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## Variable Area Flowmeter

**V31**

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### Operating Instructions



**Please read the instruction manual and keep them in a safe place!**

## Table of Contents

Introduction	4
I. Shipping and storage; product inspection	4
II. Warranty	4
III. Maintenance, Repair and Hazardous substances	4
IV. Disposal	4
V. Supplementary operating instructions	4
VI. Operating manual of explosion-proof flowmeters	4
1. Steps Prior to Operation	5
2. Safety Advisories	6
2.1 Installation, Commissioning, Operating Personnel	6
2.2 Hazard Warnings	6
2.3 Proper Use of the Device	7
2.4 Installation and servicing	7
2.5 Returning your flowmeter for servicing or calibration	8
3. Identification	9
3.1 Designation / Rating Plate	9
4. Application	10
5. Operating Principle and System Configuration	11
5.1 System Design	12
5.1.1 Type of construction / dimensions	12
5.1.2 Materials	13
5.2 Float Types	14
5.3 Contacts	14
5.3.1 Dimensions of the applied contacts [mm(inch)]	15
5.3.2 Mounting of the limit switches series K17, K33, K33i	16
5.3.3 Adjusting and wiring of the limit switches	17
5.3.4 Wiring diagrams of the limit switches K17 A/B, K33, K33i	18
6. Characteristical Data	19
6.1 Mechanical Data	19
6.2 Measuring Ranges	20
6.2.1 Water	20
6.2.2 Air	20
6.3 Characteristical Values – limit switches	21
6.3.1 K17 A/B – limit switches	21
6.3.2 K33 – limit switches	21
6.3.3 K33i – limit switches	22

7.	Installation and Condition for use	23
7.1	Operating Conditions / Installation	23
7.1.1	Installation conditions	23
7.1.2	Startup	23
7.1.3	Pumps	23
7.1.4	Installation	23
7.1.5	Gas metering	24
8.	Maintenance	24
9.	CE Marking	24
10.	Order Information	24
10.1	Basic data	24
10.2	Available accessories	24
11.	Model Code V31	25
12.	Decontamination Certificate for Device Cleaning	26
13.	Declaration of Conformity	27

## Introduction

### I. Shipping and storage; product inspection

#### Shipping and Storage

The device is to be safeguarded against moisture, dirt (especially the meters internal), impact and damage. The storage temperature limits are to be observed. Depending on the device size the area flowmeters float may be secured. This transport protection must be removed before the device is installed.

#### Product inspection

Upon receipt of the product, the consignment should be checked for completeness. The data of the device have to be compared with the packing slip and the order documents

Notify us of any shipping damage immediately upon receipt of the product. Any damage claim received at a later time will not be honoured.

### II. Warranty

Your flow meter was manufactured in accordance with the highest quality standards and was thoroughly tested prior to shipment. However, in the event any problem arises with your device, we will be happy to resolve the problem for you as quickly as possible under the terms of the warranty which can be found in the terms and conditions of delivery. Your warranty will only be honoured if the device was installed and operated in accordance with the instructions for your device. Any mounting, commissioning and/or maintenance work is to be carried out by qualified and authorized technicians only.

### III. Maintenance, Repair and Hazardous substances

When used in the intended manner no special maintenance is required. However, the flowmeter should be checked within the context of routine maintenance of the facility and the pipelines. Should a repair, calibration or maintenance become necessary, be sure to clean the device thoroughly and follow the steps in section 2.5, "Returning your flowmeter for servicing or calibration" before returning the device to Heinrichs Messtechnik. The operator is liable for any substance removal or personal damage costs arising from inadequate cleaning of a device sent for repair.

### IV. Disposal

Observe the regulations applicable to disposal in the country of installation!

### V. Supplementary operating instructions

Supplement operating manuals are available for special features, interfaces and operations relating to your device, request your copy from our service department.

### VI. Operating manual of explosion-proof flowmeters

For installation of the flowmeter within hazardous areas read the operation manual of explosion-proof flowmeters. It contains all the EX-relevant information for your flowmeter.



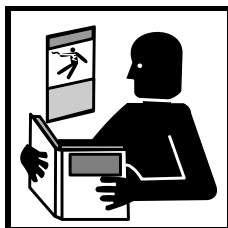
#### Warning!

Only devices designated as EX-certified on their rating plates may be used in areas of potentially explosive atmospheres!

The use of standard equipment in EX-hazardous areas is strictly prohibited.

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## 1. Steps Prior to Operation



These montage and operating instructions are provided to help aid in the correct installation as well as for the operation and maintenance of the meter. It is essential that you read these operating instructions before installing and operating the device. The device is to be installed and serviced by a qualified technician only. Special designs and applications are not included in this manual.

Downloading of the present document from our web site [www.heinrichs.eu](http://www.heinrichs.eu) and printing out this document is allowed only for the purposes of using our mass flowmeters. All rights reserved. No instructions, wiring diagrams, and/or supplied software, or any portion thereof, may be produced, stored, in a retrieval system or transmitted by any means, electronic, mechanical, photocopying or otherwise, without the prior written permission of Heinrichs Messtechnik GmbH.

Although the materials in the present document were prepared with extreme care, errors cannot be ruled out. Hence, neither the company, the programmer nor the author can be held legally or otherwise responsible for any erroneous information and/or any loss or damage arising from the use of the information enclosed.

Heinrichs Messtechnik GmbH extends no express or implied warranty concerning the applicability of the present document for any purpose other than that described.

We plan to optimize and improve the products described and in so doing will incorporate not only our own ideas but also, and in particular, any suggestions for improvement made by our customers. If you feel that there is any way in which our products could be improved, please send your suggestions to the following address:

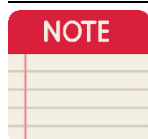
### Company:

Heinrichs Messtechnik GmbH  
HM-EE (R&D Department)  
Robert-Perthel-Strasse 9  
D-50739 Cologne  
Germany

or:

 via fax : +49 (221) 49708-178

 via email: [info@heinrichs.eu](mailto:info@heinrichs.eu)



### Note:

We reserve the right to change the technical data in this manual in the light of any technical progress that might be made.

For updates regarding this product, visit our website at [www.heinrichs.eu](http://www.heinrichs.eu), where you will also find contact information for the Heinrichs Messtechnik distributor nearest you. For information regarding our own sales operations, contact us at [info@heinrichs.eu](mailto:info@heinrichs.eu).

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## 2. Safety Advisories

### 2.1 Installation, Commissioning, Operating Personnel

The present document contains the information that you need in order to operate the product described herein properly. This document is intended for use by qualified personnel. This means personnel who are qualified to operate the device described herein safely, including

- electronics engineers,
- electrical engineers, or
- service technicians

who are conversant with the safety regulations pertaining to the use of electrical and automated technical devices and with the applicable laws and regulations in their own country.

Such personnel must be authorized by the facility operator to install, commission and service the product described herein, and must have read and understood the contents of this operating instructions before working with the device.

### 2.2 Hazard Warnings

The purpose of the hazard warnings listed below is to ensure that device operators and maintenance personnel are not injured and that the flow meter and any devices connected to it are not damaged.

The safety advisories and hazard warnings in the present document that aim to avoid placing operators and maintenance personnel at risk and to avoid material damage are prioritized using the terms listed below, which are defined as follows in regard to these instructions herein and the advisories pertaining to the device itself.

#### Warning



means that failure to take the prescribed precautions **could result** in injury, substantial material damage or even death. Always comply to these warnings and proceed with caution.

#### Caution



means that failure to take the prescribed precaution **could result** in material damage or destruction of the device. We advice always to abide to these instructions!

#### Note



means that the accompanying text contains important information about the product, handling the product or about a section of the documentation that is of particular importance.

## 2.3 Proper Use of the Device

The Coriolis Mass Flow Sensor is intended for the sole use of direct and continuous mass flow measurement of liquids and gases.

To ensure safety for people and the environment adhere to the installation and operational instructions and warning in this manual



### Warning

The operator is responsible for ensuring that the material used in the sensor and housing are suitable and that such material meets the requirements for the process medium and the ambient site conditions.

The manufacturer accepts no responsibility for the selection of unsuitable materials.



### Warning

Before using the meter with corrosive or abrasive media, the operator must check the suitability of all materials that come into contact with the media. In the case of special media, including cleaning media, we will be happy to help you check the corrosion resistance of materials. However, since small changes in the process temperature, concentration or the degree of contamination can result in changes in the corrosion resistance, the full responsibility must remain with the operator.



### Caution

To ensure the device performs correctly and safely, it must be shipped, stored, set up, mounted, operated and maintained correctly.

## 2.4 Installation and servicing

The devices described in this manual are to be installed and serviced only by qualified technical personnel such as a qualified Heinrichs Messtechnik electronics engineer or service technician.

