Kirchner und Tochter
Durchflussmesstechnik seit 1951

Installation and Operating Instructions

Sprinkler measuring orifice
SMB/SMB-OE

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Version 2.9

Contents

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1 General

These assembly and operating instructions apply to sprinkler measuring orifices, type SMB with a display of m³/min and to the SMB-OE with percentage display.

All information contained in these operating instructions on assembly, operation, repairs and maintenance have to be observed and adhered to.

The operating instructions form an integral part of the sprinkler measuring orifice; they have to be kept at a suitable location in the vicinity of the place of application and must be accessible for the operators.

In case of interaction of different plant components, the operating instructions of those also have to be observed.

1.1 Exclusion of liability

Kirchner und Tochter will not accept any liability for damage or disruptions caused by operating errors, non-observance of these assembly and operating instructions, inexpert execution of assembly and repair work or by the improper use of the sprinkler measuring orifice.

2 Safety

2.1 General safety information

These assembly and operating instructions contain important information to be observed on the assembly, the operation, on repairs and maintenance of the sprinkler measuring orifice. Each person charged with the assembly, the operation, repairs and maintenance must have read and understood these operation instructions.

Non-observance of these assembly and operating instructions, or inexpertly conducted assembly and repair work may result in disruptions of the sprinkler system. As a consequence, man or animal may be at risk or material assets may be damaged.

Hazards by electric energy or released media energy must be prevented.

2.2 Proper use

The VdS approval of the sprinkler measuring orifice is valid for the flow measurement of water. Installation in pipework may be effected only between two flanges (intermediate flange assembly).

Select the sprinkler measuring orifice model in accordance with the pipe cross-section at the location of application for the sprinkler measuring orifice.

The limit values of the sprinkler measuring orifice are to be observed as prescribed in section „Technical data“. Rebuilding or other modifications of the measuring device may be effected by Kirchner und Tochter only.

2.3 Explanation of pictographs and signs

Pictograph on work safety

This pictograph 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 pictograph 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 measuring orifice and/or other parts of the installation

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2.4 Safety information for the owner and the operators

The personnel charged with the assembly, the operation, repairs and maintenance must be qualified to fulfill the respective tasks and must have been trained and instructed with regards to the task in question.

2.5 Regulations and guidelines

Apart from the information contained in these assembly and operating instructions, the regulations, guidelines and standards such as DIN EN, as well as the DVGW and VdS guidelines in case of branch-oriented applications must be observed; the same is true for the regulations on the prevention of accidents valid in the destination country.

2.6 VdS approval

The sprinkler measuring orifice has been approved by the VdS. During the installation, operation, repairs and maintenance, the VdS guidelines have to be adhered to.

3 Transport and storage

At the factory, the sprinkler measuring orifice was suitably packed for transport and storage. Transport and storage should be effected while in the original packing only.

The measuring device is to be protected against shocks and blows!

