

AccuFlo[®] HMP

Highly accurate measurement
For gas, liquid and steam

Installation and Operating Instructions



Attention:

Please refer to the warning information on page 3 and 4 before commissioning!

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1 General information

1.1 Correct usage

The AccuFlo®HMP is used to measure highly accurately flow of gases, liquids and steams. The device may only be used for the purposes specified in these instructions. Insofar as they are not expressly stated in these instructions, all changes to the device are the sole responsibility of the user.

1.2 Safety information

This device left the factory free from safety problems. In order to maintain this status and to ensure safe operation of the device, please observe the safety information and warnings contained in this instruction.

- The device/system may only be set up and used in conjunction with this documentation.
- Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance by qualified personnel.
- This device may only be used for the applications described in the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by S.K.I. GmbH.
- You are obliged to respect the test certificates, provisions and laws applicable in your country during connection, assembly and operation of the device/system.
- The device can be operated both at high pressure and with aggressive and hazardous media. Therefore, improper use of this device may lead to serious injury and or considerable damage to property. Above all, it must be noted when the device was in use and is to be exchanged.
- Commissioning and operation of a device/system may only be performed by qualified personnel. This personnel has to see to it that appropriate voltage is used (see type stamp), that ensures that in normal operation or in case of default of the device or of components no hazardous voltages may damage the device. Insofar, improper use of this device may lead to serious injury and / or considerable damage to property.

1.3 Qualified personal

The installation and operating must be realized by qualified personnel. Qualified personnel includes persons familiar with the installation, assembly, commissioning and operation of the product and who have the appropriate qualifications for their activities such as

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures and aggressive as well as hazardous media.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the safety regulations.
- For explosion-proof devices: They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.
- Training in first aid.

1.4 Special warnings

Exceeding pressure: Appropriate measures are to be taken to secure that the allowed operation pressure according to the stamp on the type plate is not exceeded.

Exceeding or underrunning of the allowed operation temperature limits: Appropriate measures are to be taken to secure that the allowed operation temperature limits are not exceeded.

Damage: Please observe that the product is not dropped and that it is not affected by excess forces.

Too many load cycles: Appropriate measures are to be taken to secure that the allowed number of load cycles is not exceeded. The maximum load cycles are defined in EN 13480-3; 10.2 c).

Opening under pressure: Appropriate measures are to be taken to secure that the valves of the product are not opened under pressure.

Fire near the product: Appropriate measures are to be taken to secure that the product is taken out of operation in case of damage.

Improper mounting of the evaluation unit: Please observe that the several components of the product are mounted properly.

Improper mounting of the device: Please observe that the device is mounted properly.

Corrosion: Please observe that the product is used and installed as intended.

Electricity: Caution of voltage! Switch off the device before interfering in the wiring.

Other risks: Please observe that the operation instructions of the manufacturer are respected at all times.

1.5 Further information

For clarity reasons, this notice does not contain all detailed information of all types of products and may not consider every possible application nor maintenance.

Attention: If you need more information or have particular problems which are not covered sufficiently by the operating instructions, get in touch with S.K.I. GmbH directly. You may find contact information in the internet.


The contents of these instructions shall not become part of or modify any prior or existing agreement, commitment or legal relationship. All obligations on behalf of S.K.I. GmbH are contained in the respective sales contract which also contains the complete and solely applicable warranty conditions. Any statements contained herein do not create new warranties or modify the existing warranty.

Diese vertraglichen Garantiebestimmungen werden durch die Ausführungen der Anleitung weder erweitert noch beschränkt.

The content reflects the technical status at the time of printing. We reserve the right to make technical changes in the course of further development.

