



Kirchner und Tochter
Durchflussmesstechnik seit 1951



Assembly and operating Instructions

FLAP-type Flow Meter

KLA

KLA-GS

KLA-V4A

KLA-IK

KLA-IKS

KLA-EM



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1 Foreword

These Installation and Operating Instructions are applicable to devices of series KLA. Please follow all instructions and information given for installation, operation, inspection and maintenance. The Instructions form a component part of the device and should be kept in an appropriate place accessible to the personnel in the vicinity of the location. Where various plant components are operated together, the operating instructions pertaining to the other devices should also be observed.

2 Safety

2.1 Symbol and meaning



Safety notice

This symbol is placed against all directions/information relating to occupational health and safety in these Installation and Operating Instructions and draws attention to danger to life and limb. Such notices should be strictly observed.

2.2 General safety directions and exemption from liability

This document contains basic instructions for the installation, operation, inspection and maintenance of the variable area flow meter. Non-observance of these directions can lead to hazardous situations for man and beast and also to damage to property, for which Kirchner und Tochter disclaims all liability.

The operator is required to rule out potentially hazardous situations through voltage and released media energy.



2.3 Intended use

The KLA Series device is a flap-type VA flow meter for fluids. It is designed for installation in horizontal or vertical pipe runs. In vertical pipe runs, flow through the device must be from below. Installation in the pipeline may only be carried out in accordance with these Instructions. Select the version of the flap-type VA flow meter on the basis of the pipe diameter at the installation location of the device. The limit values for the device are specified in chapter 11 and must be complied with. Any modifications or other changes made to the measuring device may be carried out solely by Kirchner und Tochter. Details pertaining to the fluid product and operating conditions are noted on the scale.

2.4 Special safety instructions concerning glass devices



For safety reasons, we recommend that flowmeters with glass housings be put into operation with a protective shield. The devices must not be operated under pressure surges!

2.5 Information for Operator and operating personnel

Authorized installation, operating, inspection and maintenance personnel should be suitably qualified for the jobs assigned to them and should receive appropriate training and instruction. All persons charged with assembly, mounting, operation, inspection and maintenance duties must have read and understood the operating instructions. Gaskets in contact with the fluid product must be replaced after all maintenance and repair work.

2.6 Regulations and guidelines

In addition to the directions given in these Installation and Operating Instructions, observe the regulations, guidelines and standards, such as DIN EN and for specific applications, the codes of practice issued by DVGW (gas and water) and VdS (underwriters) or the equivalent national codes and applicable national accident prevention regulations.

**KLA**

Flap-type flow meters

2.7 Notice as required by the hazardous materials directive

In accordance with the law concerning handling of waste (critical waste) and the hazardous materials directive (general duty to protect), we would point out that all flow meters returned to Kirchner und Tochter for repair are required to be free from any and all hazardous substances (alkaline solutions, acids, solvents etc.).



Make sure that devices are thoroughly rinsed out to neutralize hazardous substances.

3 Transport and storage

Always use the original packing for transport, handling and storage. Protect the device against rough handling, coarse impact, jolts etc.



4 Installation

Flap-type flow meters are suitable for installation in either vertical or horizontal pipe runs. In vertical pipe runs, flow must be from bottom to top.

Make sure the pipes are correctly spaced and in true alignment at the installation location for the flow meter. For connection of the KLA device, fit the open ends of the pipeline at the installation point with flanges appropriate to the flow meter.

Straight unimpeded pipe runs upstream and downstream of the meter's installation location should have a length equal to a minimum of 2 x DN.

4.1 Mounting position KLA

When the KLA is mounted horizontally with left/right or right/left flow direction, make sure that the device is installed with the scale facing the front.

This position will ensure that the device functions properly (see Figure 1).

The device cannot function if it is installed with the scale facing upwards or downwards (see Figure 2).

CORRECT:
The scale faces in front.

