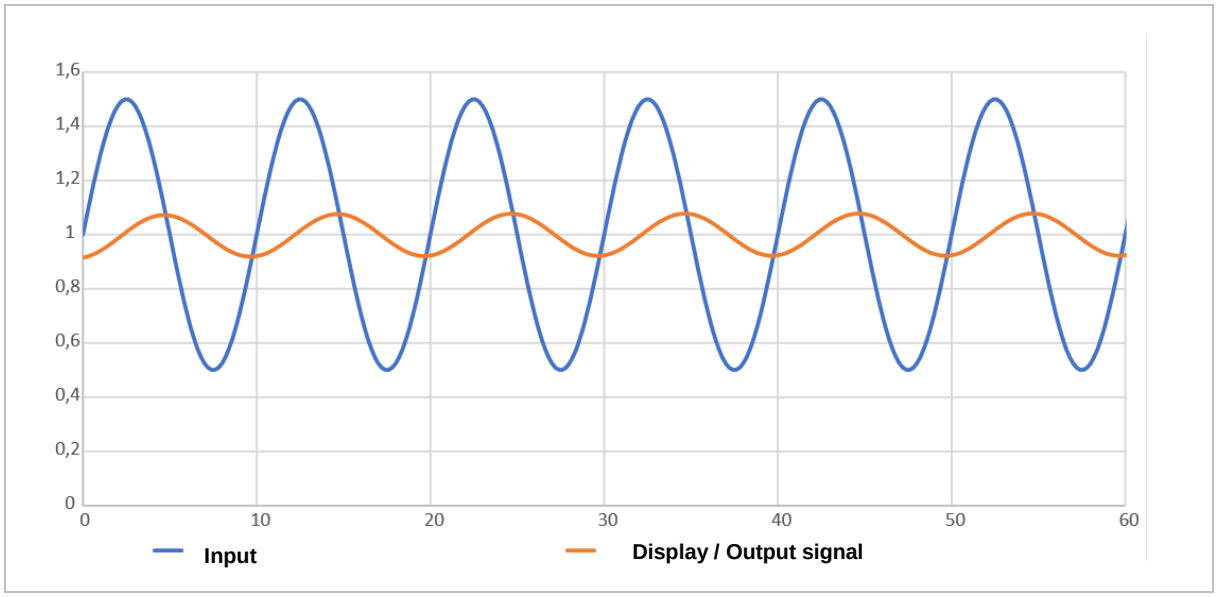


Figure 13. *Example for damping a fluctuating signal*

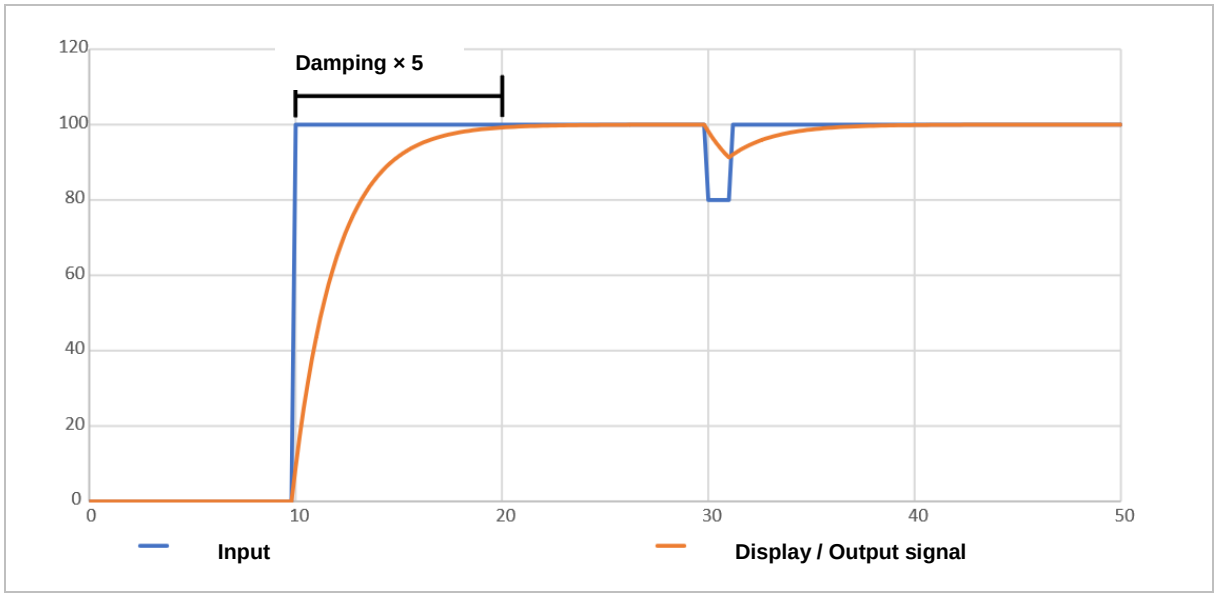


Figure 14. *Example for step response*

Parameter	Adjustment range	Default Setting	Unit
Display / Output			
Creep flow suppression • Flattens the output signal after root extraction at small differential pressures (around zero). • **<u>Functionalities:</u>** **None** (function is deactivated) **Step** (the parameter 'creep flow threshold' defines the range around zero. Within this range, the displayed value and the output signal are set to zero, *see Figure 15*. Is mostly used when the volume flow is subsequently added up.) **Linear** (the parameter 'creep flow threshold' defines the range around zero. Within this range, the square rooted characteristic line is replaced by a linear one => increase around zero is limited, *see Figure 16*. Mostly used for downstream controls.)	None, step, linear	Step	
Creep flow threshold • Min. = Display value start • Max. = Display value end	Min.…Max.	10% from Max.	
Unit The unit you wish to be displayed can be set with this parameter.	mbar, Pa, inH2O, psi,		
Display value start	-999.00…9999.00	0.0	
Display value end	-999.00…9999.00	100.0	
Upper limit value • This parameter can also be set on the device itself. • *See chapter 7.1*	Sensor Min…Sensor Max, Off	75% of basic measuring range end	mbar, Pa, inH2O, psi
Upper hysteresis limit value • *See chapter 7.1*		1% of basic measuring range end	

Parameter	Adjustment range	Default Setting	Unit
Lower limit value • *See chapter 7.1*	Off, Sensor Min…Sensor Max	Off / 1% of Base measuring range end • The lower limit value is deactivated by default for sensors with a unidirectional basic measuring range.	mbar, Pa, inH2O, psi
Lower hysteresis limit value • *See chapter 7.1*		75% of basic measuring range end	
Pick-up delay	0.0…999.9	0	s
Dropout delay	0.0…999.9	0	s
Fail-Safe Relay • When the “Fail-Safe Relay” parameter is active, the relay is energised in a non-active state. If the upper or lower limit value is overshot or underrun, the relay is de-energised *(see Figure 17).*	Inactive, Active	Inactive	