**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.**

In the event a problem arises with your device, or if you need assistance in diagnosing a problem with your device, please contact us at one of the following numbers to arrange to have your device repaired:



+49 (0)221 49708-0 +49



(0)221 49708-178

## 2.5 Returning your flowmeter for servicing or calibration

Before sending your flowmeter back to us, for servicing or calibration, make sure it is completely clean. Any residues of substances that could be hazardous to the environment or human health are to be removed from all crevices, recesses, gaskets, and cavities of the housing before the device is shipped.



### **Warning**

The operator is liable for any loss or damage of any kind, including personal injury, decontamination measures, removal operations and the like that are attributable to inadequate cleaning of the device.

**Any device sent in for servicing is to be accompanied by a Declaration of Decontamination, a template of which is provided in section 12.**



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When returned, the device is to be accompanied by a document describing the problems encountered. Please include in this document the name of a contact person whom our technical service department can contact to enable us to repair your device as expeditiously as possible and minimize the repair costs.



### 3. Identification

Manufacturer: Heinrichs Messtechnik GmbH  
Robert-Perthel-Strasse 9  
D-50739 Cologne  
Germany

 Phone: +49 221 49708-0  
Fax: +49 221 49708-178  
 Internet: [www.heinrichs.eu](http://www.heinrichs.eu)  
Email: [info@heinrichs.eu](mailto:info@heinrichs.eu)

Product type: Variable area flow-meter

Product name: V31

File name: v31\_ba\_21.01\_enx.doc



Version: 21.01,  
Date, February 15, 2021

#### 3.1 Designation / Rating Plate

The device and its specifications are presented as a model-code on the rating plate. The model-code consists of the prefix "V31" followed by an alpha-numerical code.

Refer to section 11 "Model Code V31" for a description of each position.

#### Example of a V31 rating plate.

 KOBOLD Group <a href="http://www.heinrichs.eu">www.heinrichs.eu</a> 	TYPE V31	MODEL CODE	: XX-XX-XX-Muster
	SER. NO.		: 1234567
	MAX. OPERATING PRESSURE		: X bar
	TEMP. RANGE		: -10°C to 80°C
	MANUFACTURING DATE		: 01.2009
	PED		: SEP

#### 4. Application

The V31 variable area flow-meter is used for the flow metering of transparent liquid and gas media in pipes. The scale on the device indicates the flow rate expressed as a volume or mass per unit of time. Standard scales are available for liquids with a density of 1kg/l (62.43 lb/cu.ft). The scales must be recalculated for all other media depending on the physical characteristics.

The flow tube is optionally available with percentage or 2 mm (0.078 inch) scaling.

**Applications:** Flow metering, dosing, monitoring and control of liquid or gas media.  
For the purpose of process monitoring, the device can be fitted with one or more limit switches.



#### **Warning**

The device is of limited use for the metering of potentially hazardous liquids and gases. It is imperative that the operator takes appropriate steps to ensure that in the event of a glass tube breakage, no personnel are harmed and no equipment is damaged. The system operator is legally responsible for any effects provoked by operation of the device

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## 5. Operating Principle and System Configuration

The measuring instrument composes of a float and a conical glass tube (M)

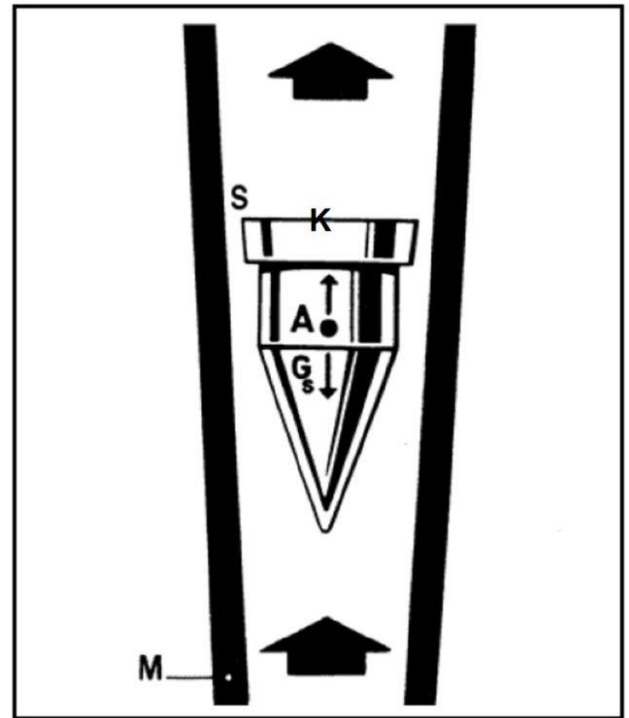
A medium flows from the bottom to the top through the measuring ring, lifting the float in the process until the buoyancy force (A) and the weight of the float (Gs) establish equilibrium. As the height of the float varies, an annular clearance (S) proportional to the flow appears between the float and the measuring tube. The height of the float (K) in the measuring tube serves as the actual rate of the flow. The flow rate is read directly from the scale.

The readings obtained apply solely to the medium for which the device has been calibrated or for a medium with the same density and viscosity as the calibration medium.

The float may also be optionally guided by a float guid rod. This option is recommended to increase the operational safety and to protect against glass breakage in particular operating environments, with the use of solenoid valve controls.

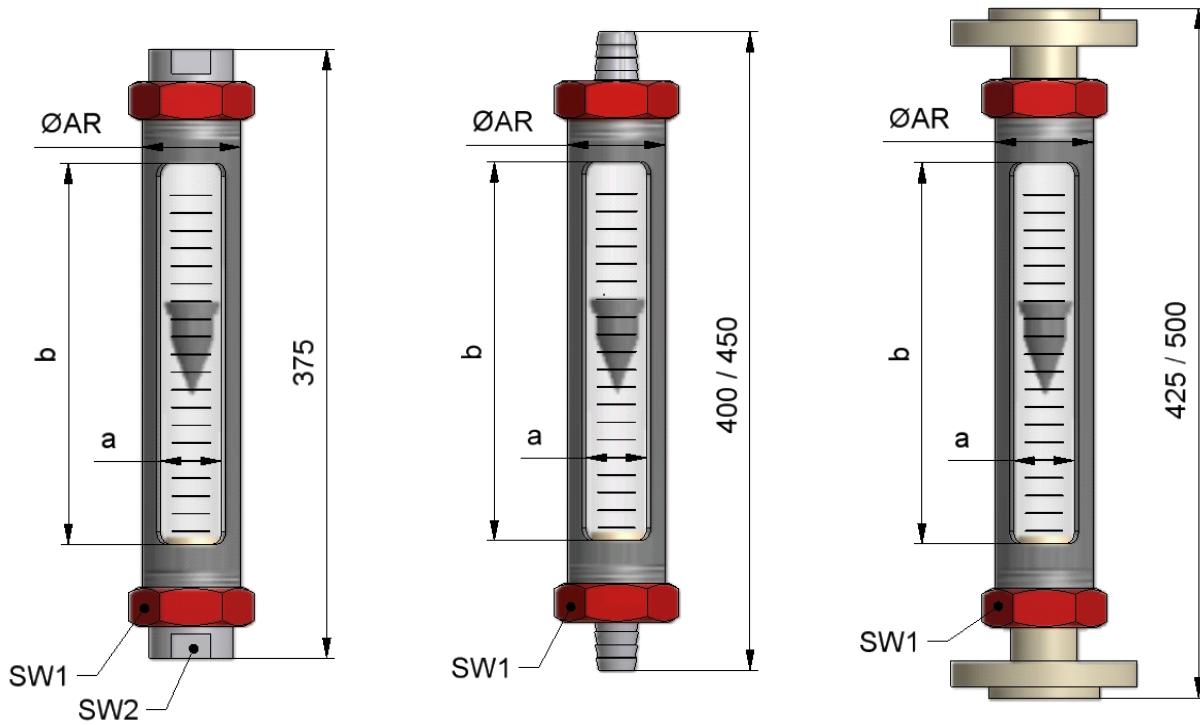
Bei certain levels of viscosity guided floats are essential. This option however cannot be combined with floats containing magnets or with PVDF coated floats.

For signalling specific flow rates, the variable area flowmeter can be outfitted with limit switches. This option is only available with floats which possess mounted magnets.



