SMK

Installation and Operating Instructions

variable-area flowmeters
SMK

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Inhaltsverzeichnis

1. Foreword

These Installation and Operating Instructions are applicable to devices of Series SMK. 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.

Kirchner und Tochter accepts no liability for any damage or interruptions of operation resulting from human error, failure to comply with these Installation and Operating instructions, improper performance of installation and repair work, use of spare parts other than those from the original manufacturers or use of the SMK devices other than for the intended purpose

2. Safety

2.1 Symbol and meaning

Safety notice

This safety notice can be found at all hints on work safety in these assembly and operating instructions pointing out hazards for life and limb of persons. Further, this safety notice highlights safety hints in these operating instructions that point to regulations, guidelines or operating sequences that must be observed without fail. Non-observance may result in damages to or a destruction of the variable area flow meters and / or other parts of the installation.

2.2 General safty directions

These Installation and Operating Instructions contain basic instructions for the installation, operation, inspection and maintenance of the flow meter. Failure to comply with these Instructions or improperly executed installation, wiring and repair work can lead to serious faults in the plant, giving rise to hazardous situations for "man and beast“ as well as damage to property.
The operator is required to rule out potentially hazardous situations through voltage and released media energy.

2.3 Intended use

The SMK devices are designed and intended for measuring the flow of compressible and incompressible fluids. They may only be installed between flanges in the pipeline. Select the SMK device model on the basis of the nominal diameter and nominal pressure at the site and also the kind of fluid product concerned; limit values are specified in the Section "Technical data" and should not be exceeded. Only devices that bear the "EEx" marking may be operated in hazardous areas.

2.4 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.

2.5 Regulations and directives

In addition to the regulations mentioned below, pay attention without fail to the notices given in Section or operation in hazardous areas!

All relevant regulations should be observed in respect of flow meter operation. These include in particular:

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.

2.6 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

The SMK device is packed by the factory in packaging appropriate for transportation and storage. Transport and storage should be carried out solely in the original packaging. Protect the device against rough handling, impact, jolts, etc.

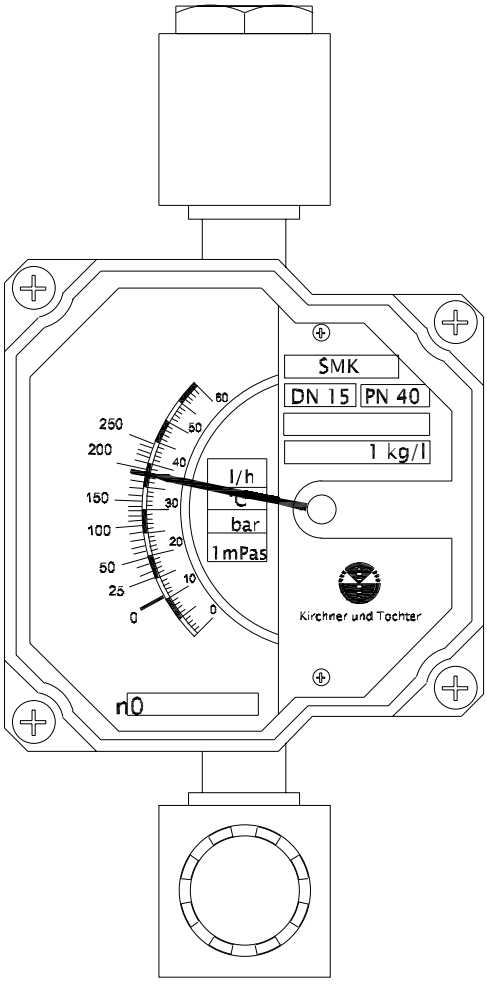
4. General

4.1 Type series

SMK	All-metal device
SMK-EM	with electrical signal output
SMK-IK1	with one inductive contact
SMK-IK2	with two inductive contacts

4.2 Application

In all cases where a rugged and dependable device is required for indicating instantaneous values and monitoring the flow in pipes, the SMK is the obvious choice as a reliable device for flow measurement of liquids and gases. Since the vertical position of the float is transmitted magnetically to a dial gauge, the SMK, as opposed to standard type variable-area flow meters with a glass tube, is also suitable for measuring the flow of opaque products. All devices are individually calibrated to meet customer specifics and fitted with a product-specific scale.
For process control, the flow meter can be equipped with limit contacts, analog output and a needle valve.
A precise description of the mode of operation and measurement principle of variable-area flow meters is given in our general technical documents or kt-web.de. ➔ technical bases.



