HE 5413

3-channel differential pressure transmitter



Operating instructions

(Translation of Original German version)



TECHNOLOGIES MEMBER

Legal Notice

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1 Legal Provisions

Manufacturer

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

Intended use

- The 3-channel differential pressure transmitter is used for measuring up to 3 differential pressures and is mainly applied in the dust extraction and ventilation industry.
- 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.

Personnel qualification

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

Device Safety

The device has been constructed and tested in accordance with VDE 0411 / EN 61010-1 and has left the factory in perfect safety condition. To maintain this condition and to ensure safe operation, the user must observe the instructions and warnings described in these operating instructions.

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/ underneath https://www.hesch-automation.com/en/support/ https://www.hesch-automation.com/en/support/download-center/ https://www.hesch-automation.com/en/support/download-center/ https://www.hesch-automation.com/en/support/download-center/ https://www.hesch-automation.com/en/support/ https://www.hesch-automation.com/en/support/ https://www.hesch-automation.com/en/support/

2 Safety Information

2.1 Symbols and Basic Safety Instructions

This chapter contains important safety regulations and notes. For protection 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.



DANGER!

2.2

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, *can* 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



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 cables must be laid separately from the power lines. Connect the protective earth connector (in the respective equipment carrier) to the protective earth conductor.



Danger of Electrocution!

In case of any interruption of the protective conductor in the equipment carrier, the device can become hazardous. Intentional interruptions are not permitted. If it can be assumed that safe operation is no longer possible, put the device out of operation and secure it against unintentional operation.



Danger of Electrocution!

Do <u>not</u> open the device while under voltage! When opening the devices or removing covers and parts, live parts may be exposed. Connection parts can also be live!



Attention!

The device must never be put into operation, if damage is recognisable.



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".



Explosion prevention!

The devices are, with closed housing, suitable for use in potentially explosive dust atmosphere in **zone 22** (applies to all device versions).

Before opening the device, you must ensure that there is no explosive atmosphere.

Before closing the device, make sure that the inside of the device is free of dust.



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. When the fault could not be found after checking these points, we recommend to send the device to AXXERON HESCH electronics GmbH.



Decommissioning!

For decommissioning the device, switch off the power supply on all poles. Secure the device against unintentional operation! If the device is connected to other devices and / or equipment, consider the impacts and take appropriate precautions before switching it off.

2.3.1 Special regulations



Material damage due to electrostatic charge!

Clean the device regularly to avoid increased dust formation on the device. Only use **moist** cleaning agents to clean the housing, in order to avoid electrostatic charging!



Note!

The ATEX approval only remains valid, if the installation is carried out professionally in compliance with the degree of protection specified in the device identification.



Note!

Close unused cable glands with locking bolts and housing bores with blanking plugs.

2.4 Device identification and name plates

2.4.1 ATEX approval

Ex II3D Ex tc IIIC T135°C Dc IP65

II3D	Device category:	for use in zone 22 for dust during regular operation	
Ex	Designates electrical equipment. Standards of the series EN 60079-0 et seqq. 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:	for use in zone 22 for dust	
IP65	Protection class:	dust-tight and water jet-protected	

2.4.2 Name plates and labelling of the measuring channels



Figure 1 Name plates (left) and channel labelling (right) (exemplary)

Note!

The name plate of your device and the labelling of the measuring channels are located right next to each other on the **top side** of the device.

3 Technical Data

General			
Supply voltage:	 1936 V DC ± 10% 100240 V AC / 50 Hz The supply must be provided by a SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage). 		
Power consumption:	max. 5 W		
Electrical safety:	according to DIN-EN 61010-1, DIN EN 61010-2-201		
EMC:	Immunity: DIN EN 61000-6-2 Emission: DIN EN 61000-6-3		
Service interface:	RJ10 socket (USB-TTL adapter required, article number: #61000011)		
Mounting position:	vertical mounting position, wall mounting		
Weight:	approx. 450 g		
Connection pressure per measuring input:	2× plug-in connection for hose with Ø6 mm		

Housing	
Housing material:	Polycarbonate, parts in contact with gas: polyurethane
Dimensions:	191 × 80 × 60 mm (W × H × D)
Protection class:	IP 65
Cable gland:	M20 for standard signal, M12 for power supply
-Optional:	with M12 connector plug