## 5.1 System Design

### 5.1.1 Type of construction / dimensions

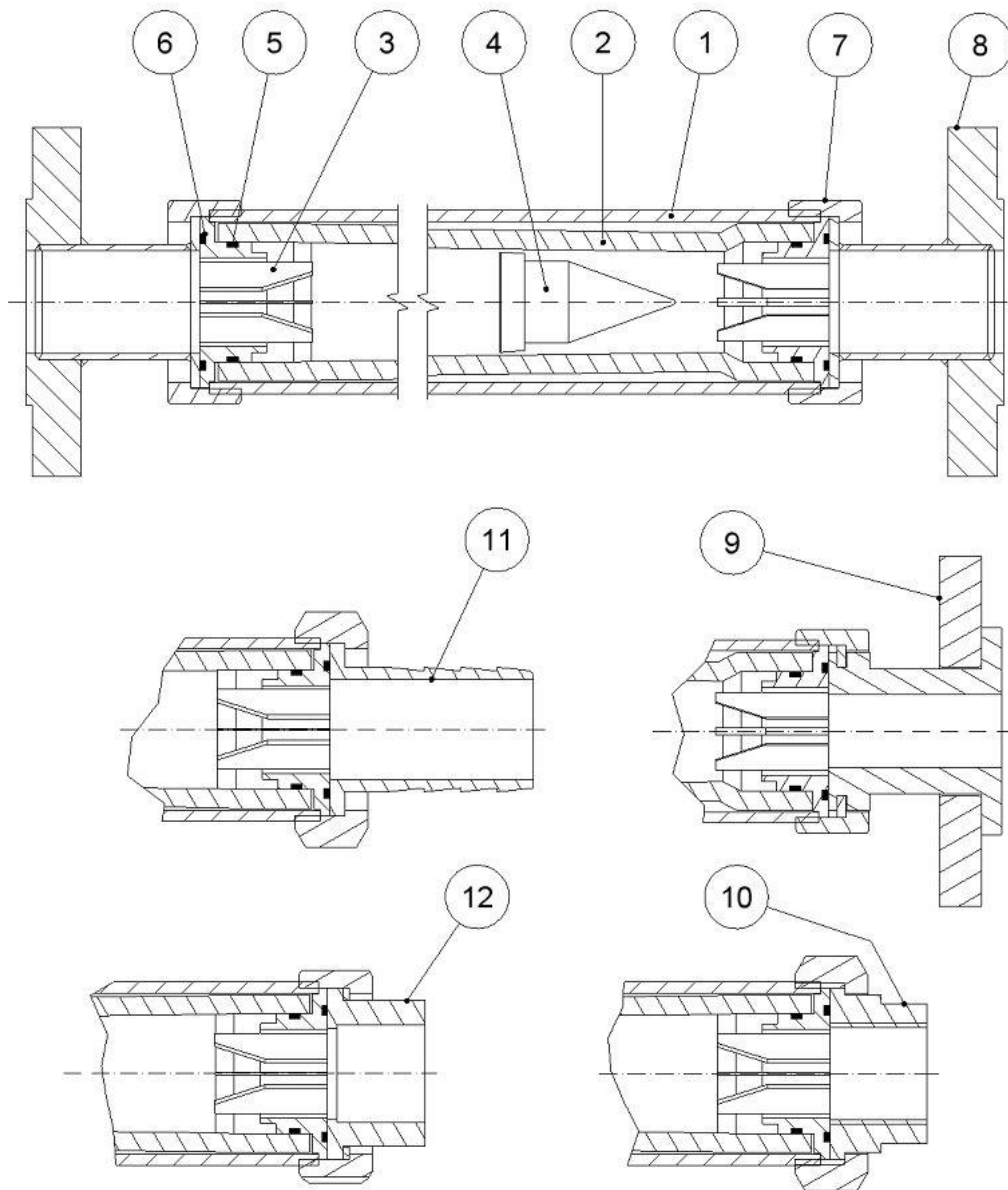


V 31 Model	Body					Connection				
	Ø AR	a	b	SW1	SW2	Female thread	Hose connector	Bonded connection	Flange	
S04	Ø 33.7	19	235	39	24	G / NPT <u>1/4"</u> , <u>7/8"</u> , <u>1/2"</u>	Ø 13, Ø 19	DN 15 d = 20 mm	DN 10/ <u>15</u> /20/25 PN 40	ASME <u>1/4"</u> , <u>7/8"</u> , <u>1/2"</u> 150 lb
S05										
S06	Ø 60.3	38	235	67	46	G / NPT <u>3/4"</u> , <u>1"</u> , <u>1 1/4"</u>	Ø 19, <u>Ø 25</u> , Ø 38	DN 32 d = 40 mm	DN <u>25</u> /40 PN 40	ASME <u>1"</u> , <u>1 1/2"</u> 150 lb
S07	Ø 88.9	58	235	100	65	G / NPT <u>1 1/4"</u> , <u>1 1/2"</u> , <u>2"</u>	Ø 38, <u>Ø 50</u>	DN 50 d = 63 mm	DN 40/ <u>50</u> PN 40 DN 65 PN 16	ASME <u>1 1/2"</u> , <u>2"</u> , <u>2 1/2"</u> 150 lb

Standard connections are underlined

Weights	Treaded conn.		Flanged conn	
S 04	G 1/2	0,7 Kg	DN 15	2,0 Kg
S 05	G 1/3	0,7 Kg	DN 15	2,0 Kg
S 06	G 1	2,0 Kg	DN 25	3,9 Kg
S 07	G 2	4,0 Kg	DN 50	8,9 Kg

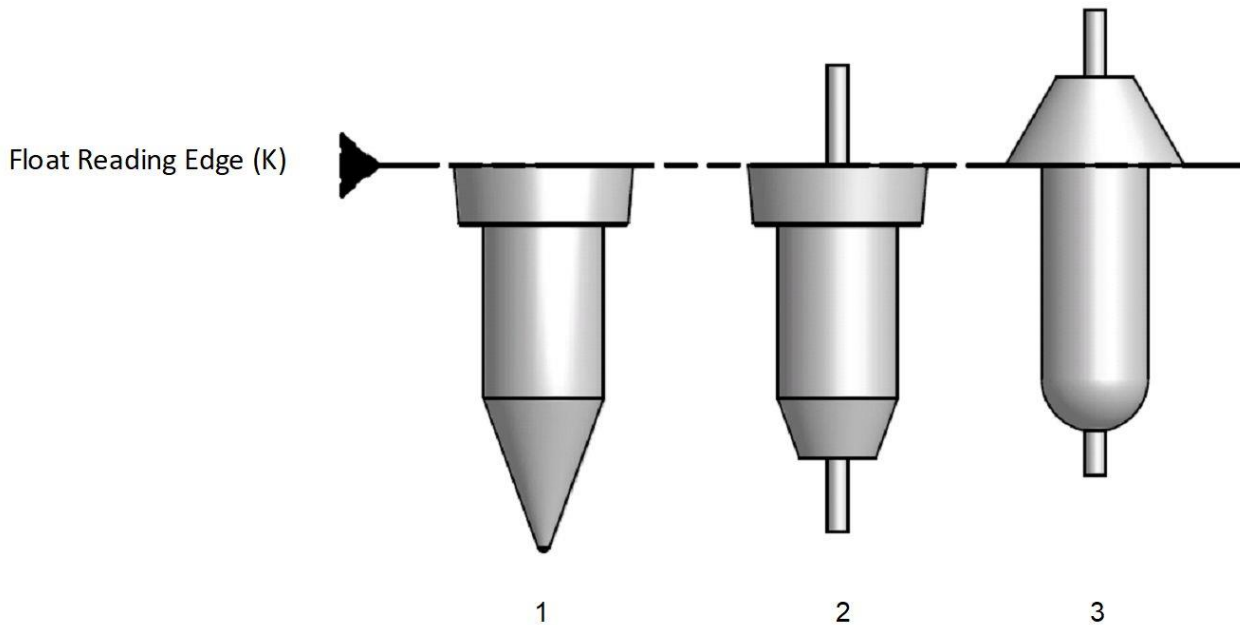
5.1.2 Materials



Item	Pieces	Name	V 31 connection		
			PVC	PVDF	SS
1	1	Housing		1.4301	
2	1	Measuring tube		Borosilicate glass	
3	2	Stop		PVDF	
4	1	Float		1.4571, AL, PVDF	
5	2	O-ring		EPDM, Viton, FEP/FFKM	
6	2	O-ring		EPDM, Viton, FEP/FFKM	
7	2	Sleeve nut		AL, SS	
8	2	Flange			X
9	2	Flange		X	
10	2	Threaded connection		X	X
11	2	Hose connector		X	X
12	2	Bonded connection	X		

## 5.2 Float Types

There are three types of floats on offer:



The following viscosity limits require a viscosity-stable float:

Model	mPa s (cp)
S05	$\geq 3$
S06	$\geq 5$
S07	$\geq 8$

## 5.3 Contacts

The bistable magnetic contacts K17A, K17B, K33 and K33i show the position of the float, thus indicating the measured value in a non-reactive and contact-free means.