5. Start-up

Be absolutely sure that the device has been properly installed before attempting start-up.

1. Check device connections
2. Pressurize the pipeline
3. Check that all components of the SMK are leak-tight; if necessary, retighten fastenings

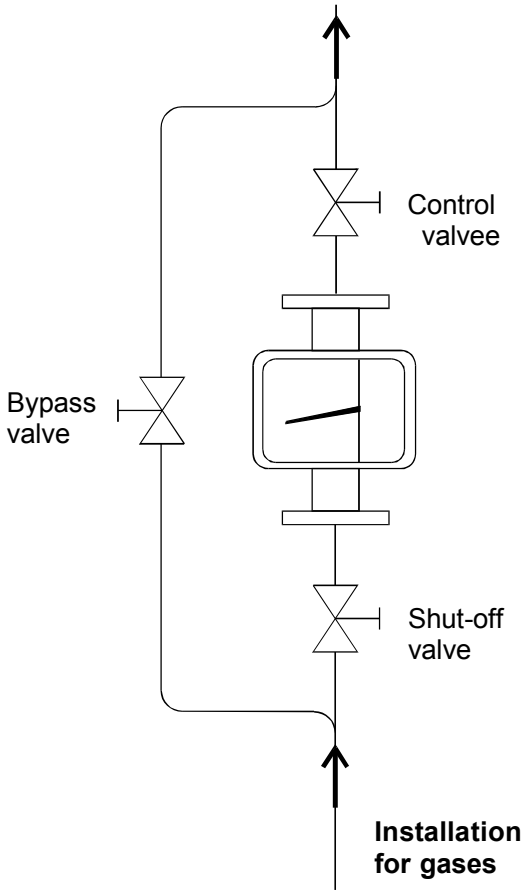
6. Product and functional description

6.1 Construction and mode of operation

SMK flow meters operate on the float measuring principle. The flow meter is installed in pipelines using screwed pipe connections or adapters with taper bush type pipe unions or similar. The measuring system has a magnetic coupling with the indicator. Only the stainless steel measuring system is in contact with the process fluid.

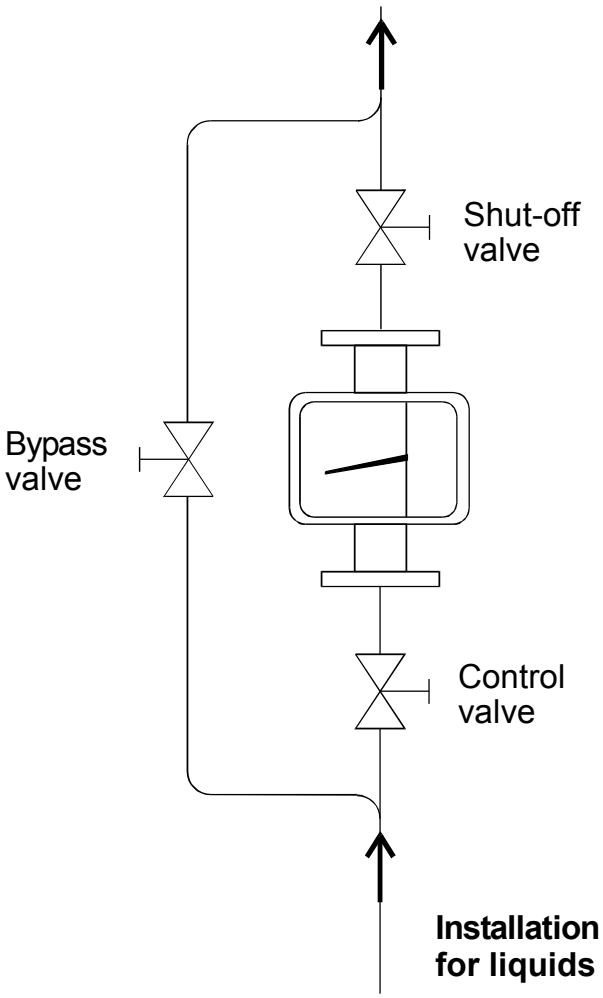
6.2 Recommended installation for gas measurement

On gas service, the correct working pressure is of decisive importance. For example, if the device is designed for a pressure of 2 bar, and measurements are taken at a pressure of 1 bar, this will result in an error of 22% in the indication of the flow rate. The flow is controlled by way of the control valve located downstream of the flow meter. For measurement, the shutoff valve is fully open, the bypass valve fully closed.



