Heinrichs
KOBOLD Group

Variable-Area Flowmeters

KDS

BGK

Operating Instructions

KDS-K/C/S

KDS-R

BGK

KDS-(E) analogue output

Betriebsanleitung bitte durchlesen und an einem sicheren Ort aufbewahren!

Contents

1 Introduction

This installation and operating manual explains how to operate, install and perform maintenance on the flowmeter. Please read the manual carefully before installing the device and putting it into operation. The manual does not apply to non-standard versions or applications.

All devices are thoroughly tested and checked for order compliance prior to shipping. Upon receipt of the device, check it for transport damage.

If any problem comes to light, contact our head office in Cologne. Please describe the problem and indicate type and serial number of the device. We extend no guarantee of any kind for repair work that is undertaken without notifying us in advance of the intention to carry out such work. Unless otherwise agreed, any part or component for which a claim is lodged is to be sent to us for examination.

2 Safety instructions

2.1 Installation, start-up and operating personnel

Only trained specialists authorized by the system operator may carry out the installation, electrical installations, start-up, maintenance and operation. They must read and understand the operating manual and follow its instructions.

Follow the conditions and provisions applicable in your country.

Heinrichs Messtechnik GmbH accepts no liability for any loss or damage of any kind arising from improper operation of any product, improper handling or use of any replacement part, or from external electrical or mechanical effects, overvoltage or lightning. Any such improper operation, use or handling shall automatically invalidate the warranty for the product concerned.

2.2 Intended use

The KDS or BGK variable-area flowmeters may be used only for flow measurements of non-viscose fluid and gaseous media. The manufacturer shall not be liable for damages that may result from improper or unintended use.

The operator carries the sole responsibility for suitability of the device for its intended use. The manufacturer is not liable for damage caused by improper or non-intended use. Usage of the device other than intended will also lead to loss of guarantee.

When dealing with an aggressive medium, clarify the material durability of all wetted parts.

When using the device in hazardous areas, follow the applicable national installation rules (see also Section 0 "*Use in hazardous areas*").

2.3 Packaging, mounting and shipment

Carefully unpack the device to avoid damaging it.

With the help of the delivery note enclosed in the packaging, check whether all technically relevant data coincide with your requirements.

Storage and installation must be done in a clean and dry room so that contamination – especially of the interior of the fitting – is avoided. Follow the limit values for ambient temperature. When transporting the device to a remote mounting location, we recommend that you reuse the factory-issued packaging and the transport protection.

2.4 Returning devices for repair and service

Note: In accordance with the applicable German waste disposal legislation, the owner/client is responsible for the disposal of special waste and hazardous materials. Consequently, all devices sent to us for repair must be free of any hazardous materials. This also applies to possible hollow spaces and fissures in the devices. If repair is necessary, confirm the above-mentioned item in writing.
(For this purpose, please use the form in the Section Fehler! Verweisquelle konnte nicht gefunden werden. **)**.

If hazardous materials remain in or on the device after it has been returned, Heinrichs Messtechnik is authorized to remove them at the client's expense without further inquiry.

3 Identification

Manufacturer: Heinrichs Messtechnik GmbH
Robert-Perthel-Str. 9 ·
D-50739 Cologne
Germany

Phone: +49 221 49708-0
Fax: +49 221 49708-178
Internet: www.heinrichs.eu
E-Mail: info@heinrichs.eu

Product type:

KDS-K/C/S and BGK:

Miniature flowmeter in full-metal design based on the float principle

KDS-R:

Miniature flowmeter in all-metal design based on the float principle with differential pressure regulator

Product name:

KDS-K/C
Rear horizontal connection

KDS-S
vertical connection

KDS-R
vertical connection

BGK
vertical flange connection

KDS-(E)
With analogue output 4-20mA

File name: KDS-BGK_BA_21.01_EN.DOC

Version No. / 21.01
Issue date: 17. Februar 2021

4 Applications

4.1 KDS und BGK

The KDS and BGK flowmeters are used for measuring the flow of liquid and gaseous products in pipes as well as dosing, monitoring, adjusting and controlling them. They show the current flow quantity in volume or mass per unit in time.

4.2 KDS-R

The KDS-R flowmeter can be used for stabilizing set flow quantities of liquid and gaseous products in pipes. The set quantity is kept constant independent of pressure changes during product inflow for type KDS-R.....N or a pressure change during product outflow for type KDS-R .....V.

5 Operational mode and system design

5.1 Measuring principle for BGK and KDS-K/C/S flowmeters

Float principle:

The product flows through the meter vertically from the bottom to the top, lifting the float until the buoyancy force and the weight of the float establish equilibrium. The height of the float is a measure of the flow quantity.

5.2 KDS-K/C/S and BGK system design

The meter consists of a conical fitting pipe with a float that can move vertically. The position of the float resulting from the flow rate is converted to a rotary motion on the pointer axis of the analog indicator unit by the built-in permanent magnet through the magnetic tracking system.

5.3 Measuring principle of the KDS-R

Differential pressure:

The diaphragm of the regulator is in a state of equilibrium when the pressure conditions are the same on both sides. The pressure on the input side depends on the pressure of the product and the pressure on the output side on the pressure drop of the setting valve of the flowmeter.

If the pressure changes either on the input side or the output side, the built-in diaphragm valve causes a pressure compensation that keeps the set flow rate constant.

Important: The regulator can only adjust pressure fluctuations on the input or the output side. The pressure conditions on the respective other side must be stable.

5.4 KDS-R system design

The unit consists of a type KDS variable-area flowmeter equipped with a differential pressure regulator.

The variable-area flowmeter consists of the device fitting made of stainless steel with an integrated conical metal tube and a vertically movable float. The valve for setting the flow rate is built-in.

The height of the float resulting from the flow rate is transmitted by the permanent magnet in the float through the magnetic tracking system in a rotation to the pointer axis of the analog indicator unit.

The differential pressure regulator is made of stainless steel and consists of a diaphragm made of Perbunan or PTFE and a compensating valve made of stainless steel.

For gaseous products, two versions are available:

1) KDS-R...-HV- for a constant inlet pressure and a variable outlet pressure

2) KDS-R...-HN- for a constant outlet pressure and a variable inlet pressure

For liquids, both versions can be used; however, the KDS-R...-V version is preferred.