Electrical connection				
Via push-in spring connection:	for devices with 24 V DC or 100240 V AC			
-conductor cross-section	0.2 mm ² 1.5 mm ²			
-conductor cross-section flexible	0.2 mm ² 1.5 mm ²			
-Conductor cross-section AWG ¹ / kcmil ²	2416			
-conductor cross-section flexible with wire end ferrule without plastic sleeve	0.2 mm ² 1.5 mm ²			
-conductor cross-section flexible with wire end ferrule with plastic sleeve	0.2 mm ² 0.75 mm ²			
Optional: Electrical connection via M12 connector plug	5-pole, only for 24 V DC devices without galvanic separation			

¹ Abbreviation for American Wire Gauge

² Abbreviation for Kilo Circular Mils

Environmental conditions			
Storage	-40°+70°C		
Transport	-40°+70°C		
Operation -20°+50°C			
Climatic application	3K6 according to DIN EN 60721-3 with restriction,		
class	relative humidity: 75% annual average, no condensation permitted		
Condensed water	not permitted		
Formation of ice	not permitted		
Max. operation height above NN	2000 m		
Air pressure:			
during operation and			
storage	80 kPa to 106 kPa		
during transport	70 kPa to 106 kPa		

dp module		
Amount	13	
Current output:		
Effective dynamic range	420 mA or 020 mA	
Output load	Load <= 600 Ω	
Linearity	< 1 %	
Precision	< 1 %	
Temperature drift	≤ 0.1 % / 10 K	
Voltage output:		
Effective dynamic range	010 V	
Output load	Load >= 1 kΩ	
Linearity	< 1 %	
Precision	< 1 %	
Temperature drift	≤ 0.1 % / 10 K	

Sensor system ³				
	According to information on name plate			
	Max. measuring range	Overpressure ⁴	Burst pressure ⁵	
	± 2.5 mbar		350 mbar	
	± 5 mbar	175 mbar		
Sensor	± 10 mbar			
	± 25 mbar	250 mbar	500 mbar	
	± 50 mbar	500 mbar	1000 mbar	
	± 100 mbar	500 11041		
	± 350 mbar	2500 mbar	5000 mbar	
	± 1000 mbar	2500 mbai		
Medium	Air as well as dry, non-aggressive gases			
Measuring piezoresistive				
system				

System accuracy				
Measuring range (in mbar)	± 2.5± 10	± 25± 100	± 350± 1000	
Basic accuracy	± 1.5 % FSO ⁶ T = 25 °C	± 1.0 % FSO T = 25 °C	± 0.5 % FSO T = 25 °C	
Total error	± 2 % FSO T = 060 °C	± 1.5 % FSO T = 060 °C	± 1.0 % FSO T = 0 60 °C	
Pneumatic connection	Push-in bulkhead fittings for 6 mm outer diameter of hose (4 mm with reduction)			

Overview of possible versions
Not galvanically separated with 0(4)-20 mA and 0-10 V output and cable gland
Not galvanically separated with 0(4)-20 mA output and M12 connector plug
Not galvanically separated with 0-10 V output and M12 connector plug
Galvanically separated with 0(4)-20 mA output and cable gland
Galvanically separated with 0-10 V output and cable gland

 ³ Information is for galvanically separated as well as for not galvanically separated sensors
 ⁴The overpressure is defined as the maximum pressure that may be applied to a pressure connection so that the sensor maintains the specifications as soon as the pressure is within the operating pressure range again. Higher pressures can lead to

 ⁵ The burst pressure is defined as the maximum pressure, which can affect a pressure connection relative to the other connection (or if just one pressure connection is connected), without causing leakages in the sensor.
 ⁶ Abbreviation for Full Scale Output

4 Mounting



Note! If you wish to mount the device to the wall, *Figure 2* and *Figure 3* can be used as drilling templates.

The ambient temperature at the installation point must not exceed the permissible temperature for nominal use specified in the technical data.