2 Inspection of incoming goods

Please check the scope of delivery for the following items:

<h1>AccuFlo®HMP</h1>	
 <p>AccuFlo®HMP</p> <p>AccuMind®</p>	1. AccuFlo®HMP (flow measurement)
	2. AccuMind® (flow computer)
	3. Optional: AccuFlo®Zero (automatic zero-point calibration)
	4. Documentation
	5. Warning notices for transportation

3 Assembling instructions

Attention must be paid to the following items when installing the AccuFlo®HMP:

- Attention must be paid to the direction of flow (flow direction arrow on the AccuFlo®HMP).
- When measuring liquids in a horizontal pipe the AccuFlo®HMP has to be installed with the differential pressure transmitter assembly pointing downwards.
- When measuring steam in a horizontal pipe the AccuFlo®HMP has to be installed with the differential pressure transmitter assembly pointing to the side.
- When measuring gas in a horizontal pipe the AccuFlo®HMP has to be installed with the differential pressure transmitter assembly pointing upwards.
- When measuring flow in a vertical pipe (steam, gas or liquid) the correct position of the differential pressure transmitter assembly will be ensured by the design of the product. Please pay attention to the flow direction.
- Please ensure coaxial alignment of the AccuFlo®HMP with the connecting piping system.
- During the leak check, all bolted connections inside the AccuFlo®HMP must be checked and tightened if necessary.
- Should unexpected problems arise during operation of the AccuFlo®HMP please consult the additional appropriate documentation enclosed in the scope of delivery or contact the manufacturer.

Special requirements for steam flow measuring systems:

- The AccuFlo®HMP has to be protected by thermal insulation to protect the operating personnel from dangerous heat and to ensure that condensation only takes place in the steam condensate vessel.
- The AccuFlo®HMP for steam is always delivered with a compact head with integrated steam condensate vessel and a welded 5-way valve block. Please check the horizontal installation of the compact head with a spirit level. During commission please fill the compact head must with water with the integrated blow-off-valves located on the outside of the 5-way valve block before using the product. Please perform this procedure for both blow-off-valves. Ignoring this step can lead to irreversible damage of the differential pressure transmitter.
- When performing above steps please check if the steam system is out of operation or if the water pressure is higher than the steam pressure because otherwise steam can leak from the system. Therefore, only if the pipe is at normal pressure the pipes should be filled. Should you need to fill under steam pressure the valve to the measuring transmitter must be closed to protect the differential pressure transmitter from overheating. If there is enough condensate in the system for the filling of the differential pressure transmitter, the valves to the measuring transmitter must be opened. Then, the steam traps must be filled. Due to the small internal volume of the condensate systems low quantity of water is required for this step.

4 Electrical connections and assembling

4.1 Installation location of the flow computer

The AccuFlo®HMP is delivered in combination with the flow computer AccuMind® (see Figure 1). This flow computer converts the data of all connected sensors into the selected flow values. It should be assembled in a cabinet protected from inappropriate environmental influences (for further information please consult AccuMind installation and operation instructions).



Figure 1: Flow computer AccuMind®

4.2 Installation of the flow computer AccuMind[®]

The flow computer has to be installed in a cabinet cut-out with the dimensions 71.5 mm x 136.5 mm (height x width). The tolerances of the cut-out are +/-1 mm in height and +/-4 mm in width.

Please remove the fixing screws from the side of the frame by pressing them to the front. Then push the unit from the front into the cut-out area. Afterwards, please re-install the clamps again and tighten the screws.

The electrical terminal blocks are pluggable and allow an easy replacement of the flow computer. The little terminal block on the power supply is tightened additionally by screws.

4.3 Electrical connections

The AccuFlo[®]HMP is available as standard device with one differential pressure transmitter as well as with two differential pressure transmitters (split-range-mode) in order to enlarge the measuring range. Furthermore, the AccuFlo[®]HMP is also available with the option of automatic zero-point calibration (AccuFlo[®]Zero) for both versions (one or two transmitters).