6 Input

6.1 Measured variable

Volume flow

6.2 Measuring range

The lower range value is considered 10 % of the upper range value.

Measuring range span: 10-100 %

Smallest measuring range: 0.1-1.0 l/h water

Largest measuring range: 10-100 l/h water (KDS-K/C)

20-200 l/h water (KDS-S and BGK)

6.3 Regulator range

Largest regulator range: 10-100 l/h water (KDS-R)

6.4 Measuring range table

Type	Measuring range	Measuring range for **water at 1000 kg/m³** [l/h]	Measuring range for **air at 1.013 bars abs** [Nl/h]	Pressure loss H_2O [mbar *] KDS-R	Pressure loss H_2O [mbar*] KDS-K/C	Pressure loss H_2O [mbar] KDS-S, BGK
KDS-K/C/R KDS-S BGK	A	0.1-1.0	3 - 30	350	6	6
	B	0.25-2.5	5-50	350	7	7.5
	C	0.6-6.0	18 - 180	350	7	7.5
	D	1.0-10	30 - 300	350	10	8
	E	1.6-16	48 - 480	350	12	9
	F	2.5-25	75 - 750	350	17	10
	G	4.0-40	120 - 1200	350	25	11
	H	6.0-60	180 - 1800	350	45	12
	I	10-100	300 - 3000	350	95	15
only KDS-S, BGK	J	16-160	480 - 4800		-	20
	K	20-200	600 - 6000		-	28

*with valve completely open

Additional special flow ranges (for gases only)

Type	Measuring range	Measuring range for **water at 1000 kg/m³** [l/h]	Measuring range for **air at 1.013 bars abs** [Nl/h]	Pressure loss H_2O [mbar *] KDS-R	Pressure loss H_2O [mbar*] KDS-K/C	Pressure loss H_2O [mbar] KDS-S, BGK
KDS-K/C/R	L	-	6-60	350	-	7.5
KDS-S	M	-	7-70	350	-	7.5
BGK	N	-	11-110	350	-	7.5

7 Electrical output

7.1 Limit switches

1 or 2 limit switches:	Manufacturer: Pepperl & Fuchs Type: NJ1.5-6.5N, Connection: M12 plug
Ex-Marking:	PTB 00 ATEX 2048 X II 2G Ex ia IIC T6-T4 Gb II 2D Ex ib IIIC T 135°C Db
OR	
1 limit switch (safety technology):	Manufacturer: Pepperl & Fuchs Type: NJ2-11-SN, Connection: M12 plug
Ex-Marking:	PTB 00 ATEX 2049 X, II 2G Ex ia IIC T6-T4 Gb, II 2D Ex ia IIIC T135°C Db,

7.2 Analogue output

4-20 mA, current loop, passive	Manufacturer: Heinrichs Messtechnik Type: KDS-E, (Uo = 14-30 V; Max. load 500 Ω) Connection: M12 plug
Ex-Marking:	BVS 12 ATEX E 093 X / IECEx BVS 12.0061X II 2G Ex ib IIC T4 Gb II 2D Ex ib IIIC T135°C Db

When installing electrical equipment in hazardous areas please pay special attention to the conditions specified in the applicable approval certificate.

8 Measuring accuracy

Reference conditions:	Water 20°C (air 20 °C)
Measured error:	± 3 % qG 50 acc. VDI/VDE 3513
System deviation for KDS-R:	± 5.0 % of URV
Repeatability:	± 1.0 % of URV
KDS-R regulator:	± 1.7 % of URV
Influence of ambient temperature:	none

8.1 Influence of fluid temperature

Deviations in fluid temperature from the temperature observed during calibration can result in a proportional display fault because of the corresponding change in density. Changes in viscosity cause a non-linear display fault.

9 Conditions of use

The VDI/VDE guidelines must be observed. The meter is suitable for liquid products with sufficient flowability that are free of solids, do not bond and do not tend to settle and gases with linear flow behavior and an adequate inlet pressure.

KDS-R: The minimum differential pressure between input and output side must amoun to 350 mbar.

9.1 Mounting/start-up

The variable-area flowmeter must be installed perpendicularly (direction of flow from the bottom to the top).

The size of the product line to be connected must be identical to the size of the device connection.

Please make sure that there is adequate clearance from parts that might cause magnetic interferences, such as solenoid valves and ferromagnetic components like steel brackets/supports. For two adjacently mounted devices we recommend a the minimum lateral distance between them of **300 mm**. The devices can be mounted closer together if they are vertically offset by one device length. The minimum lateral clearance for interfering steel parts should be **200 mm**. In case of doubt, check the interference by moving the device back and forth in the selected distance by about 200 mm and testing whether the pointer position changes.

Select the mounting location so as to enable a reliable reading of the scale values. Please take note as well of the space requirement for any possible disassembly of the device.

To achieve stress-free mounting, the flanges of the pipe must be aligned parallel to each other. Please check whether the pipe is adequately stable to rule out the possibility of vibration or swinging. (Do not use steel mounting parts on the device.)

If there is risk of dirt or solid matter penetrating the process pipes, flush them beforehand so that these materials do not get caught in the device. Ferromagnetic solid matter such as spatter can lead to the breakdown of the device. If these materials are still present during normal operating conditions, mount a magnetic filter (accessory) in front of the device.

When using gases, slowly let the inlet pressure rise to avoid pressure surges.

Basically, to prevent the float from shooting upwards during flow start-up, the use of solenoid valves should be avoided.

KDS-S, BGK: Avoid installing a valve directly in front of the device.