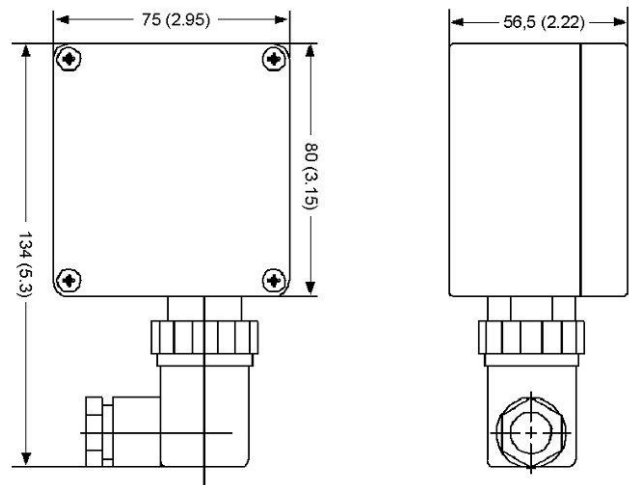
Features:

- Bistable behaviour
- High vibration resistance
- Non-reactive switching
- practically inertia less switching
- No interaction between the contact
- Simple plug-in connector

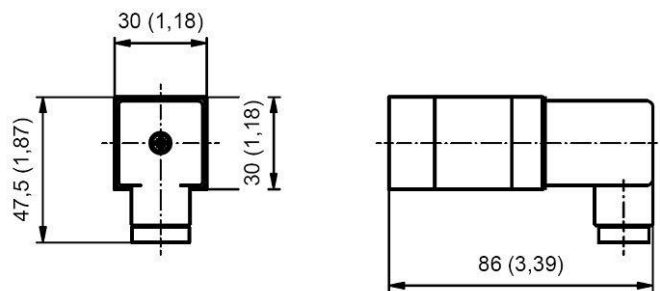
The bistable K33 contact consists of a set of contact springs inside a glass tube filled with inert gas

5.3.1 Dimensions of the applied contacts [mm(inch)]

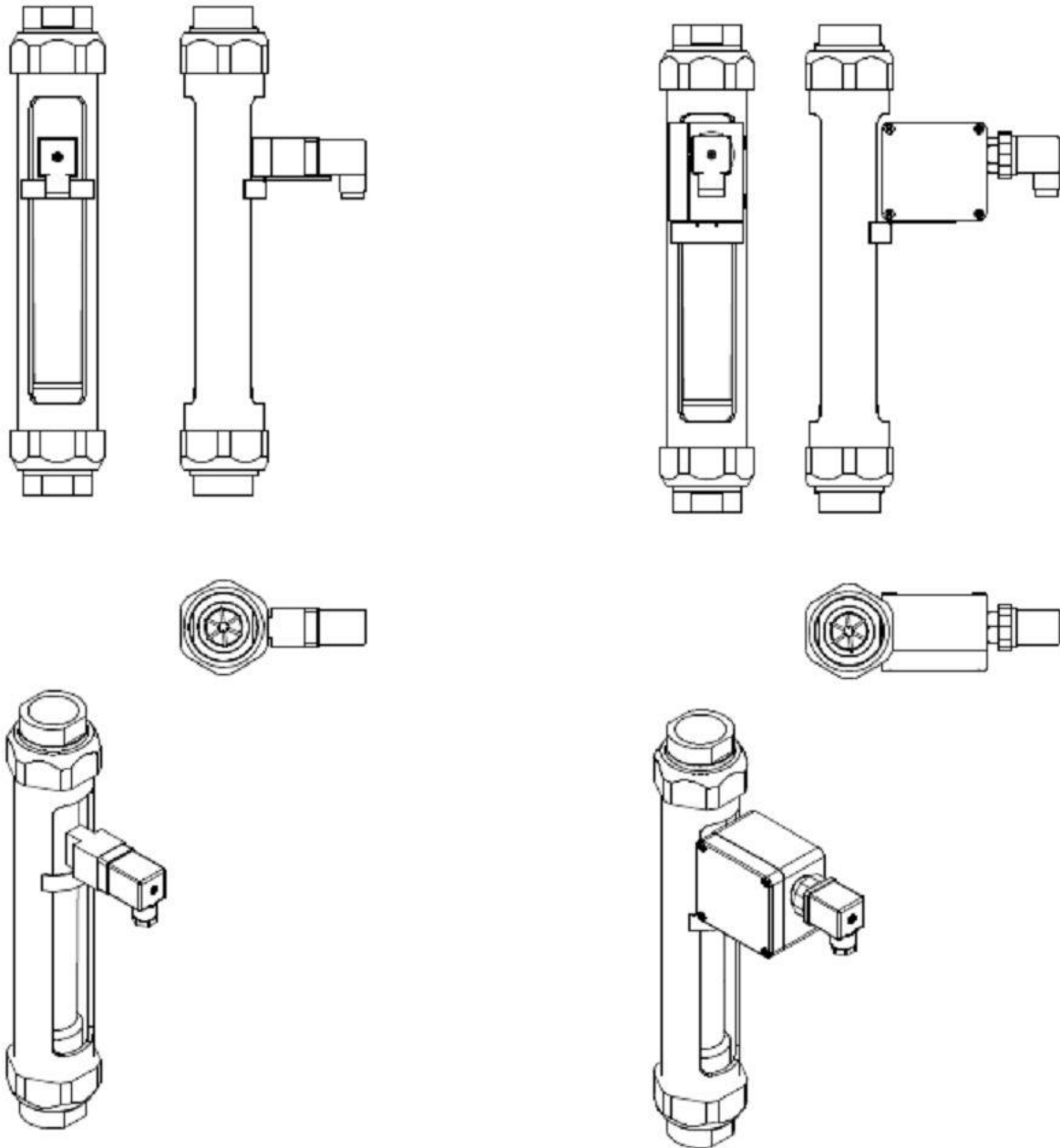
Dimensions of K33 and K33i assemblies



Dimensions of K17 A/B assemblies



5.3.2 Mounting of the limit switches series K17, K33, K33i





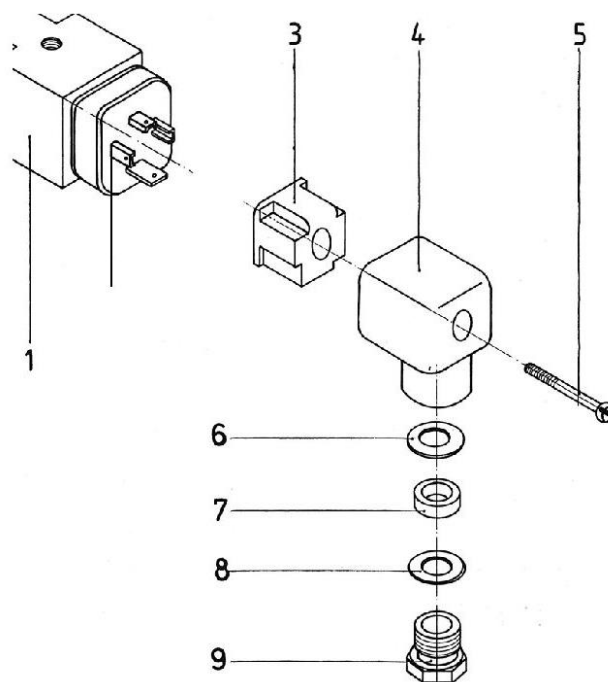
### 5.3.3 Adjusting and wiring of the limit switches

When ordered, the limit switches are factory set at the ordered values. They can however be adjusted to suit the operators requirements.

For re-adjusting an M4 nut (SW7) must be released until the clamping position can be adjusted. Now the limit switch can be slid into its new position. After the switch has been positioned, tighten the nut (SW7) until the contact clamp is secured in place.

Cable mounting and wiring K17 A/B, K33 and K33i:

1. Unscrew locking screw (5) from the cover (4) and lift the entire cover (4) from the contact housing (1). Caution – do not lose or damage the sealing (10) between plug and housing
2. Unscrew cable connection (9) and remove sealing inserts (6,7,8) from the cover.
3. Pull screw (5) out of the cover (4) and carefully lever the insertion part (3) out of the cover (4).
4. Pull connection cable  $\varnothing$  4-7,5 mm through the cable connection and insert sealing inserts into the plug. Dismantle the cables insulation at the required length and fix the wiring sockets. Finally wire-up to the terminals of the insert according to the wiring diagram.
5. The reassembly of the connector is performed in reverse order. The insert part (3) can be mounted in 90° steps so that the cable – after plugging – will be guided either to the left, the right, the top or the bottom.

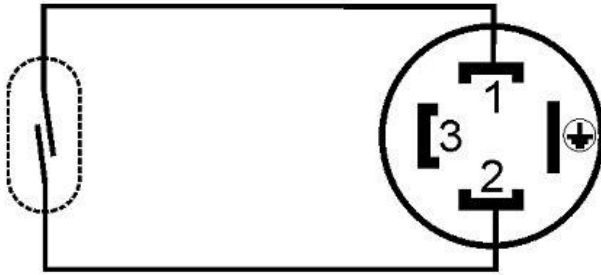


**Vorsicht:**

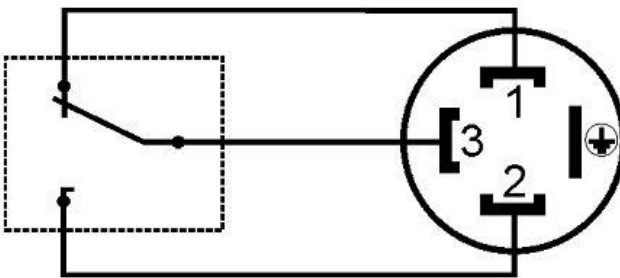
Please note that the seal of the cable gland seals on the jacket of the cable! Tighten the cable gland firmly! Damaged seals (10) plug / housing (1 and 4) must be replaced with seals and housing parts of the same type.