4 Description

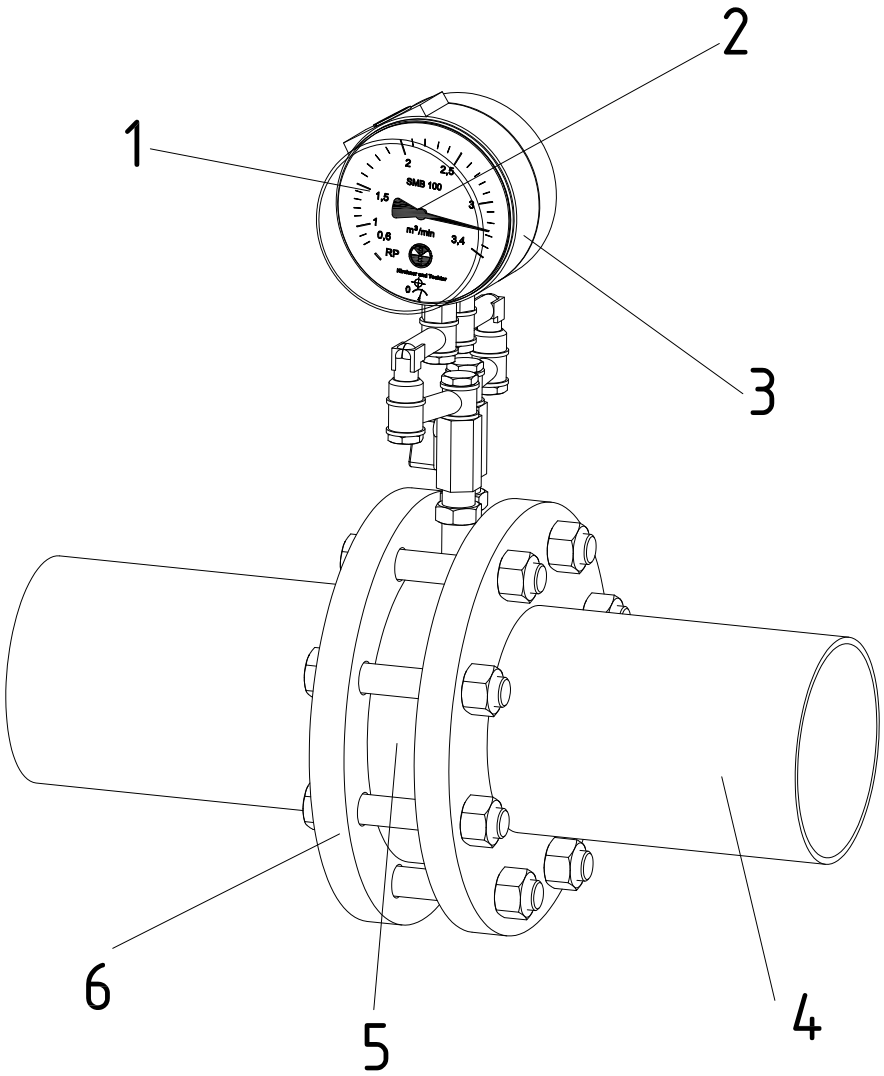

Fig. 1

① scaling
② hand
③ dial gauge
④ pipe work
⑤ orifice
⑥ flange

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4.1 Field of application

The sprinkler measuring orifice SMB is a measuring device employed to measure the flow rate in pipework of stationary sprinkler systems.

4.2 Design and function

Due to physical reasons, different pressure potentials are found on both sides of the orifice ⑤. This differential pressure acts quadratic proportional to the volume flow inside the pipework ④.

The scaling ① of the dial gauge ③ is realized in volume flow units [m³/min]. The dial gauge displays the present volume flow inside the pipe via the position of the hand ②.

4.3 Peculiarity SMB-OE

All information contained in these assembly and operating instructions are also valid for the measuring device SMB-OE.

A peculiarity of the sprinkler measuring orifice SMB-OE is the fact that the scaling of the scale reading plate has been subdivided in percent.

A label on the dial gauge serves to read the effective flow values in m³/min for the individual nominal cross-section of the pipe. (refer to section 10.3)

This permits the combination of the dial gauge with all nominal cross-sections of the SMB-OE.

4.4 Scope of supply

- SMB Sprinkler measuring orifice (for details, see section 11)
- Installation and operating instructions
- Flange seals SIL 4400 (see section 10.7)