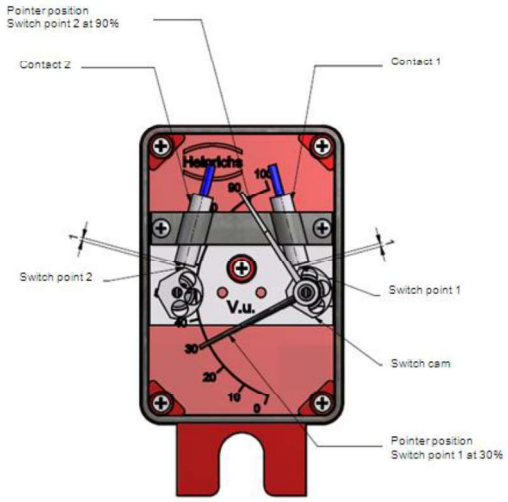
9.1.1 Device setting

The measuring equipment is delivered ready for operation according to your order specifications. **The limit transducers** are set to the desired values. If you have not submitted any requirements, the basic settings are the following:

1 contact device: - Minimum contact switching point at 10% of descending flow (damped/closed-circuit principle)

2 contact devices: Minimum contact switching point at 10% of descending flow and maximum contact switching point at 90% of ascending flow

9.1.2 Switch point setting



Set pointer to the desired switch point and adjust scale. Turn up switch cam so that the edge of the switch cam is located in the center of the diameter of the proximity switchAmbient conditions

9.2 Ambient conditions

Ambient temperature ranges

without limit transducer: -	25 °C to + 80 °C
with limit transducer:	- 25 °C to + 70 °C

Storage temperature

All versions:	- 25 °C to + 80 °C

Climatic category

Weather-protected and/or unheated locations:	Class C according to IEC 654 Part 1

Degree of protection

Acc. To DIN EN 60529:	IP 65 , t

Shock resistance/vibration resistance

To prevent damagehe meter should be protected from extreme shocks and vibrations.

Electromagnetic compatibility

Built-in limit transducer:	Acc. with NAMUR recommendation NE 21 and EN 61326-1:2006

9.3 Fluid conditions

Fluid temperature ranges KDS-S/C/K and BGK

without limit transducer:	- 40°C to + 130°C
with limit transducer :	- 25°C to + 100°C

Fluid temperature range KDS-R

Membrane:	- 10°C to + 100°C

Fluid pressure limit

KDS-K/C:	PN 40, special version up to PN 160
KDS-S	PN 63, speceial version up to PN 320
BGK	PN 40
KDS-R	16 bar, special version up to PN 40

(The maximum unilateral pressure resistance of the diaphragm is 7 bar)

Inlet and outlet sections

Inlet and outlet sections are not required for a linear flow profile of the fluid. For a non-linear flow profile, we recommend an inlet section of 150 mm (see also guidelines in accordance with VDI/VDE 3513).

Physical state

Liquid, gaseous

Pressure (for gas measurement)

The measured values only apply to the calibrated fluid data stated on the scale. Any change or deviation in pressure will cause a display fault.

Pressure loss

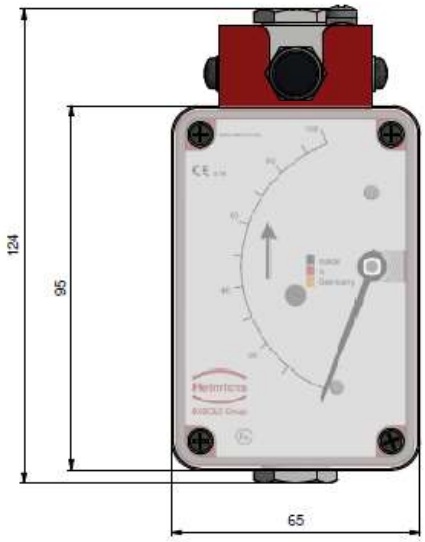
Depends on the meter size and the measuring range (see 6.4 *Measuring range table*).

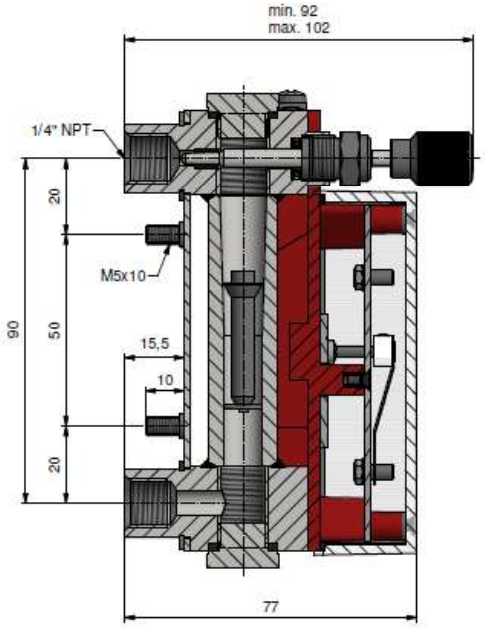
10 Construction details, type of construction/dimensions

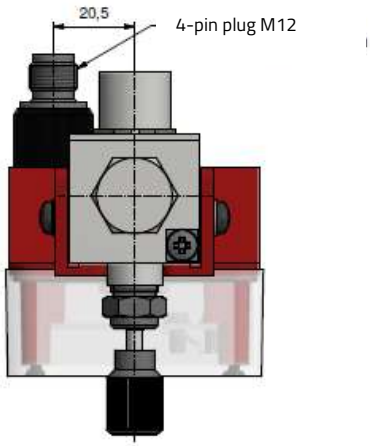
10.1 KDS-K/C

The meter consists of a conical measuring tube with a vertically movable float.
All metallic wetted parts are made of 1.4404 (316L) stainless steel.
The measured values are transmitted magnetically to the analog indicator unit mounted on the device.

KDS-K – process connections horizontally towards the back, mounting dimension: 90 mm (NPT ¼ " F connection)
KDS-C – similar to KDS-K, but with bolt for panel mounting