Before commissioning, or putting into operation by the user, we recommend that the float is manually passed by the contact. By this means, the correct start position of the contact can be ensured.

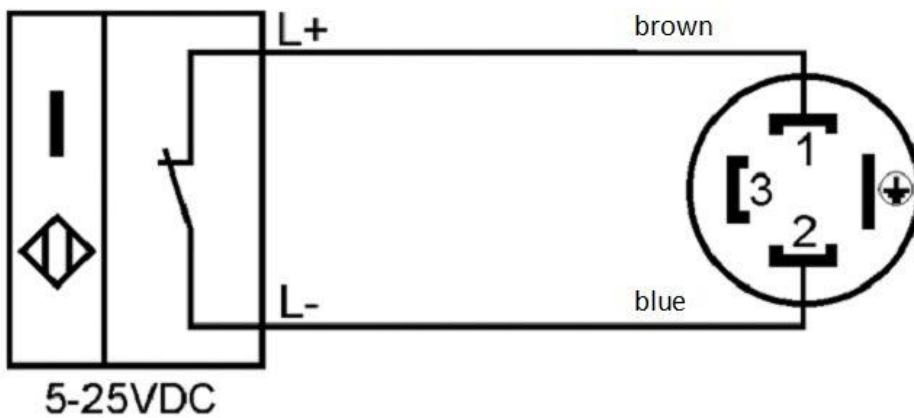
5.3.4 Wiring diagrams of the limit switches K17 A/B, K33, K33i



Wiring Diagram K17 A/B



Wiring Diagram K33



Wiring diagram K33i

## 6. Characteristical Data

### 6.1 Mechanical Data

<b>Measuring range</b>	Turndown ratio		<b>1:10</b>	
	Smallest measuring range	Water	3 - 30 l/h	
		Air	36 - 360 NI/h	
	Largest measuring range	Water	1000 - 10000 l/h	
		Air	18000 - 180000 NI/h	
	Dimensions for measured variable	Water	l/h ≤ 2500 l/h	
			m <sup>3</sup> /h ≥ 3000 l/h	
Air		l/h ≤ 40000 NI/h		
		m <sup>3</sup> /h ≥ 50000 NI/h		
covered to 0 °C and 1,013 bar abs				
<b>Accuracy class (according to VDE/VDI 3513, sheet 2)</b>	Liquids	1,6%		
	Gases	2,5%		
			q <sub>G</sub> 50%	
<b>Flow direction</b>	from bottom to top			
<b>Materials</b>	Measuring tube	Borosilicat glass		
	Connections	1.4571, PVDF, PVC		
	Float	1.4571, aluminium, PVDF		
	Float guiding	1.4571		
	Seals	Viton, EPDM, FEP/FFKM		
	Float Stop	PVDF / stainless steel		
	Protection body	1.4301		
	Shatter protection	Polycarbonat		
	<b>Ambient conditions</b>	Ambient temperature	-20...+80 °C (-4...+176°F)	
Ambient temperature PVC		-20...+80 °C (-3...+176°F)		
Storage temperature		-20...+60 °C (-4...+140°F)		
Climatic category		Weatherproof and/or unheated operation site, class C according to DIN IEC 654 part 1		
Shock resistance / vibration resistance		The device should be protected against extreme shock and vibration, either of which could cause damage		
<b>Medium Conditions</b>	<b>Pressure Resistance</b>	Ranges B1 bis C7	max. 15 bar (at max. 80°C ; 176° F)	
		Ranges D1 bis D8	max. 10 bar (at max. 80°C ; 212° F)	
		Ranges E1 bis E5	max. 6 bar (at max. 80°C ; 176° F)	
		Connections in PVDF	max. 10 bar (at max. 20°C ; 68° F)	
			max. 4 bar (at max. 40°C ; 104° F)	
			max. 2,5 bar (at max. 50°C ; 122° F)	
	Connections in PVC	max. 10 bar (at max. 20°C ; 68° F)		
		max. 4 bar (at max. 40°C ; 104° F)		
		max. 2,5 bar (at max. 50°C ; 122° F)		
	<b>Media Temperature</b>	Float material st.st. / Aluminium	-10° - +150°C (+14° - +176° F)	
		Float material PVDF	-10° - +100°C (+14° - +176° F)	
		PVC Glue connection	-10° - +50°C (+14° - +122° F)	
	<b>Status</b>	liquid or gaseous		
<b>Density</b>	Liquids	≤2,0 kg/l		
	Gases	- / -		
<b>Inlet and outlet straight</b>	Inlet and outlet straight are not required as long as the flow profile is laminar. On strongly non laminar flow profiles e.g. regulating and shuttoff devices inlet straight of 250 mm, see also directive VDI/VDE 3513			
<b>Pressure Loss</b>	see measuring ranges			
<b>Limit contacts</b>	<b>Model</b>	<b>Switching type</b>	<b>Power</b>	
	K17A	reed contact N/O	AC 250 V/ 0,5 A / 10 VA	
	K17B	reed contact N/C	DC 250 V/0,5 A / 5W	
	K33	reed contact SPDT	250 V AC/DC/1,5A/150VA/100W	
	K33i	inductive contact N/C	5-25 V DC	

## 6.2 Measuring Ranges

### 6.2.1 Water

V31 model	Connection Sizes <u>Standard</u>	Ranges acc. Range code	Pressure loss  mbar(psi)	Float 1.4571 c/w and w/o guiding	Float 1.4571+ magnet	Float 1.4571 - viscosity stable	Float PVDF weighted w. magnet
				Standard ranges for liquids - l/h - (p=1kg/l(62,43 lb/cu.ft), viscosity 1 mPas(1cp)) (turndown ratio 1:10)			
S 04	G 1/4" 3/8" <u>1/2"</u>	B1	10 (0,145)	3 - 30	-	-	1,1 - 11
		B2		4 - 40	-	-	1,5 - 15
		B3		5 - 50	-	-	2 - 20
		B4		6,5 - 65	-	-	2,5 - 25
		B5		8 - 80	-	-	3,2 - 32
		B6		10 - 100	-	-	4 - 40
S 05	G 1/4" 3/8" <u>1/2"</u>	C1	20 (0,290)	12,5 - 125	12 - 120	10 - 100	6,5 - 65
		C2		16 - 160	15 - 150	12,5 - 125	9 - 90
		C3		20 - 200	18 - 180	16 - 160	11 - 110
		C4		25 - 250	24 - 240	20 - 200	14 - 140
		C5	40 (0,580)	31,5 - 315	30 - 300	24 - 240	17,5 - 175
		C6		40 - 400	36 - 360	30 - 300	22 - 220
		C7		50 - 500	48 - 480	36 - 360	25 - 250
S 06	G 3/4" <u>1"</u> 1 1/4"	D1	19 (0,280)	40 - 400	40 - 400	-	32 - 320
		D2		65 - 650	60 - 600	40 - 400	50 - 500
		D3		80 - 800	75 - 750	50 - 500	60 - 600
		D4		100 - 1000	95 - 950	60 - 600	75 - 750
		D5		120 - 1200	120 - 1200	75 - 750	100 - 1000
		D6	24 (0,350)	160 - 1600	150 - 1500	100 - 1000	125 - 1250
		D7		200 - 2000	180 - 1800	120 - 1200	160 - 1600
		D8	33 (0,480)	250 - 2500	240 - 2400	140 - 1400	200 - 2000
		D9		300 - 3000	280 - 2800	180 - 1800	240 - 2400
S 07	G 1 1/4" 1 1/2" <u>2"</u>	E1	25 (0,360)	400 - 4000	380 - 3800	250 - 2500	320 - 3200
		E2		500 - 5000	480 - 4800	300 - 3000	380 - 3800
		E3		650 - 6500	640 - 6400	400 - 4000	500 - 5000
		E4		800 - 8000	750 - 7500	450 - 4500	640 - 6400
		E5		1000 - 10000	950 - 9500	550 - 5500	750 - 7500