In the following chapter the electrical connections are described:

- Power supply
 - The flow computer AccuMind[®] needs a voltage supply 90–250 V AC.
 - Should the product include the “Zero Option” for the automatic zero-point adjustment, you need additionally an auxiliary voltage supply of 24 V DC with a power rating of at least 2.1 ampere.
- Wires from the AccuFlo[®]HMP to the flow computer AccuMind[®] may be put together in a system-cable. This contains the following wires:
 - 2 wires for the pressure transmitter
 - 4 wires for the resistance thermometer
 - 2 wires for the differential pressure transmitter (4 if the split-range-mode is present)
 - Should the product include the “Zero Option” for the automatic zero-point calibration, you need a wire to the RJ45 modbus (socket D of the flow computer AccuMind[®] in Figure 2, chapter 4.4).
- To the control system:
 - 2 wires for each analog 4–20 mA outlet (see 6.4)
 - Further signals if necessary (see 6.5)
 - Field bus signals if necessary (see 6.6)

4.4 Terminal assignment

Overview of all terminal blocks on the flow computer AccuMind[®]:

(In the following chapter, only the necessary terminals are described. All other options are explained in the instruction of the flow computer AccuMind[®] (chapter 2.4).)

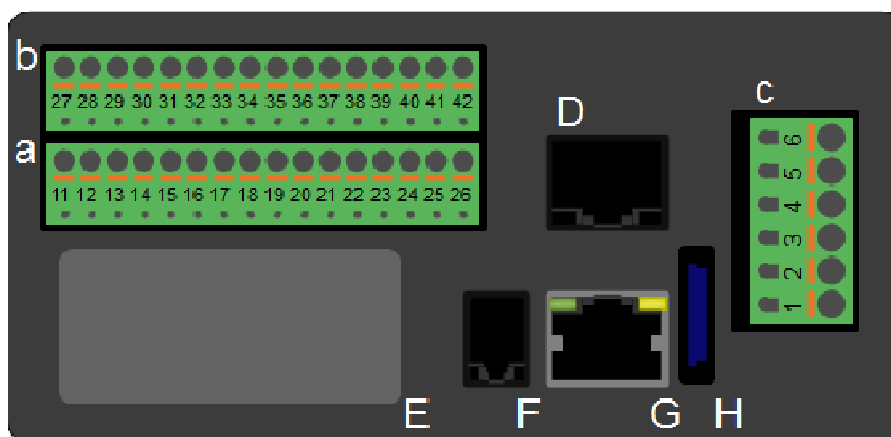


Figure 2: Terminal blocks of the flow computer AccuMind[®]

Terminal block in the AccuFlo® HMP:

(You will find the terminals behind the round cover with the logo "AccuFlo® HMP". Please use the right (free) side of the terminal block.)

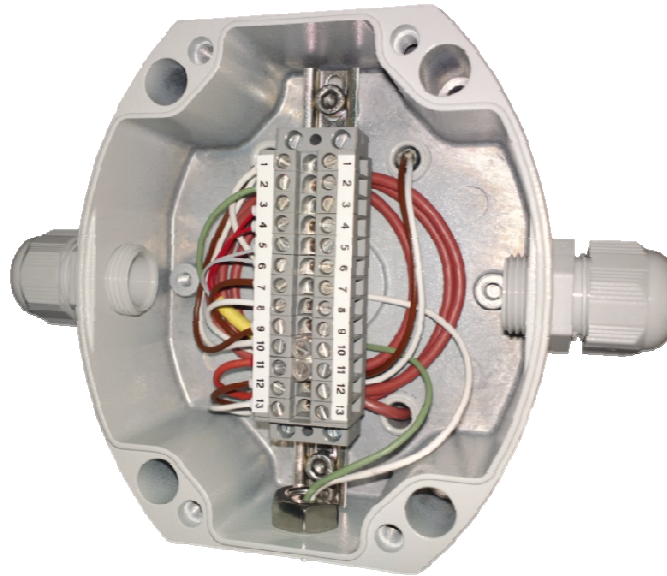


Figure 3: Terminal block in the AccuFlo® HMP

Power supply of the flow computer AccuMind®

Table 1: Small terminal block [c] in Figure 2)