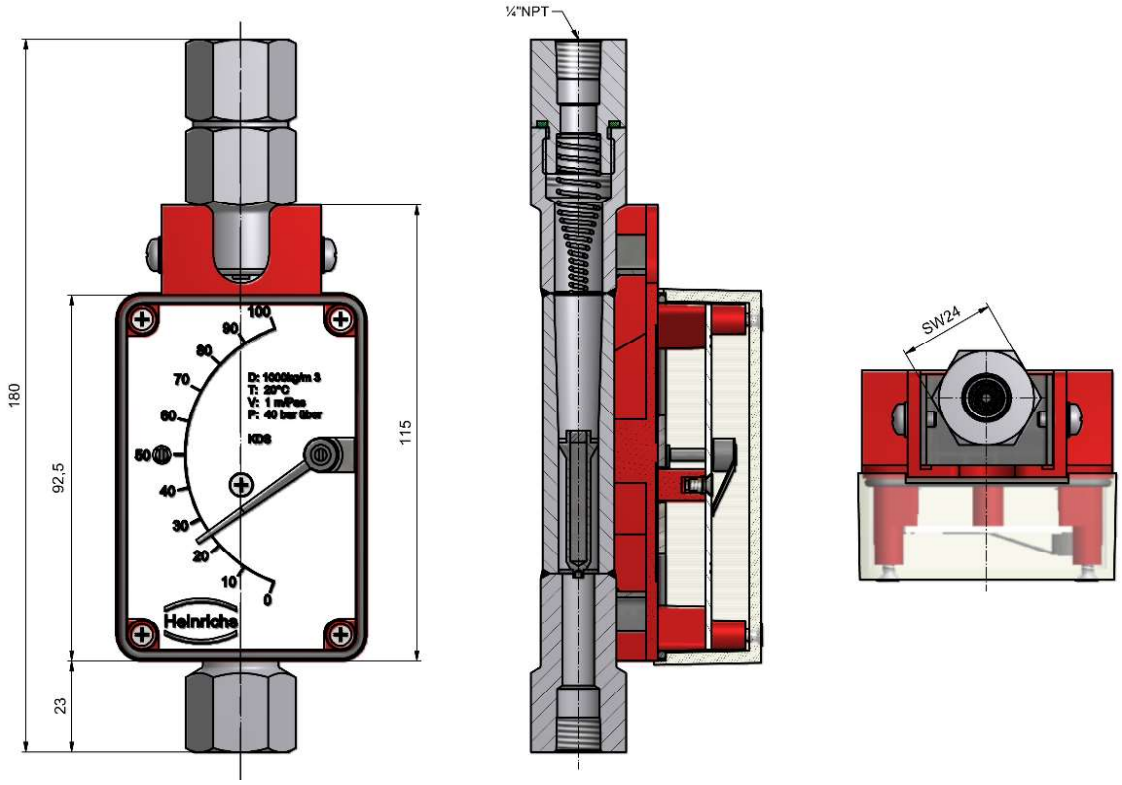






10.2 KDS-S

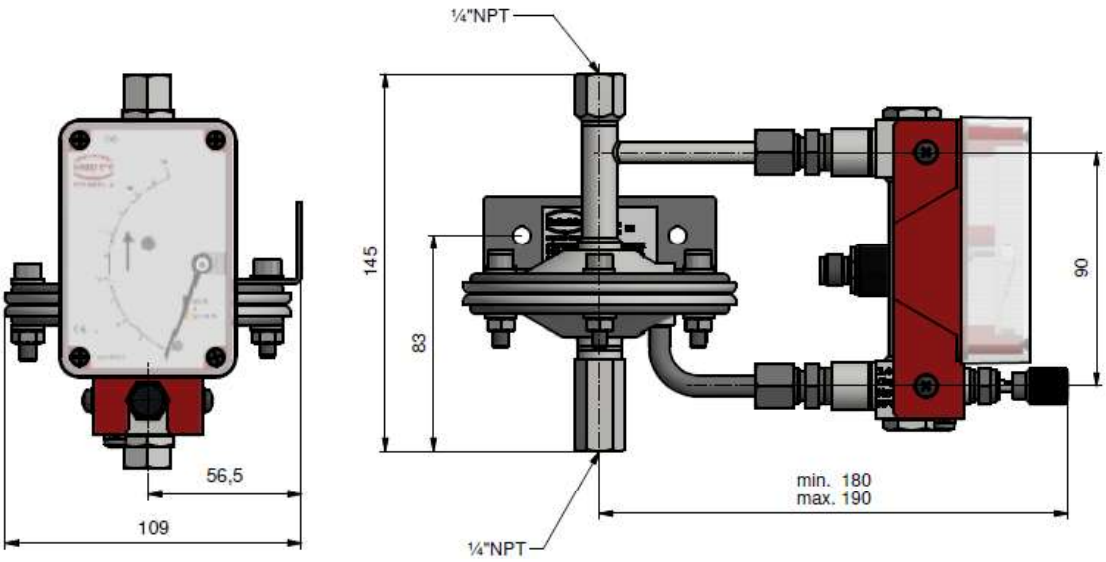
Process connections vertically at the top/at the bottom, mounting dimension: 180 mm (NPT ¼ " F connection)