Flow direction
dependent on order

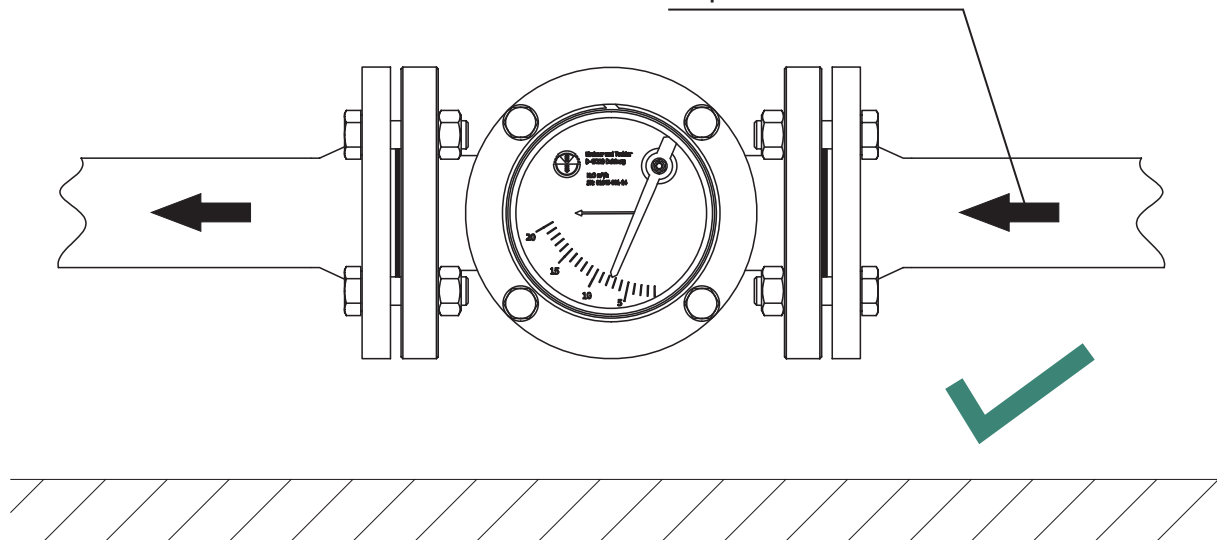


Figure 1



KLA

Flap-type flow meters

WRONG:
The scale faces upwards/downwards.

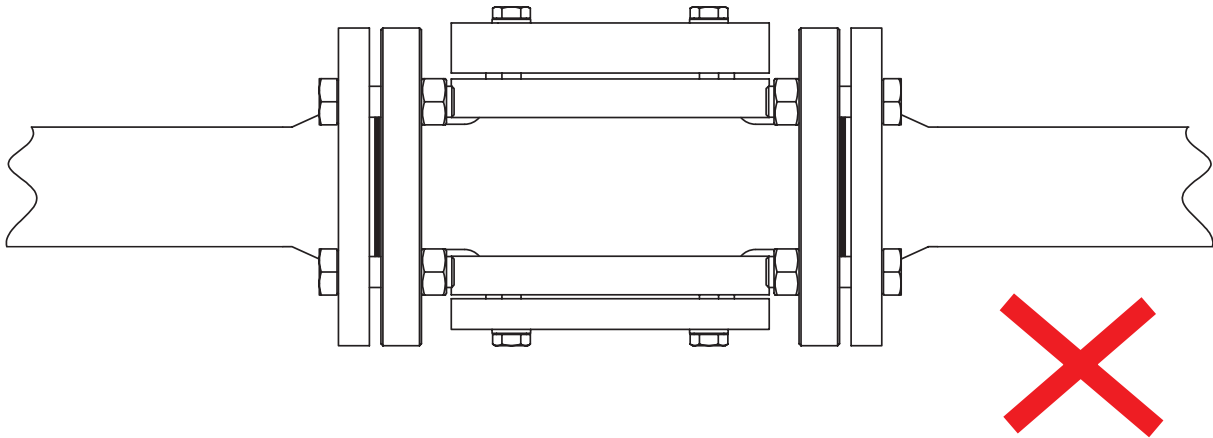


Figure 2

4.2 Installation KLA

For mounting, provide the connection flanges of the KLA with suitable flat gaskets. The gaskets are not included with the flow meter.

Before installing, remove the transport lock from inside the device and fit the open pipe ends with appropriate connecting flanges. Make sure the pipes are in true alignment and the sealing faces spaced correctly. Install the device in the direction of flow indicated by the arrow on the scale such that it is free from stresses. Use gaskets made of rubber, PVC or Teflon.



5 Start-up

The device must be properly installed before it is started up.

1. Check all device connections.
2. To set the flow: pressurize the pipelines by slowly opening the shut-off valves. On liquid service: carefully vent the pipeline.
3. Check the leak-tightness of all components and if necessary, tighten down threaded joints or screw connections.