Terminal	Description	Use
1	L	Power supply 90–250 V AC
2	PE	
3	N	

Connection between the AccuFlo® HMP and the flow computer AccuMind®

Attention:

For the AccuFlo® HMP with one differential pressure transmitter, please see **Fehler! Verweisquelle konnte nicht gefunden werden..**

For the AccuFlo® HMP with two differential pressure transmitters, please see **Fehler! Verweisquelle konnte nicht gefunden werden..**

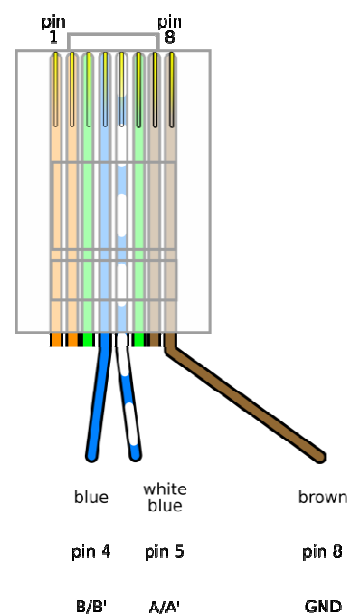
Table 2: Version with ONE differential pressure transmitter:
(Terminal blocks [a, b and D] in Figure 2)

Terminal in HMP	Terminal in AccuMind®	Use
1	26	pressure transmitter 4–20 mA
2	25	
3	19	PT100 four-wire
4	20	
5	17	
6	18	differential pressure transmitter 4–20 mA
7	23	
8	22	External power supply * for AccuFlo®Zero 24 V DC >2,1 A (necessary for magnetic valves)
9	external +24 V *	
10	external GND *	RS485 * triggering for AccuFlo®Zero
11	D Pin 8 (brown) *	
12	D Pin 5 (blue/white)*	
13	D Pin 4 (blue) *	



**Table 3: Version with TWO differential pressure transmitter:
(Terminal blocks [a, b and D] in Figure 2)**

Terminal in HMP	Terminal in AccuMind®	Use
1	26	pressure transmitter 4–20 mA
2	25	
3	19	
4	20	PT100 four-wire
5	17	
6	18	
7	23	
8	22	1st differential pressure transmitter 4–20 mA lower measuring range
9	39	2nd differential pressure transmitter 4–20 mA upper measuring range
10	38	
11	external +24 V *	External power supply * for AccuFlo®Zero 24 V DC >2,1 A (necessary for magnetic valves)
12	external GND *	
13	D Pin 8 (brown) *	RS485 * triggering for AccuFlo®Zero
14	D Pin 5 (blue/white)*	
15	D Pin 4 (blue) *	




e 4: Pin assignment

To connect the socket “D” of the AccuMind®, it is advisable to use an ordinary Ethernet-wire. Take of the RJ45 plug on one side and connect the wires 4, 5 and 8 according to **Fehler! Verweisquelle konnte nicht gefunden werden.** or **Fehler! Verweisquelle konnte nicht gefunden werden.** on the terminals in the AccuFlo® HMP (see Figure 4).

**Table 4: Connection between the flow computer AccuMind® and the control system
(Terminal blocks [a, b] in Figure 2)**

Terminal	Description	Use
15	–	Analog output 1
16	+	
31	–	Analog output 2 (if necessary)
32	+	
11	+	Switching output 1 NO (if necessary)
12	–	
27	+	Switching output 2 NC (if necessary)
28	–	

Table 5: Small terminal block [c] in Figure 2

Terminal	Description	Use
4	N.C.	 mechanical relay 6A / 240V (if necessary)
5	COM	
6	N.O.	

5 Commissioning

5.1 Set up the operating state of the device

If all components are connected, please switch on the power. The flow computer of the AccuFlo®HMP is parameterized ex factory according to your specific needs. Please control the display of the flow computer (see chapter 0).