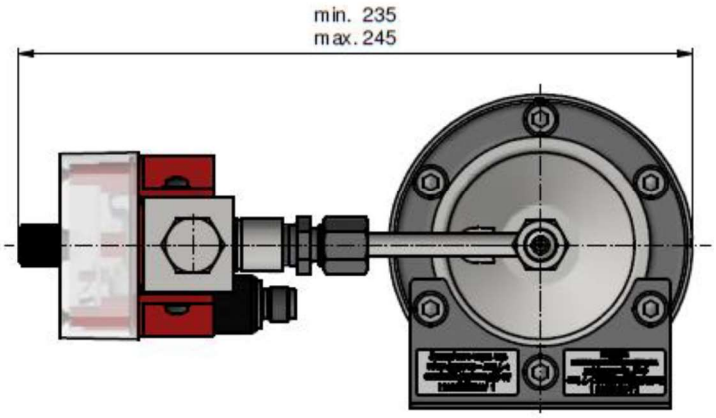


10.3 KDS-R with ¼" NPT (F) connection as outlet pressure regulator version

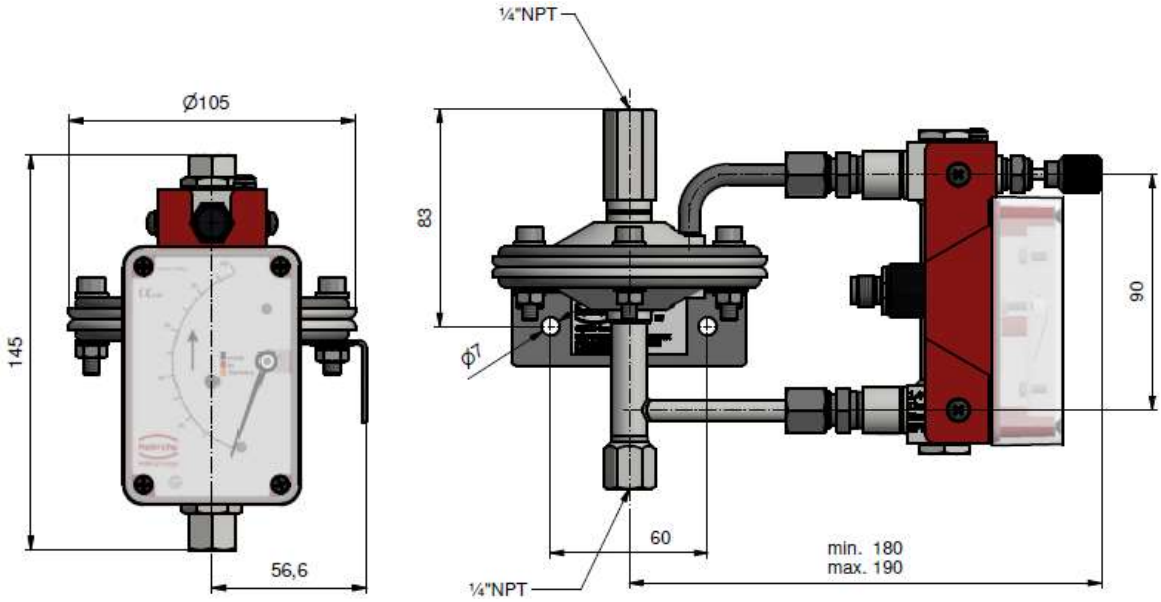
The unit consists of a variable-area flowmeter with a setting valve and a differential pressure regulator mounted on the meter.
The measured value is displayed on the scale of the analog indicator unit.

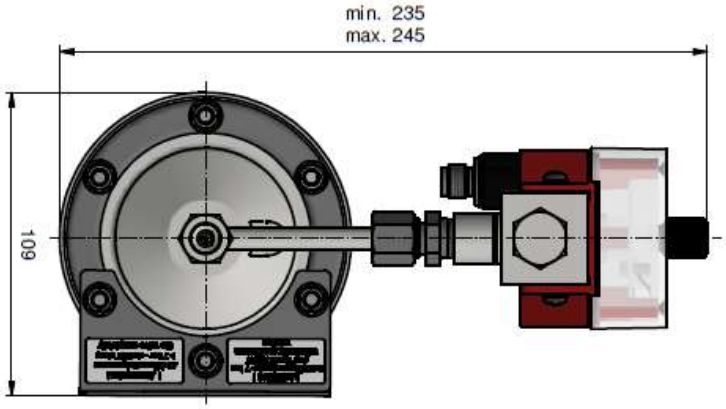
The desired flow rate can be set using the built-in valve.
All metallic wetted parts are made of 1.4404 (316L) stainless steel.



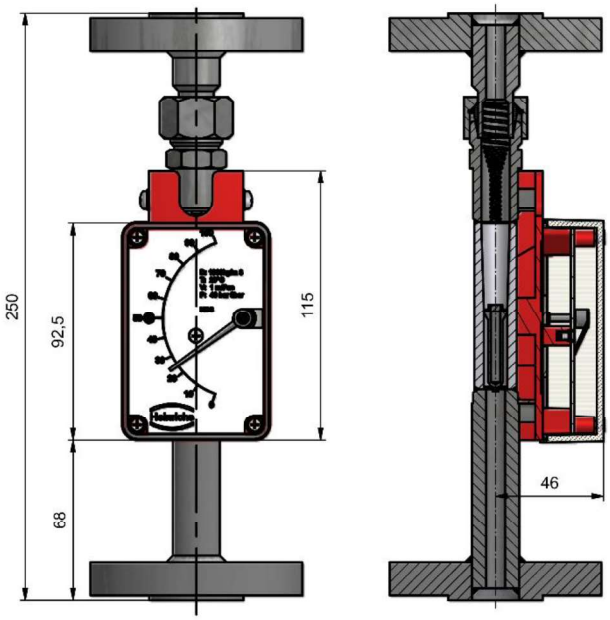


10.4 KDS-R with ¼“ NPT (F) connection as inlet pressure regulator version



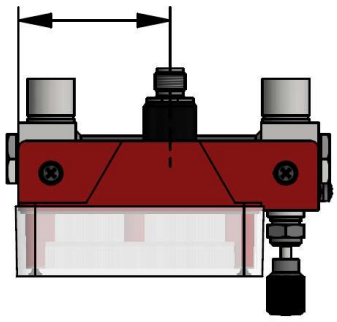


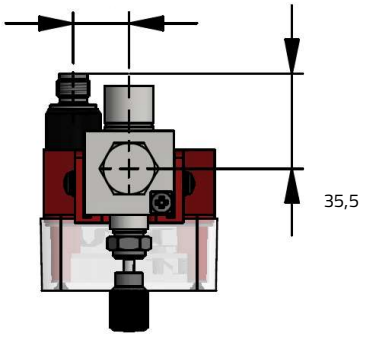
10.5 BGK with flange connection



10.6 KDS / BGK with M12 plug connection

All KDS / BGK devices equipped with electrical contacts are connected via an M12 plug socket.





10.7 Weights

KDS-K/C:	650 g
KDS-R:	1400 g
KDS-S:	620 g
BGK:	2400 g

10.8 Materials

- Measuring tube, float, connections:	1.4404 (316L) stainless steel
- Indicator unit:	Polyamide
- Indicator cover:	Ultramide
- Setting valve:	1.4404 (316L) stainless steel
- Valve sealing:	KDS-K/C/R) PTFE
- Tube sealing:	KDS-S Viton;
- Regulator diaphragm:	KDS-R Viton/PTFE

10.9 Process connection

KDS-*:	¼" NPT (F)
Special connections:	Ermeto 6/8/10/12/15 mm, Swagelok 6/8/10/12 mm, G ¼"(M), G ½" (M), Hose connector ¼" (6.35 mm), available as an adaptor. Other connections are available a special versions.

Important: The mounting lengths may be differerent.