### 6.2.2 Air

V31 model	Connection Sizes <u>Standard</u>	Ranges acc. Range code	Pressure loss  mbar(psi)	Float Aluminum c/w and w/o guiding	Float Aluminum + magnet	Float PVDF	Float PVDF weighted w. magnet
				Standard ranges for air - NI/h - (Pabs =1,013 bar(14,69psi) at T= 20°C(68° F), p=1,293kg/m³, V=0,0181 mPas) (Turndown ratio 1:10)			
S 04	G 1/4" 3/8" <u>1/2"</u>	B1	4 (0,058)	5 - 500	-	36 - 360	-
		B2		65 - 650	-	50 - 500	-
		B3		80 - 800	-	65 - 650	-
		B4		110 - 1100	-	80 - 800	-
		B5		140 - 1400	-	100 - 1000	-
		B6		160 - 1600	-	125 - 1250	-
S 05	G 1/4" 3/8" <u>1/2"</u>	C1	40 (0,580)	200 - 2000	250 - 2500	150 - 1500	200 - 2000
		C2		300 - 3000	320 - 3200	200 - 2000	300 - 3000
		C3		360 - 3600	400 - 4000	250 - 2500	360 - 3600
		C4		400 - 4000	500 - 5000	300 - 3000	450 - 4500
		C5	40 (0,580)	500 - 5000	640 - 6400	360 - 3600	600 - 6000
		C6		640 - 6400	800 - 8000	500 - 5000	700 - 7000
		C7		800 - 8000	1000 - 10000	550 - 5500	950 - 9500
S 06	G 3/4" <u>1"</u> 1 1/4"	D1	19 (0,280)	750 - 7500	850 - 8500	520 - 5200	750 - 7500
		D2		1000 - 10000	1200 - 12000	800 - 8000	1000 - 10000
		D3		1300 - 13000	1500 - 15000	900 - 9000	1300 - 13000
		D4		1600 - 16000	2000 - 20000	1200 - 12000	1600 - 16000
		D5		2000 - 20000	2400 - 24000	1500 - 15000	2000 - 20000
		D6	24 (0,350)	2800 - 28000	3200 - 32000	2000 - 20000	2800 - 28000
		D7		3600 - 36000	4000 - 40000	2500 - 25000	3600 - 36000
		D8	33 (0,480)	4000 - 40000	5000 - 50000	3000 - 30000	4000 - 40000
		D9		5000 - 50000	6000 - 60000	3600 - 36000	5000 - 50000
S 07	G 1 1/4" 1 1/2" <u>2"</u>	E1	25 (0,360)	6400 - 64000	7500 - 75000	5000 - 50000	6400 - 64000
		E2		8000 - 80000	10000 - 100000	6500 - 65000	8000 - 80000
		E3		10000 - 100000	12500 - 125000	8000 - 80000	10000 - 100000
		E4		14000 - 140000	15000 - 150000	10000 - 100000	14000 - 140000
		E5		16000 - 160000	18000 - 180000	12500 - 125000	16000 - 160000

## 6.3 Characteristic Values – limit switches

### 6.3.1 K17 A/B – limit switches

- K17 A: Contact is made when the current value falls below the limit value
- K17 B: Contact is made when the current value exceeds the limit value

Schaltprinzip	Magnetische Kontaktanrichtung, bistabil - Ausführung als Reedkontakt
Temperaturbereich	-40°C - +80°C (-40°F - +176°F)
Gehäuse/Stecker	PP/PA 6
Kontaktwerkstoff	Rhodium
Schutzart	IP65
Umgebungstemperatur	-20 bis +80 °C / -4 bis 176 °F
max. Schalthäufigkeit	5/min
max. Schaltleistung	AC 250 V/0,5 A/10 VA
	DC 250 V/0,5 A/5 W



**Caution:**

The maximum switching capacity and the maximum permissible peak inrush current must not be exceeded. Otherwise the contact reeds will weld together.

Such a contacting welding constitutes the end-of-life of the switch.

### 6.3.2 K33 – limit switches

The K33 contact is a switching contact. this switch can open or close the contact when the set value is exceeded

Housing	Aluminum
Switching principle	Bistable magnetic contact, reed contact
Temperature range	-40 °C to +80 °C (-40 °F to +176 °F)
Contact material	AgPd
Degree of protection	IP 54
Inert gas filling	
Switching voltage	[V~] 230
	[V=] 250
Continuous current	[A] 1.5
Switching capacity	[V~] 230 max.150 VA
	[V=] 250 max.100 W
Contact resistance	[Ω] 0.2 Ohm
Insulating resistance	[Ω] 50 M Ohm
Breakdown voltage	[V] 1150
Mechanical life-time	10 <sup>8</sup> switching operations
Max. switching rate	7200/h



**Caution:**

The maximum switching capacity and the maximum permissible peak inrush current must not be exceeded. Otherwise the contact reeds will weld together.

Such a contacting welding constitutes the end-of-life of the switch.

### 6.3.3 K33i – limit switches

The K33i contact is an inductive contact that makes or breaks a circuit when the current value reaches the set value

Housing	Aluminum
Switching principle	Inductive contact, magnetically coupled, proximity switch
Temperature range	-40 °C to +80 °C (-40 °F to +176 °F)
Function of switching element	N/C
Output polarity	NAMUR (DIN EN 60947-5-6)
Degree of protection	IP 54
Welded without gaps - Sensor cast free of shrink holes	
Nominal voltage $U_0$	[V=] 8
Operating voltage $U_B$	[V=] 5 .. 25
Max. switching frequency	3000 Hz



**Warning:**

The maximum stated operating voltage must not be exceeded, otherwise the sensor will be destroyed.

## 7. Installation and Condition for use

### 7.1 Operating Conditions / Installation

#### 7.1.1 Installation conditions

The device should be operated pursuant to the stipulations of VDE/VDI Code 3513, sh. 3.

Measurable media are:

- 1) Liquids that exhibit sufficient flowability are devoid of solids, do not bond and do not tend to settle.
- 2) Gases that flow laminarly (laminar flow behavior) and exhibit sufficient pre-pressure.

Mount the device vertically so as to allow for upward flow. Make sure to leave enough space for subsequent removal of the flowmeter.

Inlet and outlet sections in front of and behind the device are generally unnecessary for laminar flows. Avoid installation of any components that narrow the flow on one side in front of the device. If this is not possible, implement a straight 5 x DN inlet section in front of the device. If possible, control valves should be installed behind the metering device in the direction of flow. Make sure that the float is not being shot against the upper float stop. For further information in this regard, see the installation recommendations in VDE/VDI Code 3513, sh. 3. Do not mount the flowmeter on the suction side of a pump. (Danger of vacuum!)

#### 7.1.2 Startup

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Caution:

If there is a risk of dirt or solids in the process lines, these must be rinsed prior to start-up so that these particles cannot get lodged in the device. In particular, ferromagnetic solids such as welding beads can cause the device to fail. If such particles cannot be excluded even during normal operation, a magnetic filter should be installed in front of the device.

During commissioning, the valves must be opened slowly and the pipeline vented to avoid liquid hammering. For devices with flange connections, the cap nut must be tightened firmly! Only then should the flange connection be established.

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#### 7.1.3 Pumps

Do not mount the measuring unit into the suction side of any pumps (e.g. vacuum pumps).

#### 7.1.4 Installation

Screws, bolts, nuts and seals are not supplied by Heinrichs Messtechnik GmbH and must therefore be provided by the operator. Install the sensor between the pipes. Mounted seals must not reach into the internal cross-section of the pipe

### **7.1.5 Gas metering**

When metering gas, the operating pressure should be increased gradually. Use the control valve to vary the pressure in such a way that the float is not shock impacted against the side of the glass tube. Such an impact can result in a breakage of the glass-tube.

## **8. Maintenance**

The device requires no servicing insofar as it is operated in accordance with the manufacturer's recommendations. If however, the float becomes clogged or the float needs to be cleaned, the service technician should take note of the following aspects:

- Before dismantling the device, check to ensure that all pipes are void of media, have been depressurised and have cooled down
- Should the inside of the device contain any foreign matter, it should be cleaned thoroughly with a brush and suitable cleaning agent. Deposits should be removed carefully.

## **9. CE Marking**

The limit switches in the measuring system comply to the EMC directive 2014/30/EU and the low voltage directive 2014/EU/35.

In as much as the devices are classified under article 4 paragraph 3 of the Pressure Equipment Directive 2014/68/EU, they do not bear the CE mark for this directive.

The application of the CE marking indicates that the device complies with the aforementioned directives.