5.2 Control of the zero-point calibration

If the AccuFlo®HMP is equipped with the automatic zero-point-option (AccuFlo®Zero), the balance of the zero-point will be calibrated automatically.

Description without the option of the automatic zero-point calibration (AccuFlo®Zero):

- Close one of the outer valves on the 3-way valve block and open the middle valve. On a 5-way valve block (AccuFlo®HMP-ST), both outside valves and also the second or fourth valve must be closed. The middle valve must be opened.
- For the AccuFlo®HMP with two differential pressure transmitters, the following steps must be done for every single transmitter.
- If the display of the differential pressure transmitter is not visible (optional), remove the display cover. You will find the display behind the round cover (marked red in Figure 5) on the side not labeled with “field terminals”. The cover can be unscrewed manually.
- Open the cover of the keys of the transmitter (see the blue mark in Figure 5). In Figure 6 you see the opened transmitter.

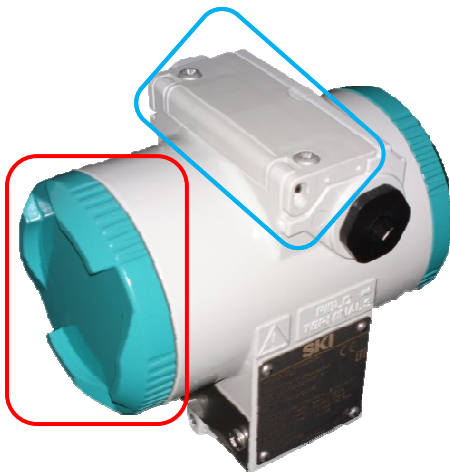


Figure 5: Closed transmitter



Figure 6: Opened transmitter

- There are three keys under the flap which are marked as follows: M, ↑ and ↓ (see red mark in Figure 7).

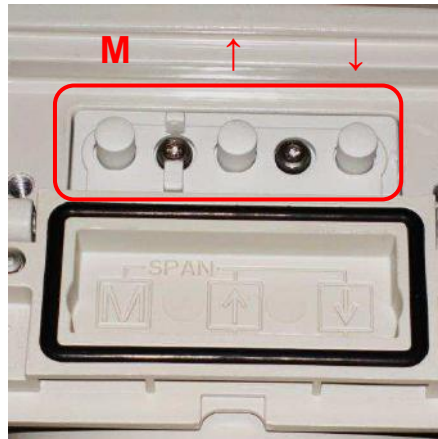


Figure 7: Keys of the transmitter

- The mode of the transmitter is displayed at the bottom left on the display. (Mode 1 to 14; no display in mode 1 (=measurement mode) (see Figure 8)). The M-key is used to scroll through the menu. Please select mode 7 (=zero-point calibration) (Figure 9).



Figure 8: Mode 1 (without a digit)
Measurement mode before calibration
(a value differing from 4.00 mA is shown)



Figure 9: Mode 7
Zero-point calibration

- Zero-point calibration: Simultaneously, press and hold the arrow keys ↑ and ↓ until the value shown in the display disappears and reappears (see Figure 10). The zero-point is now automatically saved. If the value shown in the display varies significantly from 0.00, repeat the calibration.



Figure 10: After zero-point calibration

- Press the M-key repeatedly until the transmitter is once again in the normal measurement mode (no mode-figure shown in the display, see Figure 11) or wait until the transmitter automatically switches back to the normal measurement mode.



Figure 11: Mode 1 (without a digit)
Measurement mode after calibration
("4.00 mA" is shown)

After successful adjustment of the zero-point, the middle valve on the 3-way valve block must be **closed** and the outside valves must be **opened**! On the 5-way valve block (AccuFlo[®]-ST), the outside valves and the middle valve must be **closed** and the second and fourth valves must be **opened**!