4.1 Dimensions



Figure 2 Dimensions of HE 5413 with M12 connector plug (24 V DC)



Figure 3 Dimensions of HE 5413 with cable glands (100...240 V AC, 24 V DC)

Scope of Delivery

- HE 5413 3-channel differential pressure transmitter
- Operating instructions



Check the delivery upon receipt for completeness and visible defects. In case of a complaint, contact your responsible service representative of AXXERON HESCH electronics GmbH immediately.

4.2 Opening the device

The opening and closing works without screws by means of hinge technology. A flat-tip screwdriver is required to open the device. Apply the screwdriver to the respective position on the housing lid (*see step 1 in Figure 4*).



Note!

Note!

Note!

Make sure to move the screw driver **to the right** to open the hinge (*see step 2 in Figure 4*). If the screwdriver is moved to the left, the housing lid may be damaged.

Open the housing lid to the left up to an angle of 105° (*see step 3 in Figure 4*). Optionally, the housing lid can in addition be closed with 4 screws in order to protect it from unauthorised access. For further information, please contact the service of AXXERON HESCH electronics GmbH (*see chapter 9 Maintenance and Service*).

We recommend the screwless hinge closure for quicker service access.



Figure 4 shows a similar device. However, the principle of opening is identical for HE 5413.



Figure 4 Opening the housing lid to the left

4.3 Mounting the device

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



Note! The positions of the bore holes for the screws are identical for every device. The housing in *Figure 5* is an example.





Housing rear with bore holes



Note!

Alternatively the wall mounting can be done with wall brackets. For further information, please contact the service of AXXERON HESCH electronics GmbH (*see chapter 9 Maintenance and Service*).

5 Device Description

HE 5413 is a differential pressure transmitter, which can measure up to three differential pressures.

Up to 3 differential pressure modules are mounted onto the circuit board, in order to be able to record the differential pressures (*see Figure 6*).

There is a service interface on the circuit board (*see Figure 6*) for connecting the HIMOD interface adapter (AXXERON HESCH item number: #61000011). This interface is used for firmware updates and parametrisation (*see also chapter 8 Parametrisation with service PC*).



Figure 6 Design of printed circuit board exemplary of the HE 5413 with M12 connector plug



Figure 7 Channels 1 ... 3

5.1 Overview of device versions



Explosion prevention!

The devices are, with closed housing, suitable for use in potentially explosive dust atmosphere in **zone 22** (applies to all device versions). Before opening the device, you must ensure that there is no explosive atmosphere. Before closing the device, make sure that the inside of the device is free of

Before closing the device, make sure that the inside of the device is free of dust.



Note!

The advantage of devices with M12 connector plug is that they do not need to be opened for electrical commissioning.



Figure 8 Overview of device versions

6 Electrical Commissioning



Danger of Electrocution!

For electrical installation, the power supply has to be disconnected.



Material damage due to electrostatic charge! Observe the safety measures according to DIN EN 61340-51/-3 to avoid electrostatic discharge!



Material damage due to wrong supply voltage!

The voltage supply must correspond to the voltage indicated on the name plate.



Note!

Before commissioning, please observe the information on the name plate!



Note!

Please connect the cables properly to the cable glands.



Note!

The given temperature limitations for device application, must be observed before and during operation.



6.1 Connection of HE 5413 with cable glands

Figure 9 Electrical connection via cable glands M20 and M12

	Supply voltage:			
	Connection	DC signal	AC signal	
000	PE	Protective earth	Protective earth	
	L/+	1936 V DC	100240 V AC	
PÉ L/+ N/-	N/-	GND	Ν	
	This dp module has one analogue current output and one analogue voltage output . The current differential pressure is signalled with a non -galvanically isolated 0(4)20 mA or 010 V signal. 010 V GND 0(4)20 mA			
This dp module has one analogue current output . The current differential pressure is signalled with a galvanically isolated 0(4)20 mA signal. GND 0(4)20 mA				
	This dp module has one an differential pressure is sign signal. GND 010 V	nalogue voltage out nalled with a galvanic	put . The current ally isolated 010 V	



Note!

If you have any questions concerning the dp modules, please contact our service department (*see chapter 9 Maintenance and Service*).

6.2 Connection HE 5413 with M12 connector plug



Note!

The channels 1, 2 and 3 are <u>not</u> galvanically separated from each other in devices with M12 connector plug.