6 Readings in operation

On the standard device, values are read off at the pointer on the aluminium scale. On the KLA GS version, the flow rate is indicated directly by the flap. At the front and rear, the flow meter features in each case a pane of hard glass. The flow rate is read off from a scale attached to the front hard glass pane on a level with the top edge of the KLA flap.

Measured values are correct only when the operating condition at the measuring point (flowing medium, operating pressure and temperature) corresponds to the operating state data marked on the scale



7 Limit switches

The flow meter can be equipped with limit switches with preset switching point to provide local indication with monitoring function. The switches have a bistable characteristic.

The following devices are equipped with limit switches:

KLA Standard-IK	with	BI1-HS540-Y1	- 2-Wire, NAMUR
KLA Standard-IKS	with	BI1-HS540-AP6X	- 3-Wire, PNP, NO
KLA V4A-IK	with	BI1-HS540-Y1	- 2-Wire, NAMUR
KLA V4A-IKS	with	BI1-HS540-AP6X	- 3-Wire, PNP, NO

Uncontrolled current and voltage peaks can occur in the case of inductive or capacitive loads, e.g. from contactors or solenoid valves. Such peaks will also occur, depending on cable geometry, when cables exceed a certain length. We therefore recommend using an MSR contact protection relay, which can be additionally supplied. This will increase the contact rating and prevent the occurrence of inductive and capacitive peaks, thus ensuring long service life of the contacts.

Electrical data and limit values are specified in chapter 11.

7.1 Connection of limit switches



Electrical connection of the device must be carried out in conformity with the relevant VDE regulations (or equivalent national standards) and in accordance with the regulations issued by the local power supply utility.

1. Disconnect the plant from supply before connecting the limit switch.
2. Provide a protective circuit for the switches in keeping with their capacity.
3. Connect line-side fuse elements matched to consumption.
4. The connection is established via the two or three cable ends of the limit switch.



7.2 Setting the limit switches

The KLA is adjusted during factory assembly to the customer-specific switching points.

If a new setting is required, the switching point can be changed by moving the pointer vane.

The switching function can be reversed by specifying whether the pointer vane first enters or first exits the slot sensor.

7.2.1 Preparation

In order to make the settings, the polycarbonate screen has to be removed.

1. First Remove the tensioning ring out of its groove, using a small screwdriver.
2. Take the polycarbonate screen from the ring.
3. Make sure that the O-ring located under the screen is not lost! It secures the scale space from dust and dirt ingress.

You have now access to the limit switches and the pointer vane.

7.2.2 Adjusting the limit switches

1. Manually move the pointer to the flow value at which the switching operation is to be performed. Fix the pointer and make sure that the pointer cannot move during the adjustment procedure.
2. Depending on the desired switching function of the limit switch and the flow direction, turn the pointer vane until one of its edges reaches the switching contact.
3. Check the switching point by moving the pointer through it manually.

7.2.3 Adjusting the switching function

The switching function of the contact can be set, depending on whether the pointer vane moves into the contact or moves out of him, when reaching the switching point.

2-wire BI1-HS540-Y1:

Pointer vane detected → Current consumption ≤ 1.2 mA

Pointer vane not detected → Current consumption ≥ 2.1 mA

3-wire BI1-HS540-AP6X:

Pointer vane detected → Signal output closed

Pointer vane not detected → Signal output open



7.2.4 Installation of the polycarbonate protective screen

After successful adjustment of the limit switches, you must install the polycarbonate screen again.

1. Insert the O-ring into the corresponding groove.
2. Put the polycarbonate screen back in. Make sure that the O-ring does not slip out of its groove.
3. Put the tensioning ring carefully into the corresponding groove.

7.3 Replacing the limit switch

If you need to replace the limit switch, please state the serial number of your device when ordering. If necessary, put your system or machine in a condition where the activation of the limit switch cannot cause any problems or damage.

1. If necessary, clean the device in the area of the cable outlet to prevent dirt from entering the scale chamber.
2. Loosen the M4 cylinder head screw with a size 2.5 Allen key.
3. Carefully pull the complete limit switch unit out of the flowmeter.
If necessary, use the M4 ejector thread.
4. Insert the new unit.
Take care not to knock against the pointer vane!
5. Insert the M4 cylinder head screw into the countersunk hole and tighten it.
6. Connect the connection cables to your control/evaluation system.