5.3 Verification of plausibility

If the displayed figures in the flow computer are plausible, the device is ready for operation.

If against expectations the displayed figures in the flow computer are not plausible, please check the correct assembling and the electrical connections. If despite correct connections the figures in the display are not plausible, please refer to our instruction of the flow computer AccuMind[®] (also available as download on our homepage <https://www.ski-gmbh.com/cms/index.php/en/user-area/download-area>)

6 Individual settings

6.1 Delivery status

As for the settings at delivery, please refer to the information of parameterization of the flow computer AccuMind[®]. Should you need to change the settings, you find more information in the following chapter. In the detailed description of the flow computer AccuMind[®] – chapter 4 and 5 – you will find further information.

6.2 Handling of the flow computer

The flow computer AccuMind® is operated through a touch screen. After powering up the device you see a screen that displays up to 6 result cells which may show process variables (see Figure 12). In the following you see a display with three result cells:



Figure 12: Display with result cells

The two arrow keys at the bottom lead you to the other displays that contain more or less result cells. After pressing the tool key the settings of the unit can be changed. Once, you will be asked for a password. Then a display is shown to choose your setting (see Figure 13). (based on your individual password level certain settings are accessible, inaccessible settings are black.)

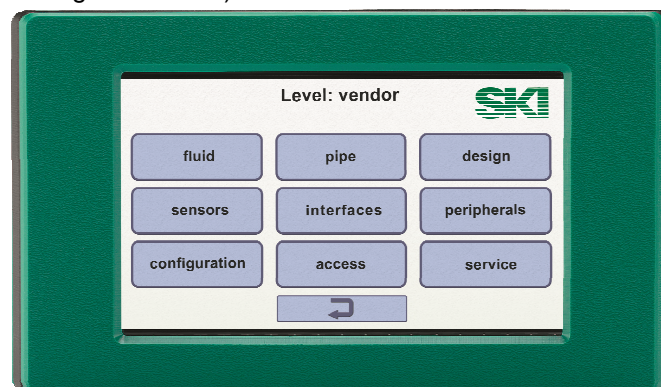


Figure 13: Setup screen

The first display leads you to several other displays: To see for example the serial number of the flow computer AccuMind®, please tip on the tool key, enter the password 8914 (only once for one session, log-out will be done automatically after a few minutes*). Then tip on the field “service”. In the next window you tip on the field “info” and at the last window the “serial number”.

In short (used in the further instructions), this show up this way:

Tool key → (PW 8914) → service → info → serial number

(*: manual log-out possible: Tool key → access → log out → yes)

To get to the main menu please tip on the return arrow at the bottom in the middle of the display (see Figure 13). If you tip on the “SKI”-Logo, you will immediately return to the main menu.

Every setting can be tested without any effect on the standard setting. Once you are sure to have your individual setting please save it. This configuration will remain even after restart of the device.

How to save the setting and return to the process variables:

Tool key → configuration → save → yes → SKI-Logo

6.3 Setting of the display

You may choose between five different displays with one, two, three, five or six cells. Each cell shows one result and may be changed individually. Tip on the chosen cell, select one of the proposed variables. The password needed is: 8914.

For example: temperature T_1 should be shown in °C with 2 decimal places.

Touch the cell → (PW 8914) → actual values → T_1 → (°C) → 2 (Count of decimals) → ENTER

Attention: The unit per variable will be asked only once. At any time, the units of all variables may be changed. (internal calculations of the flow computer AccuMind® are performed in SI-units.)

For example: volume flow rate should be shown in m³/min.

Tool key → configuration → units → unit choice → q_v → m³/min → (SKI-Logo)

6.4 Parameterization of the analog output

The analog outputs are freely configurable. The following variables may be selected:

- Output rate q_m
- Volume flow rate q_v
- Standard volume flow rate q_{vn}
- Heat flow dQ
- Differential pressure dp
- Temperature T_1
- Temperature T_2
- Pressure p_{abs}
- Pressure p_{rel}

The configuration of the analog output is explained in the following example. The password needed is: 6457. (This password is also usable for every setting explained up to now.)