4.5 Installation variants

Installation direction of flow

from left to right	from right to left
from bottom to top	from top to bottom

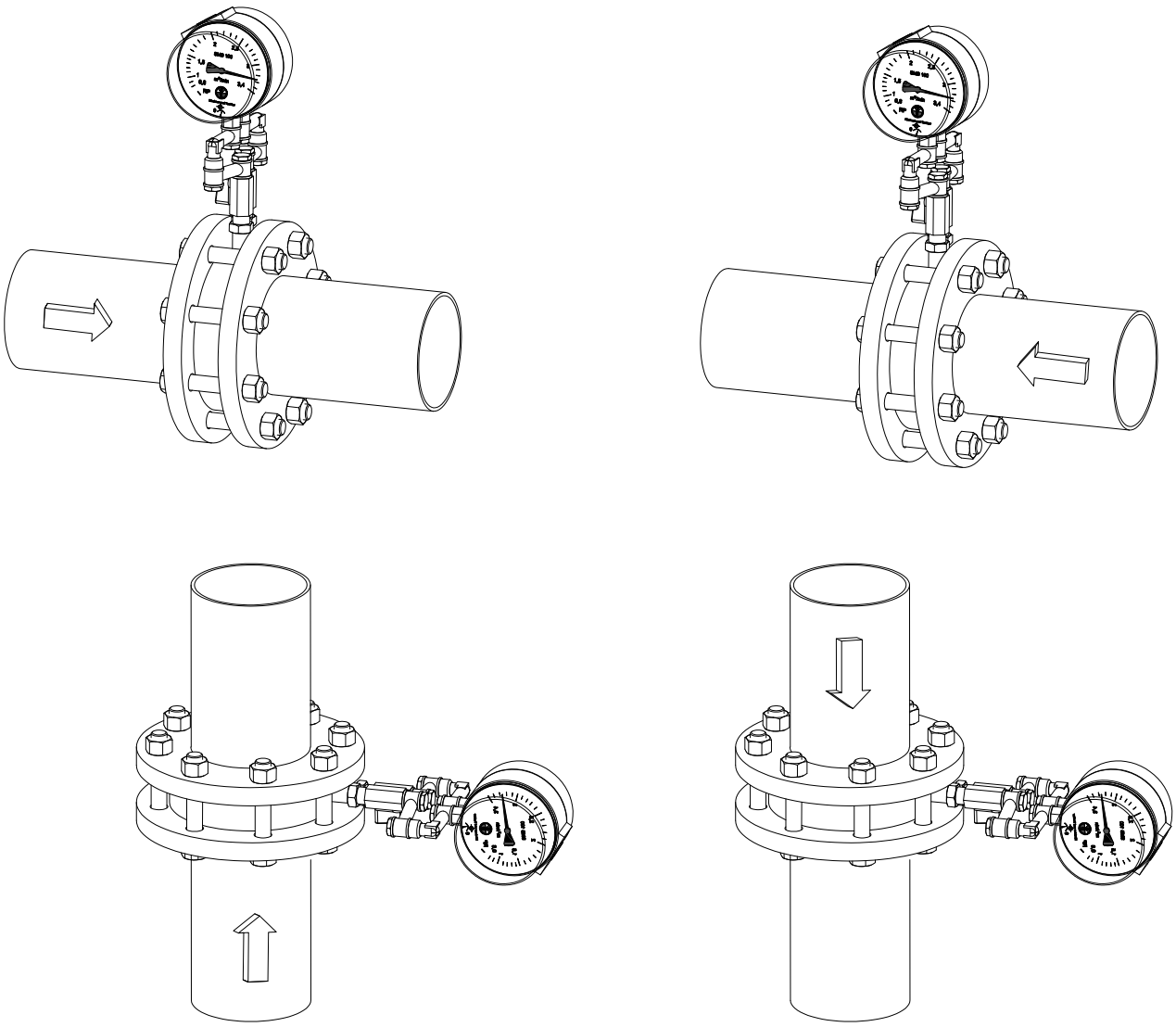

Fig. 2

Thanks to the special articulated design, the dial gauge of the sprinkler measuring orifice pivots by 180 degrees in both directions. Therefore, an assembly in various installation positions is possible (refer to fig. 2).

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5 Installation

Installation may be effected by trained personnel only!

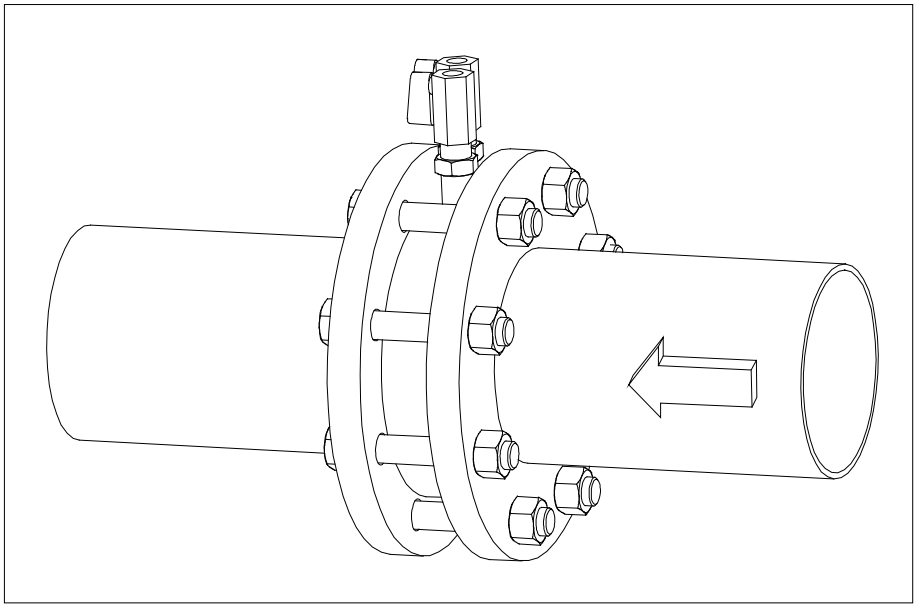

Fig. 3

5.1 Preparation for installation

1. Verify the local conditions and the direction of flow inside the pipework at the place of installation of the sprinkler measuring orifice.
2. Make sure that the sprinkler measuring orifice is suitable for installation at the planned location with regards to nominal cross-section, min. inlet and outlet distance, maximum working pressure and medium (also refer to section 10).
3. Shut off and secure the pipework in accordance with regulations and empty the circuit.
4. Lay out the installation kit for the delivered measuring orifice (refer to section 10.6).

5.2 Installation of the orifice ring

For an intermediate flange installation of the sprinkler measuring orifice, two flanges PN 16 have to be installed in accordance with DIN EN 1092-1 and the VdS guidelines. The flange distance required for installation is 40 mm with an additional 2 mm each for both flange seals.