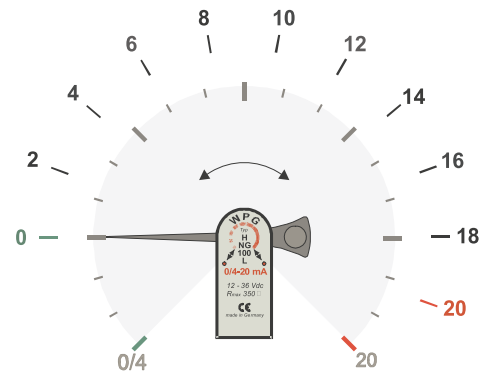
8 Analogue output EM

The angular position encoder EM is a 3-wire sensor, which delivers an output signal (4 ... 20 mA) proportional to the angular position of the pointer. This signal, for example, can be used to realize a remote display.

A linearization is possible at up to 14 points. Furthermore various input and output filters ensure operation in industrial environments.

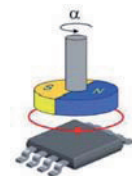
The following devices are equipped with limit an analogue output:

KLA Standard-EM with WPG NG100-L
KLA-V4A-EM with WPG NG100-L



8.1 Functional principle

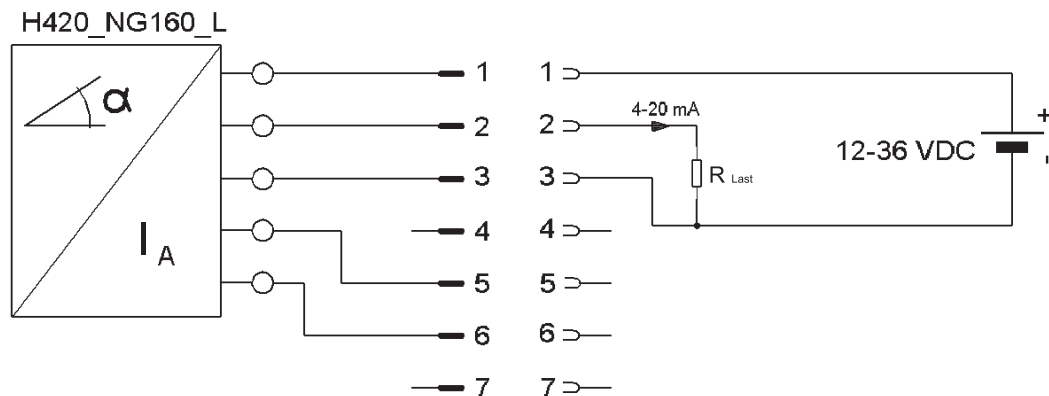
The direction of the magnetic field of a rotatable mounted magnet, which is moved by a fork, is detected by a Hall-sensor, processed by a digital processor and converted to an output signal of 4 ... 20 mA.



8.2 Connection

Pin 1 (+U_b) and 3 (-U_b) are connected to the power supply 12 ... 36 VDC (direct current). Pin 2 (I_{out}) is the analogue output.

The current is measured between pin 2 (I_{out}) and pin 3 (-U_b).



Further information can be found in Section 11.6.



9 Maintenance and cleaning of the low meter

CAUTION



Material damage or health hazards resulting may arise from fluid leakage. Kirchner und Tochter does not assume any liability for improper use. Before you start maintenance/cleaning, make sure that the medium line is shut off resp. emptied.

The KLA can be opened from the back. Undo the fastening screws on the rear cover and take the cover off. Remove any dirt and deposits that may have accumulated in the casing and on the flap. The shaft of the flap runs on pivot bearings. Should these have too much play, the device can also be opened from the front. Detach the lock nuts and retighten the bearing screws. Then retighten the lock nuts. The flap must be positioned so close to the front plate that, without the seal, it just slightly rubs against this plate. If the seal is then re-inserted before final assembly, the flap will move freely. The pointer must be able to move freely across the aluminium plate. Be sure to replace the cover to close the device tightly.

10 Service

All devices with defects or deficiencies should be sent directly to our repair department. In the service area of the Kirchner und Tochter homepage (www.kt-flow.de) you will find the declaration of decontamination as download and more information about returns.

To avoid risks to our employees and the environment, we can only process devices, for which we get a declaration of decontamination certifying that they are safe due to legal regulations. For questions, please contact our sales department, Tel. +49 2065-96090.