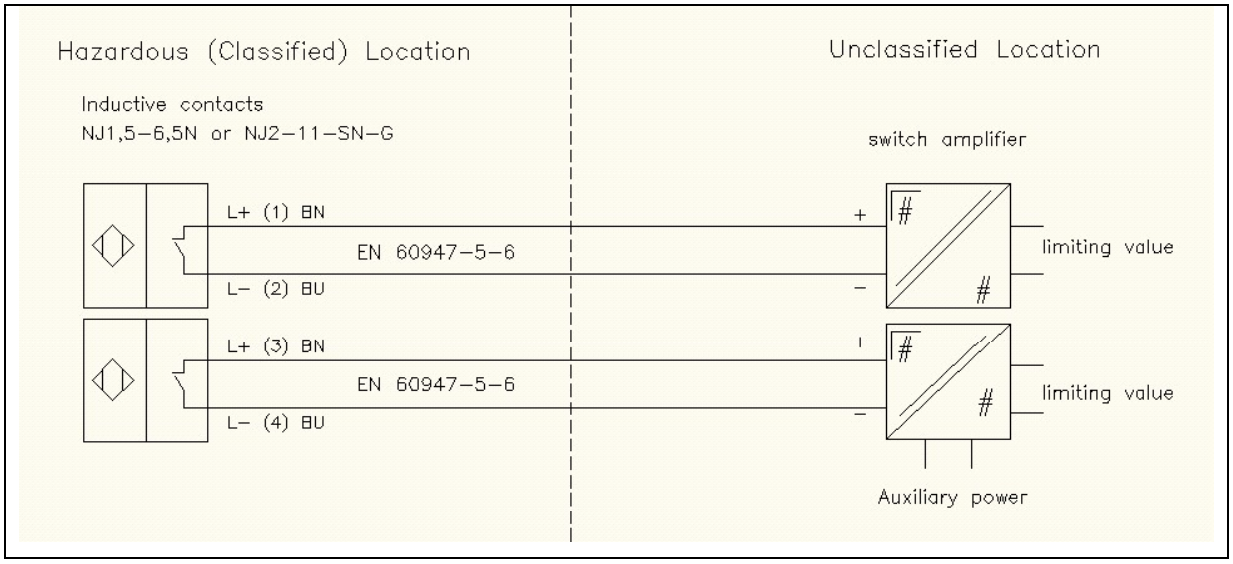
BGK:	Flanges: DN15/25, ANSI ¾", 1" Other flanges are available as special versions.

11 Available accessories

Docking adapters, Switch amplifier

12 Electrical connection

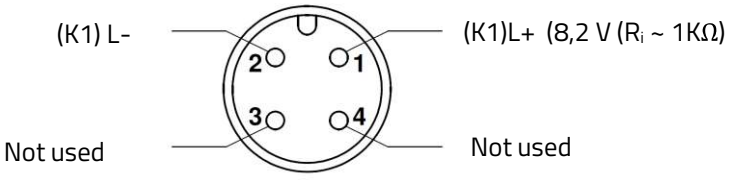
12.1 Wiring diagram for limit transducer



Connection M12 plug socket

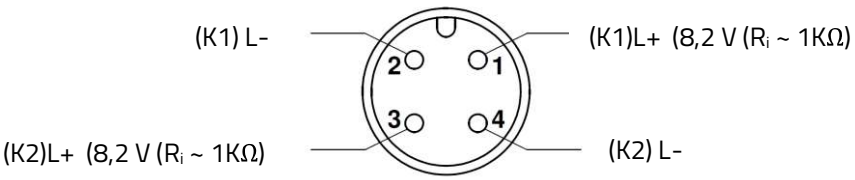
12.1.1 M12 standard configuration 1 x inductive sensor ***NJ 1.5-6.5-N***

Electrical Output		Function
KEI 1 (NJ 1,5-6,5-N)	Switch (K1) L+ to (K1) L- (Pin2)	Namur Switch



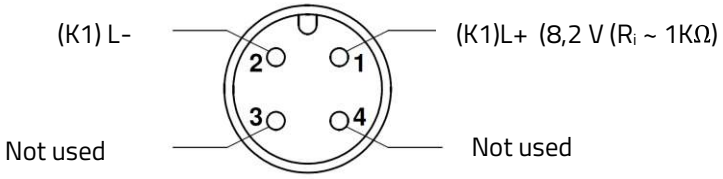
12.1.2 M12 standard configuration 2 x inductive sensors ***NJ 1.5-6.5-N***

Electrical Output		Function
KEI 2 (NJ 1,5-6,5-N)	Switch (K1) L+ (Pin1) to output (K1) L- (Pin2) Switch (K2) L+)Pin3) to output (K2) L- (Pin4)	Namur Switch



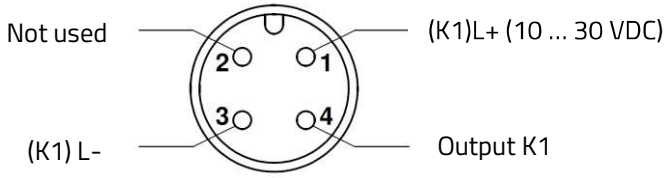
12.1.3 M12 standard configuration 1 x inductive sensor *NJ 2-11 SN*

Electrical Output		Funktion
KEI 1 (NJ 2-11-SN)	Switch (K1) L+ to (K1) L- (Pin2)	Namur Switch



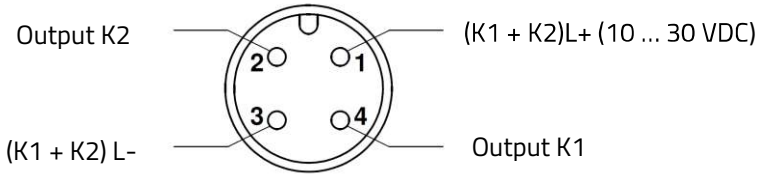
12.1.4 M12 standard configuration 1 x inductive sensor *NBB 2-6,5M 30-E2*

Electrical Output		Funktion
KEI 1 (NBB 2-6,5M 30-E2)	(K1) L+(Pin 1) (K1) L-(Pin 3) (K1) output (Pin 4)	3 – wire - PNP



12.1.5 M12 standard configuration 2 x inductive sensors *NBB 2-6.5M 30-E2*

Electrical Output		Funktion
KEI 2 (NBB 2-6,5M 30-E2)	(K1 + K2) L+(Pin 1) (K1 + K2) L-(Pin 3) (K1) output (Pin 4) (K2) output (Pin2)	3 – wire – PNP (2 Contacts)



13 Indicator unit

- Analogue indicator approx. 160° with pointer
- Customized product scale

14 Auxiliary power for limit switch

Inductive sensor NJ 1.5-6.5 N: 8.2 V (R_i approx. 1 kΩ)
Inductive sensor NJ 2-11 SN: 8.2 V (R_i approx. 1 kΩ)
Inductive sensor NBB 2-6.5M 30-E2: 10...30 VDC

Via an isolating amplifier.
Available as an accessory for 24/115/230 VAC and 24 VDC.