For details of conformity please refer also to section O

Basic Code S04/S05 / V31-										
	G	NPT	Flange	Hose Conn. / Glue Conn.	Hygenic Conn.- DIN 1851	TRI-Clamp ISO 2852	TRI-Clamp DIN 32676	TRI-Clamp DIN 32677		
14"	4000	6010			on requ.	on requ.	on requ.	on requ.		
3/8"	4010	6020		625						
12"	4020	6030	203R	620						
3/4"			202R							
f			203R							
DN10			303B							
DN15			305B	4200						
DN20			3A5B							
DN25			309B							
<b>Mounting Length</b>										
					(G and NPT)	375 mm	1			
					(hose conn.)	400 mm	2			
						425 mm	3			
						500 mm	5			
<b>Connection Material (wetted)</b>										
						PVDF	F			
						Edelstahl	S			
						PVC	V			
<b>Float</b>										
						14571(3/16 TI) (3/16 TI)	01			
						14571(3/16 TI) guided	02			
						14571(3/16 TI) - c/w Magnet	03			
						14571(3/16 TI) - viscosity stable - guided	04			
						PVDF	05			
						PVDF weighted	06			
						PVDF c/w Magnet	07			
						Aluminum	08			
						Aluminum guided	09			
						Aluminum c/w Magnet	10			
						Special	99			
<b>Range</b>										
						see Measuring Tables	B+			
							C7			
<b>Media</b>										
						Water	W			
						Air	L			

Basic Code S07 / V31 -										
	G	NPT	Flange	Hose	Hygenic	TRI-	TRI-	TRI-		
114"	4050	6060			on requ.	on requ.	on requ.	on requ.		
112"	4060	6070	225R							
2"	4070	6080	226R	6260						
2 1/2"			227R							
DN40			317B							
DN50			320B	4250						
DN65			325B							
<b>Mounting Length</b>										
					(G and NPT, glue conn. PVC)	375 mm	1			
					(hose conn.)	425 mm	3			
						450 mm	4			
						500 mm	5			
<b>Connection Material (wetted)</b>										
						PVDF	F			
						Edelstahl	S			
						PVC	V			
<b>Float</b>										
						14571(3/16 TI)	01			
						14571(3/16 TI) guided	02			
						14571(3/16 TI) - c/w Magnet	03			
						14571(3/16 TI) - viscosity stable - guided	04			
						PVDF	05			
						PVDF weighted	06			
						PVDF c/w Magnet	07			
						Aluminum	08			
						Aluminum guided	09			
						Aluminum c/w Magnet	10			
						Special	99			
<b>Range</b>										
						see Measuring Tables	E1-			
							E5			
<b>Media</b>										
						Water	W			
						Air	L			

Basic Code S06 / V31-										
	G	NPT	Flange	Hose Conn. / Glue Conn.	Hygenic Conn.- DIN 1851	TRI-Clamp ISO 2852	TRI-Clamp DIN 32676	TRI-Clamp DIN 32677		
3/4"	4030	6040	203R		on requ.	on requ.	on requ.	on requ.		
f	4040	6050	203R							
114"	4050	6060								
112"			205R							
DN25			309B	4220						
DN32				4230						
DN40			317B	4240						
<b>Mounting Length</b>										
					(G and NPT, hose conn. PVC)	375 mm	1			
					(hose conn.)	400 mm	2			
					(Flange conn.)	425 mm	3			
					(hose conn. PVDF)	450 mm	4			
					(Flange)	500 mm	5			
<b>Connection Material (Mediaberührt)</b>										
						PVDF	F			
						Edelstahl	S			
						PVC	V			
<b>Ranges</b>										
						see Measuring Tables	D+			
							D9			
<b>Float</b>										
						14571(3/16 TI)	01			
						14571(3/16 TI) guided	02			
						14571(3/16 TI) - c/w Magnet	03			
						14571(3/16 TI) - viscosity stable - guided	04			
						PVDF	05			
						PVDF weighted	06			
						PVDF c/w Magnet	07			
						Aluminum	08			
						Aluminum guided	09			
						Aluminum c/w Magnet	10			
						Special	99			
<b>Media</b>										
						Water	W			
						Air	L			

General Part		
<b>O-Ring</b>		
		EPDM B
		Viton® FKM F
		FEP/Perfluor® FFKM V
<b>Float Stop</b>		
		PVDF F
		Edelstahl S
		Specialwerkst X
<b>Sleeve Nut</b>		
		Aluminum lackiert A
		Edelstahl S
<b>Chip Guard</b>		
		c/w 0
		w/o 1
<b>Contacts</b>		
		w/o 0
		K17 A 1
		K17 B 2
		K33 3
		K33 4
		2xK33 5
		Special 6
<b>Scale</b>		
		%-Scale (H2O) 1
		MB-Scale (H2O) 2
		%-Scale Media 3
		Range-Scale Media 4
		engraved Scale 5
		Special 6
<b>Certificat</b>		
		2.1 certificate acc. EN 10204 1
		3.1 certificate (DIN EN 10204:2004 for wetted st. l. Parts) 2
<b>Calibration report</b>		
		w/o 0
		Standard 3-point confirmation of the accuracy class 1
		5-point cal. Report 2
		Special scaling accuracy class 1% 3
		Special calibration acc. Customer request 9
<b>Cleaning acc. Company Norm (oxygen service)</b>		
		w/o 0
		cleaning class VA c/w marking oil and grease free 1
<b>Pressure and Leak Test reports</b>		
		w/o 0
		Pressure test acc. EN 10204 c/w APZ 3.1 1
		leak testing acc. EN 10204 c/w APZ 3.2 2
<b>Approvals</b>		
		w/o 0
		ATEX IIG (Gas Zone 1) - in preparation only for mech. version 1
		ATEX IIG (Gas Zone 2) - in preparation only for mech. version 2
		ATEX IIG (Staub Zone 1) - in preparation only for mech. version 3
		ATEX IIG (Staub Zone 2) - in preparation only for mech. version 4
<b>Signing</b>		
		w/o 0
		st. st. plate 40 x20 mm 1
<b>Supplementary</b>		
		w/o 0
		c/w (separate specification required) 1

"

## **10. Order Information**

### **10.1 Basic data**

All orders should contain the following information: Product data, specific weight, standard density (for gases), temperature, pressure, viscosity, material used, connection sizes, flow-rate range, and desired accessories.

### **10.2 Available accessories**

- 1 or 2 limit switches
- Shatter protection

### 11. Model Code V31

Basic Code S04/S05 / V31-								
V31-	G	NPT	Flange	Hose Conn. / Glue Conn.	Hygenic Conn.- DIN 1851	TRI-Clamp ISO 2852	TRI-Clamp DIN 32676	TRI-Clamp DIN 32677
14"	4000	6010			on requ.	on requ.	on requ.	on requ.
3/8"	4010	6020		6215				
12"	4020	6030	20R	6210				
3/4"			202R					
1"			203R					
DN10			30B					
DN15			305B	4200				
DN20			3A5B					
DN25			309B					
Mounting Length								
	(G and NPT)		375 mm	1				
	(hose conn.)		400 mm	2				
			425 mm	3				
			500 mm	5				
Connection Material (wetted)								
				PVDF	F			
				Edelstahl	S			
				PVC	V			
Float								
				14571(316 TI) (316 TI)	01			
				14571(316 TI) guided	02			
				14571(316 TI) - c/w Magnet	03			
				14571(316 TI) - viscosity stable - guided	04			
				PVDF	05			
				PVDF weighted	06			
				PVDF c/w Magnet	07			
				Aluminum	08			
				Aluminum guided	09			
				Aluminum c/w Magnet	10			
				Special	99			
Range								
				see Measuring Tables	B1			
					C7			
Media								
				Water	W			
				Air	L			
go on with general part →								
Basic Code S06 / V31-								
V31-	G	NPT	Flange	Hose Conn. / Glue Conn.	Hygenic Conn.- DIN 1851	TRI-Clamp ISO 2852	TRI-Clamp DIN 32676	TRI-Clamp DIN 32677
3/4"	4030	6040			on requ.	on requ.	on requ.	on requ.
1"	4040	6050	203R					
11/4"	4050	6060						
11/2"			205R					
DN25			309B	4220				
DN32				4230				
DN40			317B	4240				
Mounting Length								
	(G and NPT, hose conn. PVC)		375 mm	1				
	(hose conn.)		400 mm	2				
	(Flange conn.)		425 mm	3				
	(hose conn. PVDF)		450 mm	4				
	(Flange)		500 mm	5				
Connection Material (Mediaberührt)								
				PVDF	F			
				Edelstahl	S			
				PVC	V			
Ranges								
				see Measuring Tables	D1			
					D9			
Float								
				14571(316 TI)	01			
				14571(316 TI) guided	02			
				14571(316 TI) - c/w Magnet	03			
				14571(316 TI) - viscosity stable - guided	04			
				PVDF	05			
				PVDF weighted	06			
				PVDF c/w Magnet	07			
				Aluminum	08			
				Aluminum guided	09			
				Aluminum c/w Magnet	10			
				Special	99			
Media								
				Water	W			
				Air	L			
go on with general part →								
Basic Code S07 / V31-								
V31-	G	NPT	Flange	Hose	Hygenic	TRI-	TRI-	TRI-
11/4"	4050	6060			on requ.	on requ.	on requ.	on requ.
11/2"	4060	6070	225R					
2"	4070	6080	226R	6260				
2 1/2"			227R					
DN40			317B					
DN50			320B	4250				
DN65			325B					
Mounting Length								
	(G and NPT, glue conn. PVC)		375 mm	1				
	(hose conn.)		425 mm	3				
			450 mm	4				
			500 mm	5				
Connection Material (wetted)								
				PVDF	F			
				Edelstahl	S			
				PVC	V			
Float								
				14571(316 TI)	01			
				14571(316 TI) guided	02			
				14571(316 TI) - c/w Magnet	03			
				14571(316 TI) - viscosity stable - guided	04			
				PVDF	05			
				PVDF weighted	06			
				PVDF c/w Magnet	07			
				Aluminum	08			
				Aluminum guided	09			
				Aluminum c/w Magnet	10			
				Special	99			
Range								
				see Measuring Tables	E1			
					E5			
Media								
				Water	W			
				Air	L			
go on with general part →								
General Part								
O-Ring								
				EPDM	B			
				Vito® FKM	F			
				FEP/Perfluoro FFKM	V			
Float Stop								
				PVDF	F			
				Edelstahl	S			
				Specialwerkst.	X			
Sleeve Nut								
				Aluminum lackiert	A			
				Edelstahl	S			
Chip Guard								
				c/w	0			
				w/o	1			
Contacts								
				w/o	0			
				K17 A	1			
				K17 B	2			
				K33	3			
				K33	4			
				2xK33	5			
				Special	6			
Scale								
				%-Scale (H2O)	1			
				MB-Scale (H2O)	2			
				%-Scale Media	3			
				Range-Scale Media	4			
				genraved Scale	5			
				Special	6			
Certificat								
				2.1 certificate acc. EN 10204	1			
				3.1 certificate (DIN EN 10204:2004 for wetted st. st. Parts	2			
Calibration report								
				w/o	0			
				Standard 3-point confirmation of the accuracy class	1			
				5-point cal. Report	2			
				Special scaling accuracy class 1%	3			
				Special calibration acc. Customer request	9			
Cleaning acc. Company Norm (oxygen service)								
				w/o	0			
				cleaning class VA c/w marking oil and grease free	1			
Pressure and Leak Test reports								
				w/o	0			
				Pressure test acc. EN 10204 c/w APZ 3.1	1			
				leak testing acc. EN 10204 c/w APZ 3.2	2			
Approvals								
				w/o	0			
				ATEX IIG (Gas Zone 1) - in preparation only for mech. version	1			
				ATEX IIG (Gas Zone 2) - in preparation only for mech. version	2			
				ATEX IIG (Staub Zone 1) - in preparation only for mech. version	3			
				ATEX IIG (Staub Zone 2) - in preparation only for mech. version	4			
Signing								
				w/o	0			
				st. st. plate 40 x 20 mm	1			
Supplementary								
				w/o	0			
				c/w (separate specification required)	1			