10.1 Disposal

Please help to protect our environment and dispose workpieces in conformity with current regulations resp. continue using them.



11 Technical data

Connection	Flange connection acc. EN 1092-1 PN10 optionally: ANSI B16.5 150 lbs
Pressure ranges	PN 10 (standard) in special design PN 6
Connection sizes	DN 15 – 200 / ½" – 8"
Installation length	see table section 11.3
Corrosion protection	powder coating, kiln-dried, traffic blue (RAL 5017)
Corrosion class	C3
Rubber lining	NR-isoprene quality
Temperature resistance ^{1) 2)}	standard max. 100 °C with rubber lining max. 90 °C special design up to 150 °C
Ambient temperature ²⁾	max. 90 °C
Measuring range	usu. 1:10
Uncertainty of measurement	5 % FS
Viewing window	Soda lime glass, optionally Borosilicate glass
Degree of protection	in conformity with IP 54, switches: IP 53

¹⁾ The medium to be measured must not freeze.

²⁾ KLA-IK resp. KLA-IKS max. 70°C

other connection geometries on request



11.1 Materials

Type/Fitting	flap	bearing	disc	blind flange/ring	seal	DN
KLA						
Gray cast iron EN-GJL-200	1.4571	1.4571	1.4571	EN-GJL-200/S355	NBR	15 – 150
Steel S355, welded	1.4571	1.4571	1.4571	S355	NBR	200
KLA-V4A						
Stainless steel 1.4571, welded	1.4571	1.4571	1.4571	1.4571	FKM	25 – 100
KLA-GS						
Gray cast iron EN-GJL-200	1.4571	1.4571	Soda lime glass ¹⁾	S355	NBR	15 – 25
KLA-GS-V4A						
Stainless steel 1.4571, welded	1.4571	1.4571	Borosilicate glass	1.4571	FKM	25 – 100
KLA rubber lined design						
Gray cast iron EN-GJL-200 rubber lined	1.4571	1.4571	1.4571	EN-GJL-200/S355 rubber lined	Sil-C8200	32 – 150
Gray cast iron EN-GJL-200 rubber lined	Hastelloy C4	Hastelloy C4	1.4571 – PTFE	EN-GJL-200/S355 rubber lined	Sil-C8200	32 – 150
Gray cast iron EN-GJL-200 rubber lined	PTFE	Hastelloy C4	1.4571 – PTFE	EN-GJL-200/S355 rubber lined	Sil-C8200	80 – 150
Gray cast iron EN-GJL-200 rubber lined	PTFE	PTFE	1.4571 – PTFE	EN-GJL-200 / S355 rubber lined	Sil-C8200	80 – 150

We quote other designs on request:

- gaskets, rubber lining (also with the approval for drinking water)
- cast bronze (CuSn)

³⁾ optionally: borosilicate glass



11.2 Measuring ranges

DN	measuring range H ₂ O horizontal flow				measuring range H ₂ O vertical flow				max. operating pressure [bar]	
									standard version	KLA-GS
15	0,2	–	1	m ³ /h	0,2	–	1,5	m ³ /h	10	10
	0,3	–	6	m ³ /h	1	–	6,5	m ³ /h		
20	0,2	–	1	m ³ /h	0,2	–	1,5	m ³ /h	10	10
	0,3	–	6	m ³ /h	1	–	6,5	m ³ /h		
25	0,2	–	1	m ³ /h	0,2	–	1,5	m ³ /h	10	10
	0,3	–	6	m ³ /h	1	–	6,5	m ³ /h		
32	0,5	–	4	m ³ /h	0,5	–	4	m ³ /h	10	9
	0,7	–	7	m ³ /h	0,6	–	6	m ³ /h		
	3	–	30	m ³ /h	2,5	–	25	m ³ /h		
40	0,5	–	4	m ³ /h	0,5	–	4	m ³ /h	10	9
	0,7	–	7	m ³ /h	0,6	–	6	m ³ /h		
	3	–	30	m ³ /h	2,5	–	25	m ³ /h		
50	0,5	–	4	m ³ /h	0,5	–	4	m ³ /h	10	9
	0,7	–	7	m ³ /h	0,6	–	6	m ³ /h		
	3	–	30	m ³ /h	2,5	–	25	m ³ /h		
65	1	–	8	m ³ /h	2	–	15	m ³ /h	10	10
	2	–	15	m ³ /h	4	–	15	m ³ /h		
	4	–	50	m ³ /h	5	–	40	m ³ /h		
80	1	–	10	m ³ /h	2	–	10	m ³ /h	10	10
	2	–	20	m ³ /h	3	–	20	m ³ /h		
	7	–	70	m ³ /h	5	–	50	m ³ /h		
100	1,5	–	15	m ³ /h	1,5	–	15	m ³ /h	10	10
	12	–	120	m ³ /h	10	–	100	m ³ /h		
125	2	–	20	m ³ /h	2	–	20	m ³ /h	10	7
	14	–	140	m ³ /h	12	–	120	m ³ /h		
150	2	–	25	m ³ /h	4	–	25	m ³ /h	10	6,5
	5	–	50	m ³ /h	10	–	80	m ³ /h		
	16	–	160	m ³ /h	15	–	140	m ³ /h		
	15	–	200	m ³ /h*	15	–	140	m ³ /h		
200	8	–	80	m ³ /h	15	–	150	m ³ /h	10	---
	25	–	300	m ³ /h	20	–	300	m ³ /h		