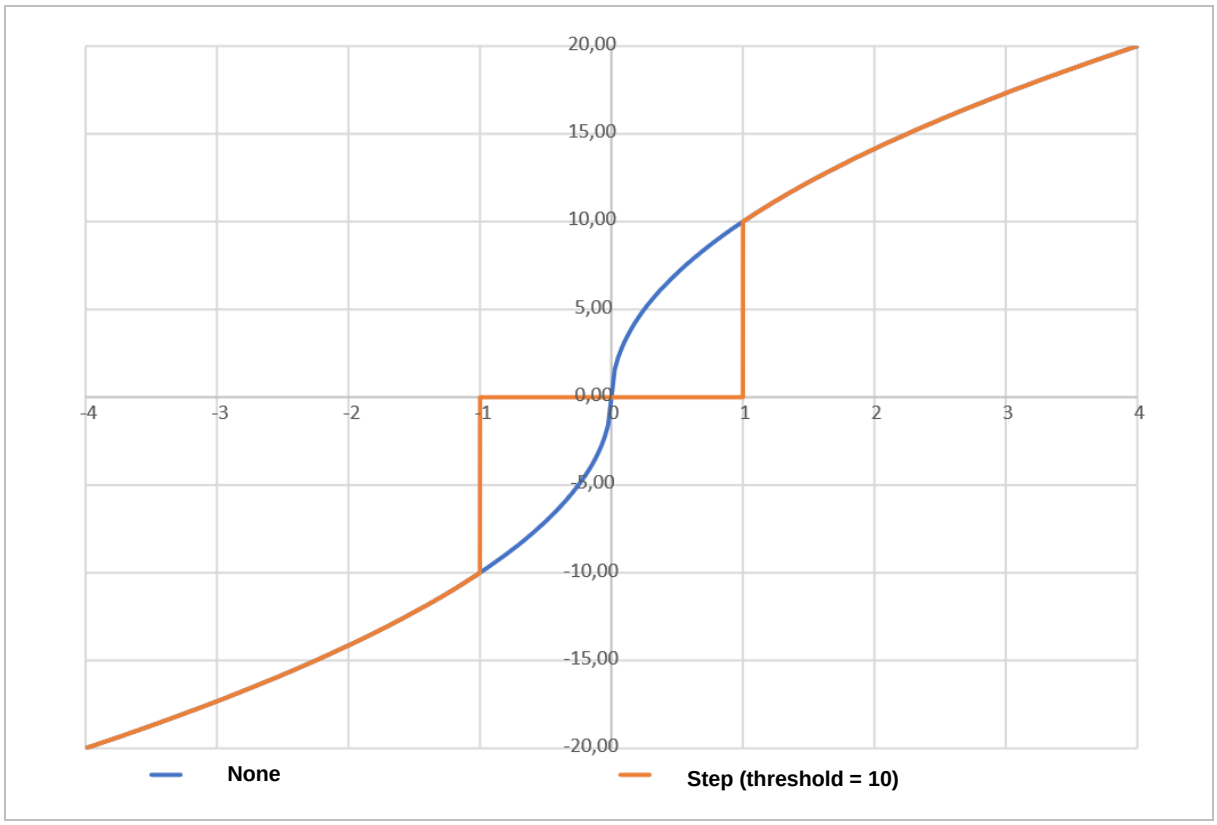


Figure 15. *Creep flow suppression 'Step'*

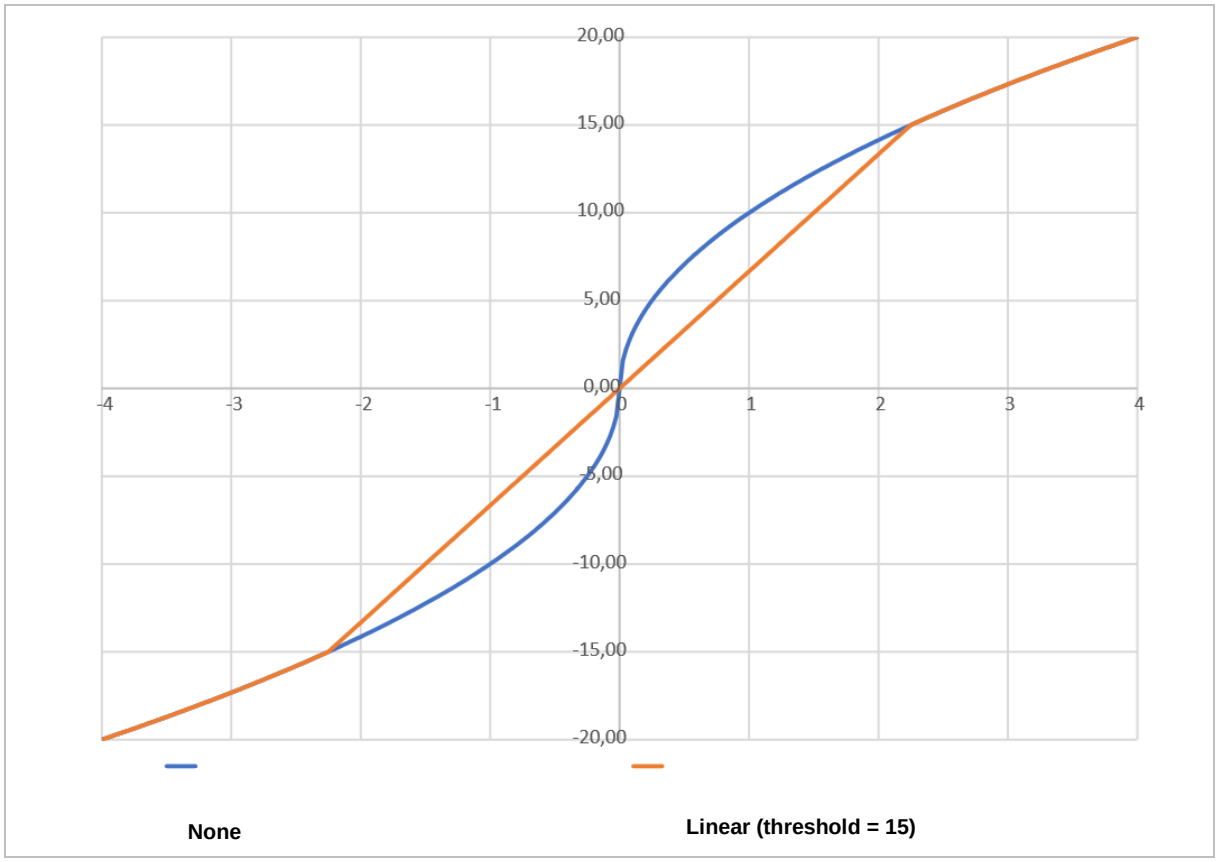