15 Analog output 4-20 mA

15.1 Measuring principle

The position of the float is transmitted to the pointer axle by means of a magnetic system. The KDSE measures the field of a magnet mounted on the pointers axle and generates an output current of 4 to 20 mA from it.

15.2 System configuration

KDS-E possesses a passive 4 to 20 mA loop powered analogue output. Therefore the voltage at terminals (plug) must never fall short of 14 V DC. The 4 to 20 mA output is linearized and corresponds to the indication scale. Thus the accuracy of the analog output is not influenced by any non-linear function of the float.

15.3 Measured variable

The position of the float is transmitted to the pointer axle by means of a magnetic system. The KDS-E measures the magnet field of a magnet -mounted on the pointer axle- and generates a current output

of 4 to 20 mA. As the pointer scale is non-linear - the analog output is linearized with max. 16 interpolation points not to have an effect on the meter accuracy.

15.4 Parameters

Power supply: none, 2 wires current loop 4 – 20 mA (passive)

Input voltage: 14 ... 30 V DC
Input power: < 0.65 VA
Load: 500 Ω

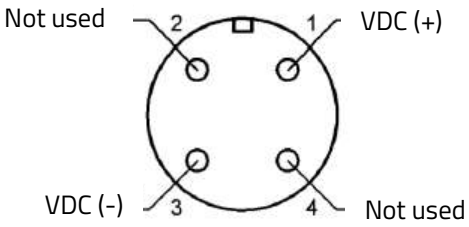
The maximum load is calculated according to the formula:

$$R\max = \frac{U - 14V}{22mA} \leq 500\Omega$$

Damping : 1 second, fixed
Influence $T_{Enviroment}$ ± 0,05 % per 10 K

15.5 Electrical connection

The transmitter is connected by a reverse polarity protected 4-pole M12 plug (A coding).



16 Use in hazardous areas

Only devices with ex marking may be operated within explosive atmospheres areas.

Ambient temp.	Process-Temp.	Marking	Zone	Description
-25°C .. +70 °C	-25°C .. +100 °C	II 2G Ex h IIC T6...T5 Gb II 2D Ex h IIIC T85°C...T100°C Db	1	With switch
-25°C .. +70 °C	-25°C .. +100 °C	II 2G Ex h IIC T6...T5 Gb II 2D Ex h IIIC T85°C...T100°C Db	1	With KDSE
-25°C .. +70 °C	-40°C .. +130 °C	II 2G Ex h IIC T6...T4 Gb II 2D Ex h IIIC T85°C...T135°C Db	1	with purely mechanical device

16.1 Atmospheric conditions

In accordance with DIN EN 1127-1, a "potentially explosive atmosphere" is defined as a mixture of air and combustible gases, vapors, mist or dust under atmospheric conditions. Such conditions are defined in DIN EN ISO 80079-36, para. 1, with values Tatm = -20 °C to +60 °C and Patm = 0.8 to 1.1 bar. Outside this range, safety parameters for most ignition sources are not available.

Usually, variable-area flow meters operate under operating conditions outside the atmospheric conditions of 0.8 to 1.1 bar. Irrespective of the zone classification –safety parameters of explosion protection – are basically not applicable to the inside of the measuring tube.

Therefore operation with combustible products is only allowed if a potentially explosive air mixture is not formed inside the flow meter. Where this condition is not met, the operator will need to assess the ignition hazard in each individual case and give due consideration to existing parameters (e.g. pressure, temperature, process product, materials of construction for the measuring tube).

16.2 Electrostatic charge of non-conductive parts

In hazardous areas of **protection class IIC** pay attention to the risk of the electrostatic charge in dangerous quantities during cleaning work of the plastic parts of the enclosure.

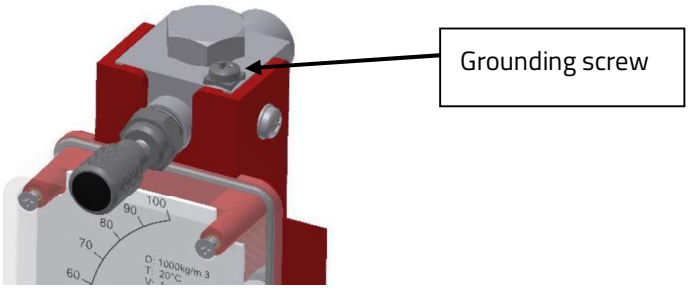
Devices where explosive electrostatic charges can be expected to be generated due to cleaning action are marked with an adhesive label.

WARNUNG- / WARNING-
Gefahr elektrostatischer Aufladung! Nicht reiben!
Danger of electrostatic charge! Do not rub!

16.3 Ground connection

In variable-area flow meters, it is possible under operating conditions for charge separation to occur in the measuring tube due to the transport of non-conductive fluids and/or when the flow comes into contact with non-conductive internals (e.g. liners, floats). Therefore, to discharge electrostatic build-up, variable-area flow meters must be permanently grounded by the operator by way of the process connections (flanges).

If grounding cannot be achieved via the process connections (plastic process connections or undefined connections), the flow meter must be connected to the local ground potential via the flanges. This connection only ensures electrostatic grounding of the device and does not meet the requirements for equipotential bonding.



16.4 Mechanical stability

The flow meters have undergone an impact test to DIN EN ISO 80079-36.for a low level of mechanical hazard. Additional protective measures are required if there is a higher mechanical hazard level.

16.5 Without electrical equipment

The basic version of the flow meter is a non-electrical device without its own ignition source and meets DIN EN ISO 80079-36 requirements. It can be used in hazardous areas that require Category 2 equipment.

Markings 

II 2G Ex h IIC TX Gb
II 2D Ex h IIIC TX°C Db
Reg. No.: BVS 03 ATEX H-B 113
Tech. File Reg. No.: 03-01 X

Since the device does not have its own power sources that would result in a temperature increase, the fluid temperature is decisive for the maximum surface temperature.