The table shows the minimum and maximum measuring range, all intermediate measuring ranges available on request.

Pressure loss 20 – 30 mbar depending on the flow-rate.

* only with glass screen

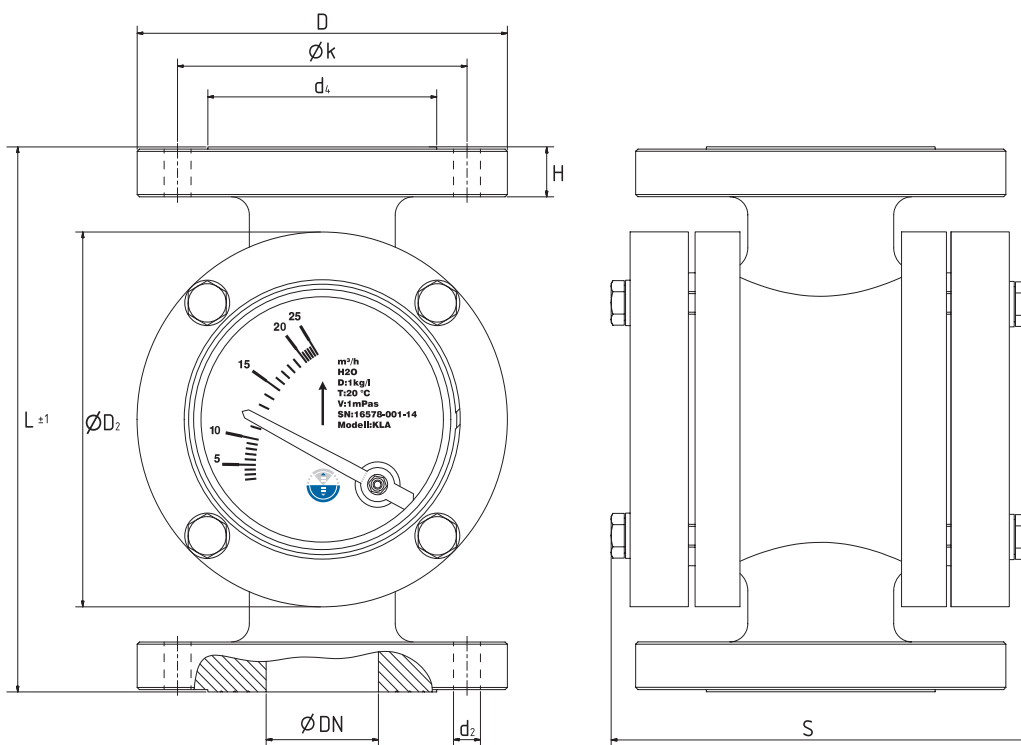


KLA

Flap-type flow meters

11.3 Dimensions and weights

11.3.1 Flange connection acc. EN 1092-1 PN10

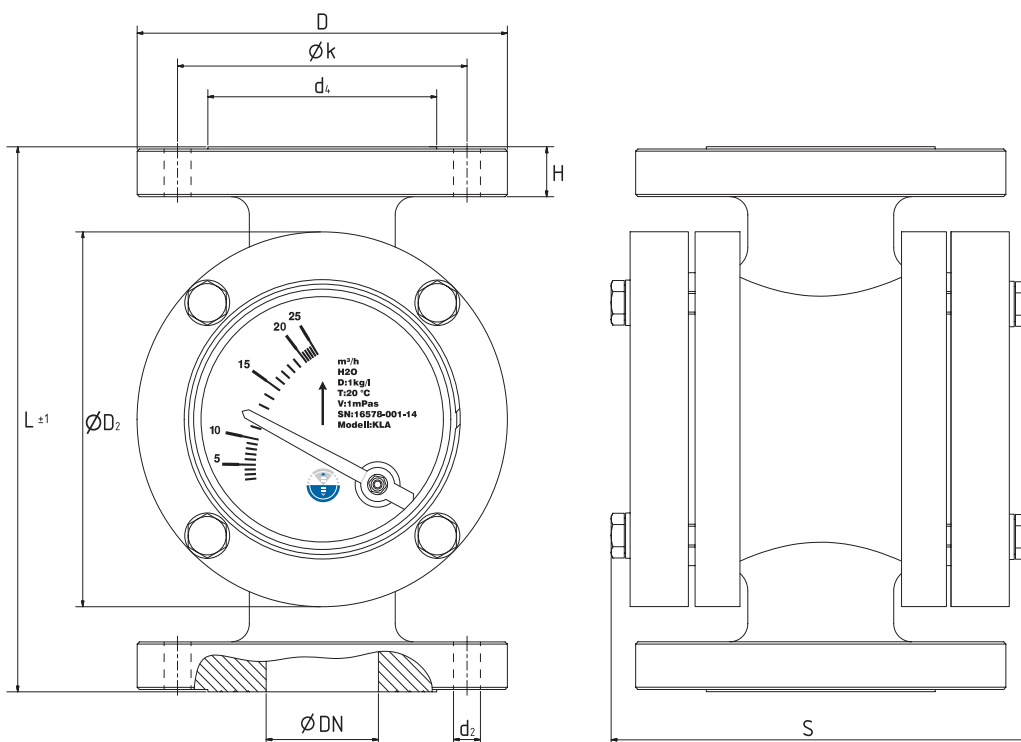


DN	Dimensions							number of screws	S			weight [kg]
	Ø D	Ø k	Ø d ₄	Ø H	L	Ø D ₂	d ₂		standard / IK	GS	EM	
15	95	65	45	18	170	119	M12	4	145	132	164	8
20	105	75	58	18	170	119	M12	4	145	132	164	8,5
25	115	85	68	18	170	119	Ø 14	4	145	132	164	9
32	140	100	78	21	240	165	Ø 18	4	176	186	195	16
40	150	110	88	21	240	165	Ø 18	4	176	186	195	16
50	165	125	102	21	240	165	Ø 18	4	176	186	195	17
65	185	145	122	21	280	185	Ø 18	4	201	217	220	22
80	200	160	138	22	320	225	Ø 18	8	214	227	233	34
100	220	180	158	24	350	245	Ø 18	8	267	278	286	43
125	250	210	188	25	380	285	Ø 18	8	299	310	318	58
150	285	240	212	25	380	295	Ø 22	8	299	310	318	64