Figure 16. *Creep flow suppression 'Linear'*

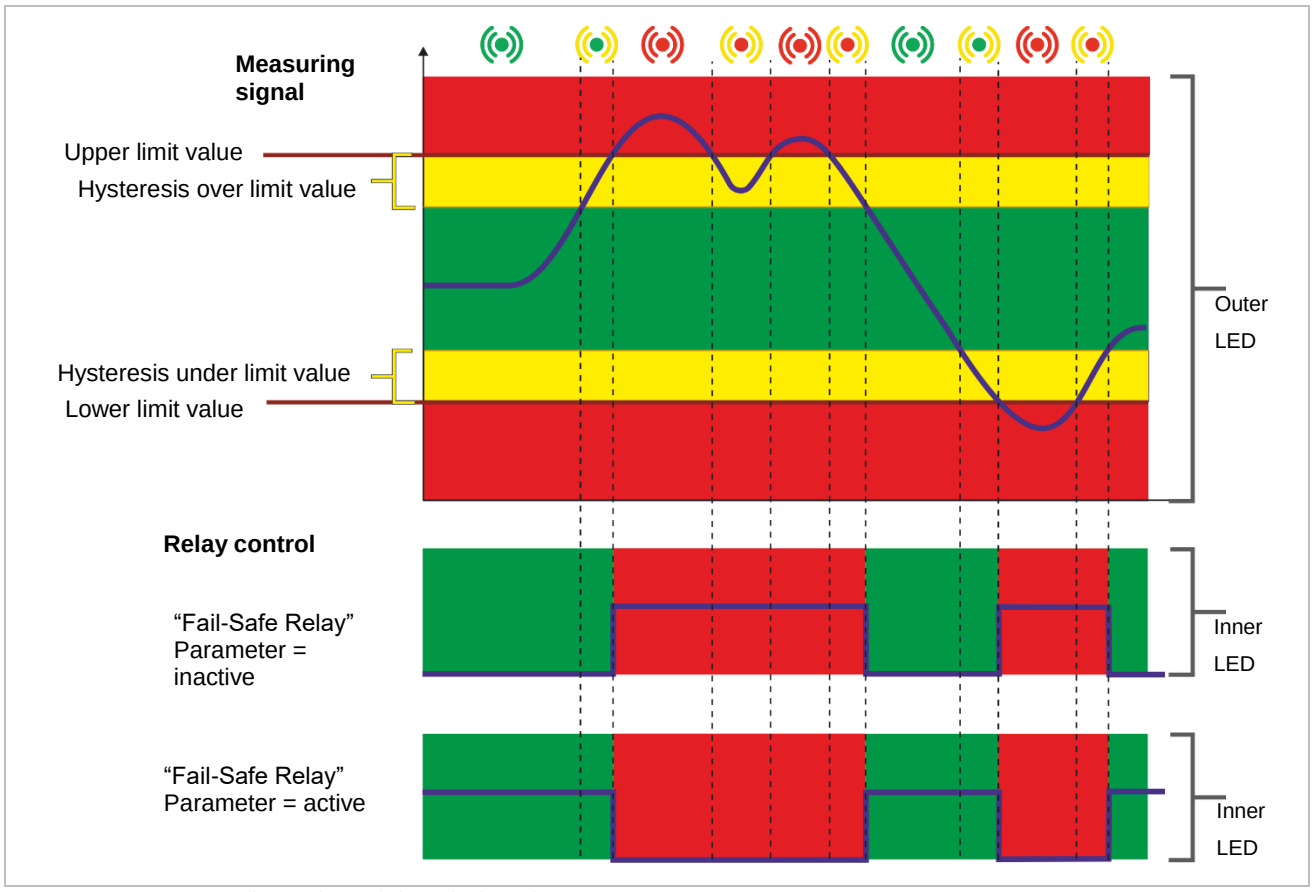
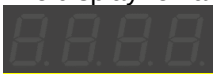