For Example: Volume flow rate should be shown from 0 to 18000 m³/h as 4–20 mA signal on output 1.

Tool key → interfaces → analog output → output 1 → 4-20 mA → q_v → (m³/h) → 0 (Enter minimum) → ENTER → 18000 (Enter maximum) → ENTER → (SKI-Logo)

6.5 Parameterization of the digital output

The digital outputs may be configured as switching output or counter pulse. The switching output offers a general alarm, a condensate alarm and a threshold function. The counter pulse emits a pulse each time a defined amount has been passed by. The user may set up the type and dimension.

Examples:

General alarm:

In case of an error output 1 shall switch (e.g. broken wire to the transmitter).

Tool key → interfaces → binary out → output 1 → switching output → sum alarm → yes → (SKI-Logo)

Threshold function:

If the volume flow rate exceeds 9000 m³/h output 1 shall switch.

Tool key → interfaces → binary out → output 1 → switching output → threshold → yes → maximum → q_v → (m³/h) → 9000 (Enter threshold) → ENTER → (SKI-Logo)

Counter pulse:

Output 1 should emit a pulse for each 100 kg (please regard that the counter pulse times must be higher than 0.5s).

Tool key → interfaces → binary out → output 1 → counter pulse → Σm1 → (kg) → 100 (Enter impulse value) → ENTER → (SKI-Logo)

6.6 Parameterization of field busses (optional)

To parameterize the field busses please refer to the instruction of the flow computer AccuMind® (chapter 5.2.5).



Konformitätserklärung

Declaration of Conformity

Déclaration de conformité

Wir, die Firma
 We, the company
 Nous, la société

S.K.I. Schlegel und Kremer Industrieautomation GmbH
Hanns-Martin-Schleyer-Straße 22, 41199 Mönchengladbach, Germany

erklären in alleiniger Verantwortung, dass das Produkt
 declare with full responsibility that the product
 déclarons sous notre seule responsabilité que le produit

Messstrecke measuring section Ligne de mesure	ACG / ACL / ACS (AccuFloLPD/HMP)
---	--

auf das sich diese Erklärung bezieht, mit folgender Richtlinie und Norm übereinstimmt:
 which this declaration applies to, suits directive and standard:
 qui fait objet de cette déclaration, est conforme à la directive et norme:

Richtlinie/Directive/Directive	Norm/Standard/Norme
2014/68/EU Druckgeräterichtlinie Pressure Equipment Directive Directive équipements sous pression	EN13480

Bei maximalem Betriebsdruck unter 0,5 bar in Anlehnung an Art. 4.3 der Richtlinie 2014/68/EU.
 Since the maximum operating pressure is below 0,5 bar similar to article 4 (3) of directive 2014/68/EU.
 En cas de pression de service maximale inférieures à 0,5 bar, en référence à l'article 4 (3) de la directive 2014/68/EU.

Die Kennzeichnung des Geräts enthält folgende Angabe:
 The equipment name plates contain the following information:
 La plaque signalétique de l'euqipement contient,

				Kennzeichnung/Marking/Repères	
Richtlinie Directive Directive	Konformitätsbewertung Assessment Evaluation de conformité	Kategorie Category Catégorie	Benannte Stelle Notified Body Organisme notifié		Nr. + Kategorie No. + Category Nr. + Catégorie
2014/68/EU	Art. 4.3	Art. 4.3	n. a.	n. a.	n. a.
	Mod. A	I	n. a.	CE	./K1
	Mod. D1	II	TÜV Rheinland	CE	0035/K2
	Mod. H	III	TÜV Rheinland	CE	0035/K3

Mönchengladbach, den 18.10.2016

(Gerald Papperitz, QMB)

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The illustrations may contain optional installations.

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