200	340	295	268	27	550	370	Ø 22	8	386	-	405	104

all dimensions in mm



11.3.2 Flange connection acc. ASME B16.5 class 150lbs



NPS	Dimensions								number of screws	S			weight [kg]
	Ø DN	Ø D	Ø k	Ø dk	Ø H	L	Ø D ₂	d ₂		standard/IK	GS	EM	
1/2"	15	90	60,3	34,9	18	170	119	1/2" *	4	145	132	166	8
3/4"	20	100	69,9	42,9	18	170	119	Ø 15,9	4	145	132	166	8,5
1"	25	110	79,4	50,8	18	170	119	Ø 15,9	4	145	132	166	9
1 1/4"	32	115	88,9	63,5	21	240	165	Ø 15,9	4	176	186	197	16
1 1/2"	40	125	98,4	73,0	21	240	165	Ø 15,9	4	176	186	197	16
2"	50	150	120,7	92,1	21	240	165	Ø 19,1	4	176	186	197	17
2 1/2"	65	180	139,7	104,8	21	280	185	Ø 19,1	4	201	217	222	22
3"	80	190	152,4	127,0	22	320	225	Ø 19,1	4	214	227	235	34
4"	100	230	190,5	157,2	24	350	245	Ø 19,1	8	267	278	288	43
5"	125	255	215,9	185,7	25	380	285	Ø 22,2	8	299	310	320	58
6"	150	280	241,3	215,9	25	380	295	Ø 22,2	8	299	310	320	64
8"	200	345	298,5	269,9	27	550	370	Ø 22,2	8	386	-	407	104

alle Maße in mm

* Thread according to customer specification (UNC, UNF, G etc.)