Figure 17. *Configuration of the Limit Value*

Parameter	Adjustment range	Default setting	Unit
Test • *See chapter 8.6*			
Test duration	10…300	300	s
Test value current signal	0.00…100.00	50	%
Test value voltage signal	0.00…100.00	50	%

Parameter	Adjustment range	Default setting	Unit
Device settings			
Display brightness	50…100	100	%
Password • The password must be entered using the UP and DOWN keys before the parameters “Upper limit value” or “Lower limit value” can be set.	000…999	001	

10 Error Messages

Display	Cause	Troubleshooting
The display shows  alternating with the currently measured value.	Measurement range overshot or pressure connections reversed.	• Check the measurement range set. • Check the pressure connections.
The displays shows  alternating with the currently measured value.	Measurement range underrun or pressure connections reversed.	• Check the measurement range set. • Check the pressure connections.
The display shows  alternating with 	The calibration data of the sensor is not valid.	• The error cannot be solved by the customer. • Please contact HESCH service *(see chapter 12 Maintenance and Service).*
The display shows  alternating with 	The sensor is missing or faulty.	• The error cannot be solved by the customer. • Please contact HESCH service *(see chapter 12 Maintenance and Service).*
The display shows  alternating with the process value or displayed value.	The stored parameters are not valid (e.g. after a firmware update).	• Write parameters with the software “EasyTool Controls”. • Or set a parameter at the device , e.g. ‘Zeroing’ or ‘Limit’.
The green LED flashes (*see Figure 9: Pos. B)*  The display remains black 	The supply voltage is wrong or faulty (e.g. when connecting 24 V DC to 100…240 V AC).	• Check supply voltage

11 Accessories

HESCH offers a series of optional accessories in connection with the assembly and connection technology of the HE 5411 differential pressure measuring transducer:

Item	Picture	Name	Order number
1		**Wall bracket** as an alternative means of fastening the HE 5411 housing Colour: Light grey	upon request
2		**Housing hinge closure** available in various colours: Light grey, graphite grey, bright red, ultramarine blue	upon request
3		**Screws (4 pieces)** for the optional screwing of the housing. Factory standard 1412, 30×18×10, cross head, left thread	B SHR
4		**dp-connection adapter** incl. screw connection, seals, filter pads, blind plugs	#54990001
5		**Universal adaptor set** for push-on bulkhead fitting, PU hose Ø i=4mm / Ø o=6mm onto Whitworth pipe thread G¼"	# 54210099
6		**Reduction** 6mm plug nipple x 4 mm hose IQS-Mini	#181452

Item	Picture	Name	Order number
7		**Multiple sealing insert** 3 x cables Ø 5 mm	upon request
8		**USB/TTL adapter** Incl. connection cable and “EasyTool Controls” PC software	# 61000011
9		**M12 connector** 4-pole, A-coded **Reduction** M20×1.5…M16 ×1.5	#135725 #165533

12 Maintenance and Service

Maintenance, Repair
The device must be cleaned regularly to prevent increased dust generation on the device. Cleaning of the housing is only permitted with damp cleaning agents.

Disposal
Dispatch metals and plastics for recycling. Electrical and electronic components must be collected separately and disposed of appropriately. Dispose of assembled printed circuit boards professionally.

Service
AXXERON HESCH electronics GmbH
Boschstraße 8
31535 NEUSTADT
GERMANY
Phone: +49 5032 9535-0
Internet: www.hesch-automation.com
Email: info@hesch.de