6.3 Recommended installation for liquid measurement

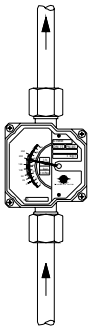
For flow measurement of liquids, select the configuration shown in the diagram.
The flow is controlled by way of the control valve located upstream of the flow meter.
The bypass valve is fully closed and, initially, the shutoff valve is also closed. After the pipe system has been filled, it needs to be opened slowly so as to remove any airlocks.
A magnetic filter is recommended upstream of the flow meter if the liquid product contains magnetic particles.



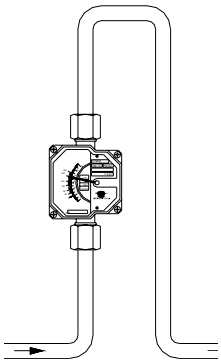
7. Installation / Assembly

7.1 Before installing

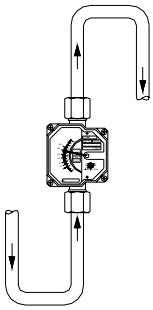
Check the pipeline´s position in space and also the direction of flow.
SMK flow meters are designed to be installed in vertical pipe runs. The direction of flow should be upwards, from bottom to top.
For downward flow, from top to bottom, and also for installation in horizontal pipe runs, appropriate pipe bends are needed to allow upward flow through the flow meter.



Direction of flow: upwards



Direction of flow: horizontal



Direction of flow:downwards

7.2 Installation

1. Remove the SMK from its transport packing
2. Remove upper and lower stoppers (used for protection in transit)
3. Remove the float transport lock from the device

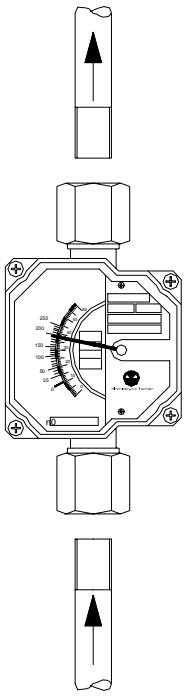
Check that the float moves freely in the device and that the indicator follows the float movement.

7.3 Installation in the process

1. To be carried out only by authorized and qualified personnel
2. Drain pipelines before installing the device
3. Only for operation with suitable media
4. Be aware of maximum pressure and maximum temperature levels
5. Only for mechanical installation in the process (for model, see device nameplate)
6. Direction of flow must be from bottom to top

7.4 Installation of the SMK

1. Pipelines must be in alignment
2. Fit the SMK between the pipelines
3. Align the device
4. Tighten down fastening elements so that the device is bolted free of stresses in the pipeline



8. Maintenance and cleaning

The device does not normally require any maintenance. However, should the device become soiled it can be removed from the pipeline for cleaning. Dismantle the device in the reverse order as described under Installation.

1. Depressurize the pipeline
2. Drain/vent pipelines
3. Dismantle the device
4. Carefully clean the device, do not use metal objects to clean the float
5. Check gaskets, replace those damaged
6. Assemble device and install in the pipeline

To ensure reliable operation and a long service life, we recommend that the device be inspected as regular intervals.
Exact inspection cycles will depend on the operating and environmental conditions.
Where various system components interact, the operating instructions for all other devices should also be consulted.

9. Handling

Protect the flow meter against rough handling, impact and jolts, etc.
Be sure to transport the flow meter solely in the packing provided for such purpose.

10. Service

All devices with defects or deficiencies should be sent direct to our repair department.
To enable our customer service facility to deal with complaints and repairs as quickly as possible, we would kindly request you to coordinate the return of devices with our sales department (0049+) 2065-96 09 0.

11. Waste disposal

For the sake of the environment.
Please help to protect our environment and dispose of workpieces in conformity with current regulations or use them for some other purpose.

12. Models

SMK variable-area flow meters are available in a choice of sizes. The models have different measuring ranges and dimensions. The standard range is 1:10.