KLA

Flap-type flow meters

11.4 Type series

KLA	with magnetically coupled pointer dial
KLA-GS	with glass screen
KLA-IK	with one inductive switch
KLA-IKS	with one electronic switch
KLA-EM	angular position encoder with 4 ... 20 mA analogue output
KLA-V4A	↳ made of stainless steel (1.4571)
KLA Ex	explosion proof design
KLA-IK Ex	↳ with one inductive switch

11.5 Technical data of limit switches

The following devices are equipped with limit switches:

KLA Standard-IK	with	BI1-HS540-Y1	- 2-Wire, NAMUR
KLA Standard-IKS	with	BI1-HS540-AP6X	- 3-Wire, PNP, NO
KLA V4A-IK	with	BI1-HS540-Y1	- 2-Wire, NAMUR
KLA V4A-IKS	with	BI1-HS540-AP6X	- 3-Wire, PNP, NO

IK 2-wire (BI1-HS540-Y1)	
Features	adjustable, bistable
Switching function	Normally closed, normally open
Output function	Two-wire, NAMUR
Voltage:	
NAMUR / other applications	max. 8.2 V DC / 8 ... 20 V DC
Power consumption: Pointer flag	
not captured / captured	$\geq 2,1 \text{ mA} / \leq 1,2 \text{ mA}$
Repeatability	$\leq 2 \% \text{ f.s.}$
Temperature drift	$\leq \pm 10 \%$
Hysteresis	1 ... 10 %
Temperature stability	-25 ... +70 °C
Approval according to	KEMA 02 ATEX 1090X
Identification of the sensor	Ex II 2 G Ex ia IIC T6 Gb / II 1 D Ex ia IIIC T95 °C Da
Sil according to IEC 61508	SIL 3 and PL
Degree of protection	IP 67
MTTF	6198 years according to SN 29500 (Ed. 99) 40 °C
Electrical connection	cord
Cable quality	Ø 3 mm, blue, Lif9YYW, PVC, 2 m
Cable cross-section	2 x 0.14 mm ²
Circuit diagram	BN= brown= + BU= blue= -



IKS 3-wire (BI1-HS540-AP6X)	
Features	adjustable, bistable
Switching function	Normally closed, normally open
Output function	Three-wire, PNP
Operating voltage	10 ... 30 V DC
Repeatability	$\leq 2 \% \text{ f.s.}$
Temperature drift	$\leq \pm 10 \%$
Hysteresis	3 ... 15 %
DC Rated operational current	$\leq 100 \text{ mA}$
No-load current	$\leq 15 \text{ mA}$
Residual current	$\leq 0.1 \text{ mA}$
Temperature stability	-25 ... +70 °C
Degree of protection	IP 67
MTTF	2283 years according to SN 29500 (Ed. 99) 40 °C
Electrical connection	cord
Cable quality	Ø 3 mm, grey, Lif9Y-11Y, PUR, 2 m
Cable cross-section	3 x 0,14 mm ²
Circuit diagram	BN= brown= + BU= blue= - BK= black= signal



11.6 Analogue output EM

4 ... 20 mA EM	
Operating voltage (U _b)	12 ... 36 V DC
Accuracy	± 1 %
Temperature drift	± 0,005 % /K
Temperature resistance	-20 ... +70 °C
Load impedance	300 Ω at U _b = 24 V 50 Ω at U _b = 12 V
Power consumption	< 0,2 W, load-free output
Output function	Three-wire, analogue output
Current output	4 ... 20 mA
Measuring cycle	250 ms
Lifetime	> 10 ⁶ cycles
Circuit diagram	

[illegible]

[illegible]



Kirchner und Tochter

Durchflussmesstechnik seit 1951



The devices from **Kirchner und Tochter** have been tested in compliance with applicable EC/EU CE-regulations of the European Community.

The respective declaration of conformity is available on request. Subject to change without notice. The current valid version of our documents can be found at www.kt-flow.de.

The **Kirchner und Tochter** QM-System is certified in accordance with DIN EN ISO 9001:2015. The quality is systematically adapted to the continuously increasing demands.