## 12. Decontamination Certificate for Device Cleaning

Company name:.....

Address:.....

Department:.....

Name of contact person:.....

Phone: .....

Information pertaining to the enclosed V31

Model V31.....

Was operated using the following fluid:

.....

In as much as this fluid is \*:



toxic



health hazard-



corrosive



radioactive



safe



explosive



combustible



bio hazard

We have done the following:

- 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 come into contact with the fluid\*
- Cleaned the housings and all surfaces\*

\*cross all 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

### 13. Declaration of Conformity



**Konformitätserklärung**  
**Declaration of Conformity**



Nº. 20-4164-01

Hersteller:  
*Manufacturer:* Heinrichs Messtechnik GmbH  
Robert-Perthel-Strasse 9  
50739 Köln

Produktbeschreibung:  
*Product description:* **Schwebekörper-Durchflussmessgerät vom Typ V31**  
**Variable Area Flowmeter Model V31**

Hiermit erklären wir, in alleinige Verantwortung, dass das oben genannte Messsystem den Anforderungen der folgenden EU-Richtlinien, einschließlich allen bis heute veröffentlichten Änderungen bzw. Nachträgen entspricht:

*We declare herewith, in sole responsibility, that the product described above is conform with the provisions of the following EU-directives, including all published changes and amendments as of today:*

**2014/30/EU (EMC)**  
*(nur für Geräte mit Sensor)*

EU-Richtlinie über die Elektromagnetische Verträglichkeit  
*EU-Directive relating to electromagnetic compatibility*

**2014/34/EU (ATEX)**

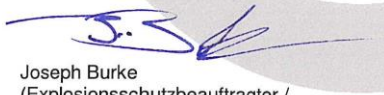
EU-Richtlinie über Geräte zur Bestimmungsgemäße Verwendung in explosionsgefährdeten Bereichen.  
*EU-Directive relating to electrical equipment intended for use in potentially explosive atmospheres*

**2014/68/EU (PED)**

EU-Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Druckgeräten auf dem Markt  
*EU-Directive on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment*

Anhang N und X sind ein integraler Bestandteil dieser Erklärung  
*Annex N and X are an integral part of this declaration*

Köln, den 01.04.2020



Joseph Burke  
(Explosionsschutzbeauftragter /  
Explosion Protection Representative)



Michael Manderfeld  
(Druckgerätebeauftragter /  
PED Representative)



Guido Thometzki  
(Geschäftsführung / Managing Director)

**Kontakt:**  
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**CE** Anhang N zur Konformitätserklärung  
**Annex N of the Declaration of Conformity**



Nº. 20-4164-01

Produktbeschreibung: **Schwabekörper-Durchflussmessgerät vom Typ V31**  
 Product description: **Variable Area Flowmeter Model V31**

Durch diese Erklärung wird die Konformität mit den auf Seite 1 genannten Richtlinien sowie die Einhaltung der folgenden Normen bestätigt (gegebenenfalls abhängig von Gerätevariante):  
 Conformity to the Directives referred to on Page 1 of this Declaration is assured through the application of the following standards (possibly dependent on version of device):

Richtlinie Directive	Norm –Ref. Nr. Standard / Ref. Nº.	Ausgabe Edition	Norm Beschreibung Standard Description	V31	Anbau elektrische Sensor
	<b>DIN EN -</b>				
2014/30/EU	61000-6-2	2011-06	Immunity Industrial environment		X
	61000-6-3	2012-11	Emission residential environment		X
	55011	2011-04	Radio frequency disturbance		X
	61326-1	2011-07	EMC requirements		X
2014/34/EU	60079-0	2012+A11	General requirements		X
	60079-11	2012	Intrinsic Safety „i“		X
	1127-1	2011	Grundlagen und Methodik	X	
	80079-36	2016	General requirements non electrical devices	X	
2014/68/EU	AD 2000-Merkblätter		Module H	X	

X: Zutreffende Norm / Applicable Standard

Name und Anschrift der Notifizierte Stelle / Name and Address of the Notified Body

TÜV-SÜD Industrie Service GmbH  
 TÜV SÜD Gruppe  
 Westendstraße 199  
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DEKRA Testing and Certification GmbH  
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**CE** Anhang X zur Konformitätserklärung  
**Annex X of the Declaration of Conformity**



N°. 20-4164-01

Produktbeschreibung: **Schwebekörper-Durchflussmessgerät vom Typ V31**  
Product description: **Variable Area Flowmeter Model V31**

Gerät Zulassungen / Device certification

EU-Baumusterprüfbescheinigung EU-type examination certificate	Nachtrag Supplement	Kennzeichnung Marking		
BVS 10 ATEX H/B 119	-	II 2G II 2D	X	V31
Tech. File Ref.	-	HM-V31-ATEX-10-02X	X	

X: Zutreffende Norm / Applicable Standard

Konformitätserklärungen für die als Option verwendeten Schalter werden vom Hersteller auf deren Homepage bereitgestellt.

*For proximity switches offered as an option in conjunction with the above-mentioned products, the Declarations of Conformity are provided by the switch manufacturer on their homepage.*

Die oben genannten Produkte entsprechen der Richtlinie 2014/34/EU. Neue Editionen können bereits eine oder mehrere der in den jeweiligen EU-Baumusterprüfbescheinigungen genannten Normen ersetzt haben. Der Hersteller erklärt, dass alle in dieser Konformitätserklärung erwähnt Produkte auch die Anforderungen der neuen Ausgaben einhalten, da die veränderten Anforderungen der neuen Ausgaben entweder keinen Einfluss auf das Produkt haben, oder das Produkt die Anforderungen erfüllt.

*The above-mentioned products comply with the Directive 2014/34/EU. New editions may have already replaced one or more of the Standards stated in the respective EU-Type-examination certificates. The manufacturer declares that all products mentioned in this Declaration of Conformity also comply with the requirements of the new editions since either the changed requirements of the new editions do not affect the product, or the product also fulfills the requirements.*

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Köln  
Amtsgericht Köln HRA 37040

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Dipl. Ing. (FH)  
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