Materials

Measuring tube	1.4404 (stainless steel)
Float	1.4404 (stainless steel)
Float guide	1.4404 (stainless steel)
Sealing face	1.4404 (stainless steel)
Indicator unit:	
Scale casing	aluminium / plastics
Pointer	aluminium / plastics
Scale	aluminium
Spindle / bearing	stainless steel 1.4401
Pane / seal	methacrylate / acrylonitrile

Models and connections

SMK-Rp-H	Rp, horizontal
SMK-NPT-H	NPT, horizontal
SMK-Rp-H-V	Rp, horizontal with valve
SMK-NPT-H-V	NPT, horizontal with valve
SMK-Rp	Rp, vertical
SMK-NPT	NPT, vertical
SMK-S	Sanitary connection, vertical
SMK-TC	Tri-Clamp, vertical

Measuring ranges

Meter size / Connection					
Rp/NP	Tri-Clamp DN	Sanitary DN	Water l/h	Pressure drop, water mbar	Air l/h at n.t.p.
¼	6	6	0.1-1	28	4-30
¼	6	6	0.2-2.5	28	8-80
¼	6	6	0.4-4	28	12-120
¼	8	8	1-10	30	30-300
¼	8	8	1.6-16	30	50-500
¼	8	8	2.5-25	30	80-800
¼	10	10	4-40	32	120-1200
¼	10	10	6-60	32	160-1800
¼	10	10	10-100	32	300-3000
½	15	15	16-160	34	500-5000
½	15	15	25-250	34	750-7500
½	20	20	40-400	40	1200-12000
½	20	20	60-630	40	1800-18000
¾	20	20	100-1000	40	3000-30000

Measuring ranges for other process products aund operating conditions on request.

13. Technical data

Accuracy class	4, in conformity with VDE/VDI 3513
Repeatability	< 2%
Scale	in physical units, e.g.: l/h, m³/h
Scale length	60 mm
Standard range SMK	1 : 10
Cable entry	plug connector with solder springs
Type of protection, casing	IP 65
Process temperature	
Model without contact	- 80 .. + 150°C
Model with contact	- 20 .. + 60°C
Allowable working pressure	
without valve	PN 100
with valve	PN 40
on request	PN 400
Overall length	132 .. 170 mm, depending on connection
Connections	Rp, NPT, Tri-Clamp, sanitary screw connection, etc.

14. Options

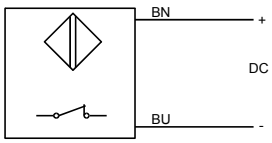
14.1 IK Limit contact with inductive slot type initiator

The flowmeter can be equipped with one or two inductive contacts to Namur DIN 19234. The contacts are set as follows:

1. Detach the screws from the plexiglass cover and remove cover.
2. Slacken the two Phillips screws on the red setpoint pointer and move the pointer to the operating point.
3. Check the operating point by approaching it by way of the volumetric flow in your system.

IK 1	Model with one contact
IK 2	Model with two contacts
Contact	Inductive slot-type initiator to NAMUR DIN 19234
Switching function	NC / NO contact, according to relay connection
Switching performance	bistable
Voltage supply	8 V DC via isolation switching amplifier KFA 6 Ex (optional)
Current consumption/output	
active area clear	3 mA
active area obscured	1 mA
Ambient temperature	-25°C ... +70°C
Explosion protection	Intrinsic Safety in conjunction with isolation switching amplifie KFA 6 Ex (optional)
Only for connection to intrinsical safe circuits	
with the following maximum valu	15.5 V
No-load voltage U_0	52 mA
Short-circuit current I_K	169 mW
Output P	150 µH
Self-inductance (Li)	150 nF
Self-capacitance (Ci)	PTB No. Ex-95.D.2195 X
Individual approval	
Terminal assignment on plug connector	
Soldering tag 1	- (BU)
Soldering tag 2	+ (BN)

Connections:

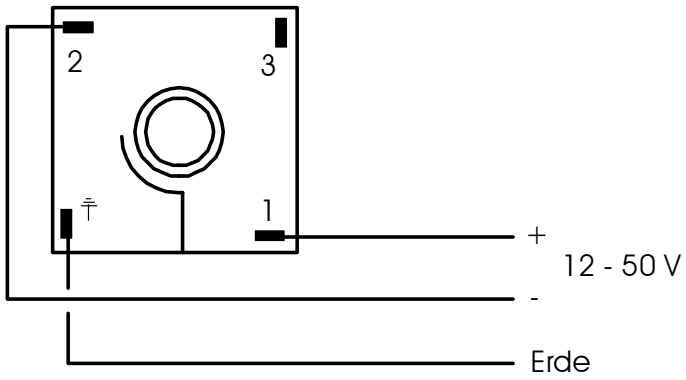


14.2 EM Electrical measuring transducer

The transducer is designed for non-contact measurement of the pointer position by means of the Hall effect. The transducer generates a linear output signal of 4-20 mA that is proportional to the measured flow rate.