When used in potentially explosive dust atmospheres, the device must be cleaned regularly to avoid deposits exceeding 5 mm.

16.6 With integrated electrical sensors

When the electrical sensors are installed, the device becomes an electrical assembly and receives the additional markings off the built in sensors in accordance with DIN EN 60079ff.

The electrical and thermal data, depending on the fluid temperature and ambient temperature, and the specific conditions of the EC-Type Examination Certificate of the built-in sensor must to be considered.

See the example below.

16.6.1 With limit transducer

When the limit transducer is installed, the device becomes an electrical assembly. The installed limit transducer of the company Pepperl & Fuchs is certified for the use in a explosive gas environment and for the use in a explosive dust environment by **PTB 00 ATEX 2048 X** EU Type Examination Certificate. The electrical and thermal data and the special conditions of these EU Type Examination Certificates must be observed.

Marking on the cable of the limit transducer: 

PTB 00 ATEX 2048 X
II 2G Ex ia IIC T6-T1 Gb
PTB 00 ATEX 2048 X
II 2D Ex ib IIIC T135°C Db

16.6.2 Analog output 4-20mA

Parameters and Markings:

Manufacturer Heinrichs Messtechnik		BVS 12 ATEX E 093 X
Type KDSE, 4-20 mA current loop		IECEx BVS 12.0061X
passive; 14-30 V DC		II 2G Ex ib IIC T4 G
Load max. 500Ω; connection with M12 plug		II 2D Ex ib IIIC T135°C Db

When using the device in hazardous areas please read the explosion supplementary instructions of the electronic module type KDSE. This includes all ex-relevant parameters and special conditions for safe use.

16.6.3 Depending on the fluid and ambient temperature

The influence of the fluid temperature on the built-in limit transducer must be observed.

The excessive Temperature of the maximum fluid temperature based on the maximum ambient temperature must be considered with a factor of **0.4.**

Example of integrated limit switches:

Max. ambient temperature: $T_{amb} = 40°C$
Max. fluid temperature: $T_m = 90°C$
Temperature class: T4

$T_ü$ = excessive Temperature
T_a = Ambient temperature of the limit switches

$T_ü = T_m - T_{amb} = 90°C - 40°C = 50°C$

$\mathbf{T_a} = T_ü * 0{,}4 + T_{amb} = 50°C * 0.4 + 40°C = \mathbf{60°C}$

In accordance with the tables in the PTB 00 ATEX 2048 X EC Type Examination Certificate, the NJ 1,5-6,5 N... inductive sensor must be operated in the T4 temperature class with an intrinsically safe circuit that does not exceed the maximum values of the Type 3 circuit.

17 CE mark

The measuring system meets the statutory requirements of the following EU directives: *Directive 2014/34/EU* (Equipment and Protective Systems for Use in Potentially Explosive Atmospheres) and Electromagnetic Compatibility (EMC) *Directive 2014/30/EU*.

With respect to the Pressure Equipment *Directive 2014/68/EU*, the devices fall within the scope of application of Article 4, Section 3, and requires no CE mark in accordance with this directive.

Heinrichs Messtechnik confirms compliance with the directives by attaching the CE mark.
For more informations refer to the Declaration of Conformity

18 Standards and directives

Directive 2014/68/EU (PED directive - Pressure Equipment)

- Production in accordance with AD 2000 guidelines and HPO approval (TRB200/TRD201)
- TÜV approval for welding requirements in accordance with EN ISO 3834-3:
- Measuring range rated and converted to other products according to guidelines VDE/VDI 3513

Directive 2014/34/EU (ATEX Directive)

- DIN EN ISO 80079-36 Non-electrical equipment for use in potentially explosive atmospheres – Basic method and requirements
- EN 60079-0 - General requirements
- EN 60079-11 - Intrinsic safety „i"

Directive 2014/30/EU (EMC Directive)

- EN 61000-6-2 - Immunity industrial environment
- EN 61000-6-3 - Emitted interference residential environment
- EN 55011 - Group 1, Class B
- NAMUR recommendation NE 21

Others:

- EN 60529 - Degrees of protection through housing (IP code)
- EN 61010-1 - Safety requirements for electrical measuring, control and laboratory devices
- EN 60947-5-6 - Low-voltage switchgear and controlgear

19 Order information

Please include the following information in your order:

Product data, specific weight, temperature, pressure, viscosity, material design, connection size, measuring range, desired accessories, required approvals and material certificates

20 Maintenance

The device requires no maintenance if used according to its intended purpose. However, if cleaning is necessary to remove dirt from the measuring ring or the float, take note of the following aspects:

- Before removing a device, make sure that the pipeline is free of the product, is pressureless and has cooled down.
- Fittings with the insides coated may be carefully cleaned after removal with a brush and the appropriate cleansing agent.

21 Trouble shooting

- ***Device shows incorrect values**:* Compare process data, density, viscosity, temperature and pressure with the values on the scale. If they deviate, convert the scale values using the VDE/VDI 3513 standard.
- ***Pointer does not react in spite of varying flow:*** The pointer may have gotten stuck; remove the cover and move the pointer; if the pointer can be moved easily, the float cannot move. If the pointer is unable to move further, send the device to the head office for servicing.
- ***The float is stuck at one place due to dirt:*** Disassemble the device. If necessary, dismantle and clean the float. Install a magnetic filter if there are magnetic contaminants.
- ***Electrical equipment are not functioning:*** Check the auxiliary power. Are suitable power supply equipment connected, have the terminals been selected correctly, has the parameterization carried out correctly?

22 Decontamination certificate for device cleaning

Company name: ..... Address: .....

Department: ..... Contact person: .....

Phone: .....

The enclosed variable-area flowmeter, Model .....

was operated using the following fluid:

.....

In as much as this fluid is water-hazardous / toxic / corrosive / combustible / a health hazard / environmentally hazardous

we have performed the following steps:

☐ Checked all cavities in the device to ensure that they are free of fluid residues*

☐ Washed and neutralized all cavities in the device*

☐ Cleaned all seals/gaskets and other components that came into contact with the measured medium*

☐ Cleaned the housings and all surfaces*

*tick applicable items

We hereby warrant that no health or environmental hazard will arise from any fluid residues on or in the enclosed device.

Date: ..... Signature: .....

Company Stamp