Figure 10 Electrical connection via M12 connector plug



Figure 11 Connection diagram with M12 connector plug

Contact	Meaning	Colour
1	+24 V supply	Brown
4	Channel 1	Black
5	Channel 2	Grey
2	Channel 3	White
3	GND supply	Blue

Assembly of measuring hose to pressure connection 6.3



Figure 12 Assembly of hose onto push-in bulkhead fitting

A Hose connection

Insert hose with 6 mm outer diameter into the connection.

B Hose disconnection

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

7 Indication elements



LEDs	Meaning	
On main PCB:		
	LED operation Lights up green <u>permanently</u> , when a supply voltage is applied.	
	LED status Lights up yellow <u>permanently</u> , when the device is operating.	
	<u>Hashes quickly</u> , when the controller is in the boot loader (start programme). A software update is necessary.	
	The LED is off, when the device is not working or when there is no valid firmware available.	
	LED error Lights up green <u>permanently</u> , when an error occurred.	
On dp modules:		
	LED status Lights up yellow <u>permanently</u> , when the dp module is active.	

8 Parametrisation with service PC

For parametrisation with a service PC, the software **EasyTool Controls 4.0** is required. The also required USB-TTL adapter is available at AXXERON HESCH electronics GmbH (article number: #61000011).

With this programme you can save a configuration or restore a saved configuration.

8.1 Connecting with service PC



8.2 Parameter table

Sensor min. = basic measuring range start Sensor max. = basic measuring range end



Note!

Please see name plate for basic measuring range!



Note!

When setting the start and end of the measuring range, please note that the difference between the two must not be less than 25% of the basic measuring range!

Parameter	Setting range	Default setting	Unit
 Damping (time constant T) The damping is implemented as a first order low pass. It affects the measured value and stabilises a fluctuating input signal (<i>see Figure 15</i>). Approx. 99 % of the end value are reached, after the fivefold time, set via the parameter 'Damping' (<i>see Figure 16</i>). The higher the damping value, the slower does the output signal respond. 	0.0060.00	0.20	S
Offset	-10 %+10 % of basic measuring range end	0.00	
 Measuring range start The measuring range start indicates the pressure where an output signal of 0% is given. 	Sensor minSensor max	0.00	mbar
 Measuring range end The measuring range start indicates the pressure where an output signal of 100% is given. 	Sensor minSensor max	Sensor max.	
Option norm signal	020, 420	420	mA
 Characteristic line If the parameter "Characteristic line" is set to table, the characteristic line can be defined with the parameters "Base Output Signal 1", "Base Input Signal 1" and "Base Output Signal 2", "Base Input Signal 2". 	Linear, square- rooted, table	linear	-

Parameter	Setting range	Default setting	Unit
Number of bases ⁷	230	2	-
Base output signal 1	0100	0.00	%
Base input signal 1	Sensor min…Sensor max	0.00	mbar
Base output signal 2	0100	100.00	%
Base input signal 2	Sensor minSensor max	5.00	mbar

⁷ The number of bases as well as base signals are indicated in EasyTool Controls, when the parameter **characteristic line** is set to **table**.



Figure 15 Example for damping of a fluctuating signal



Figure 16 Example for step response

Parameter	Setting range	Default setting	Unit
 Creep flow suppression⁸ Flattens the output signal after root extraction at small differential pressures (around zero). 	None, step, linear	linear	
 <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 <i>Figure 17</i> . 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 <i>Figure 18.</i> Mostly used for downstream controls.)			
Creep flow threshold Min. = Indication value start Max. = Indication value end	minmax.	10.00 from max.	%

⁸ Creep flow suppression and creep flow threshold are indicated in EasyTool Controls, when the parameter **Characteristic line** is set to **square-rooted**.



Figure 17 Creep flow suppression 'step'



Figure 18 Creep flow suppression `linear

9 Maintenance and Service

Maintenance, Repair

The device must be cleaned regularly to prevent an increased generation of dust on the device. The housing must be cleaned with damp cleaning agents only.

Disposal

Dispatch metals and plastics for recycling. Electrical and electronic components must be collected separately and disposed of properly. Dispose of equipped printed circuit boards properly.

Service

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