Supply voltage	12..50 V DC
Output signal	4-20 mA DC
Maximum load	700 Ω at 24 V DC
Ambient temperature	-5°C ... +70°C
Accuracy	< 0.6% of indicated value
Connection	2-wire technology, loop powered
Terminal assignment plug connector	
Soldering tag 1	+
Soldering tag 2	-
Soldering tag earth	earth

Connections:

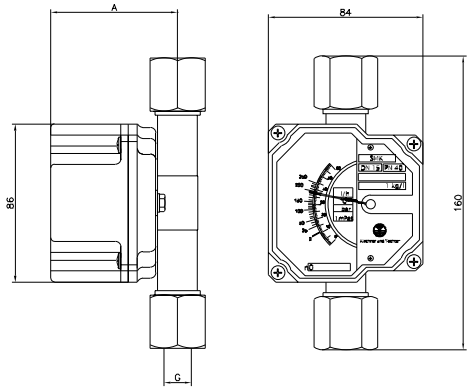


Accessory units
electrical devices for remote indication and control:

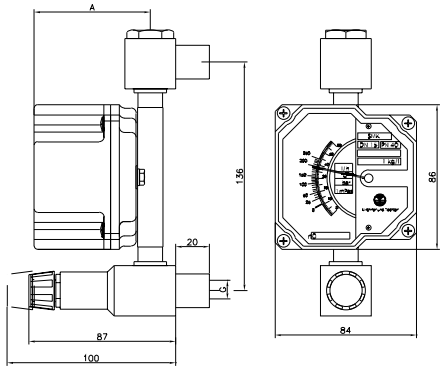
analog displays,
digital displays,
recorders,
PID controllers,
limit-value monitors and
contact protection relays.

see separate price list.

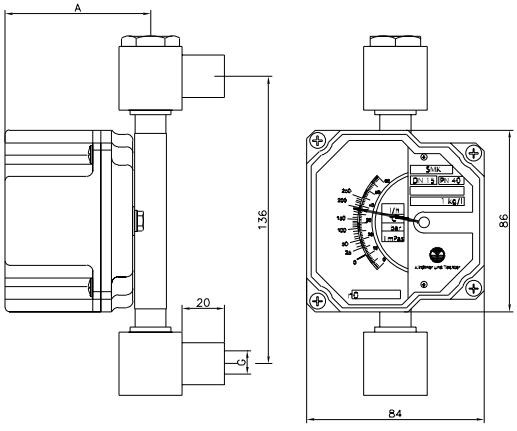
15. Dimensions



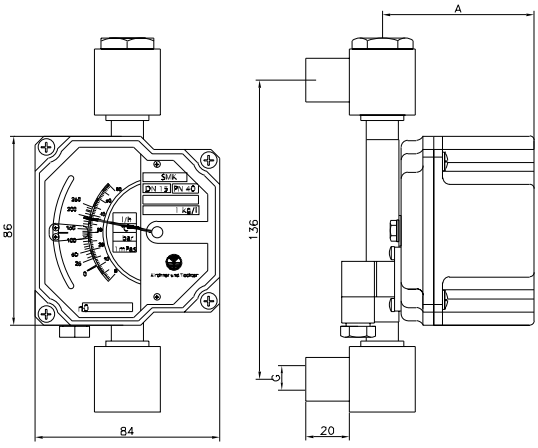
Model SMK-Rp



Model SMK-Rp-H-V



Model SMK-Rp-H



Model SMK-Rp-H-IK/EM

The Kirchner equipment has been tested in compliance with the applicable CE-regulations of the European Community.
The respective declaration of conformity is available on request.
The KIRCHNER QM-System will be certified in accordance with DIN-EN-ISO 9001:2000.
The quality is systematically adapted to the continuously increasing demands. An appropriate declaration of conformity will be provided on request.