1. Pre-assemble the flanged connection in such a way as to permit the insertion of the measuring orifice with its seals from the front (vertical piping) or from above (horizontal piping), respectively.
2. Together with the seals attached on both sides, place the measuring orifice between both prepared flanges and slide same all the way against the pre-assembled screws.
   - This serves to center orifice and seal. The seals have to be in true alignment with the entire circumference of the measuring orifice.
   - The flow direction has to coincide with the hand on the measuring orifice.
3. Insert the remaining screws and uniformly tighten all screwed connections crosswise.

Note

The best measuring accuracy is obtained with smooth inside pipe joints and pipe configurations in accordance with the VdS guidelines

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5.3 Installation of the dial gaug

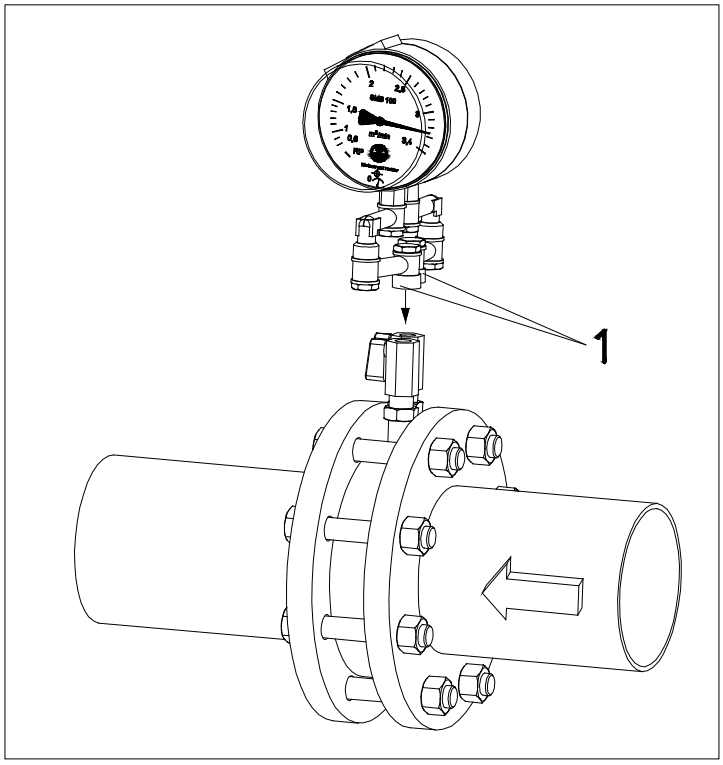

Fig. 4

Remove the shipping protection plugs (1, Fig. 4) from the threads of the dial gauge and the screwed connections of the measuring orifice

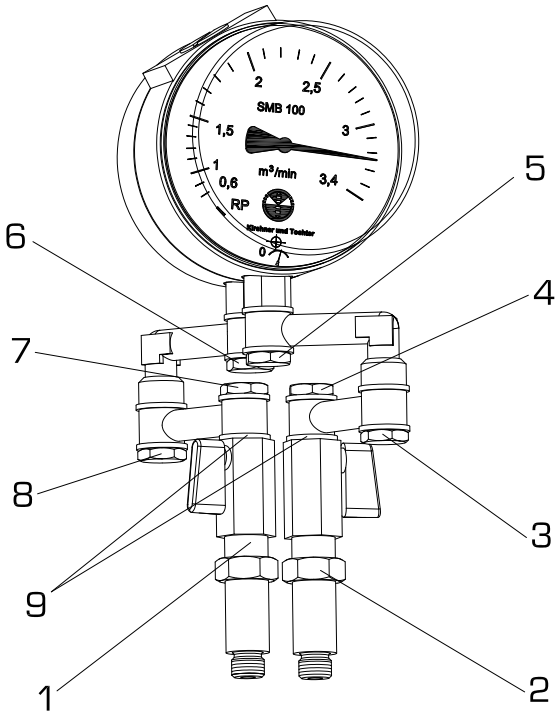

Fig. 5

The sealing rings (9) required during assembly have been attached to the dial gauge with cable binders.

1. Use screws (4 and 7) to fix the dial gauge with its inserted sealing rings (9) to the ball valves of the measuring orifice.
   - In the process, connect the plus line of the dial gauge with the plus line of the measuring orifice and minus line of the dial gauge with the minus line of the measuring orifice.
   - Observe the respective markings at the dial gauge and on the lable of measuring orifice.
2. Position the dial gauge in such a way, as to permit an unimpeded reading of the display.
3. Tighten the fixing screws (4 to 7) with a torque of 15 Nm.
   - In order to prevent leaks, the joining pieces (1 and 2) should not be tightened with a torque.
   - When tightening the screwed connections (4 and 7) immobilize the joining pieces (1 and 2) with a wrench.
4. Next follow the steps in section 6 „Commissioning“.

5.4 Minimess hose connection

With assembly of the Minimess hose connection the hingethreading needs not to be applied.

The Minimess hose connection is delivered already partly assembled.

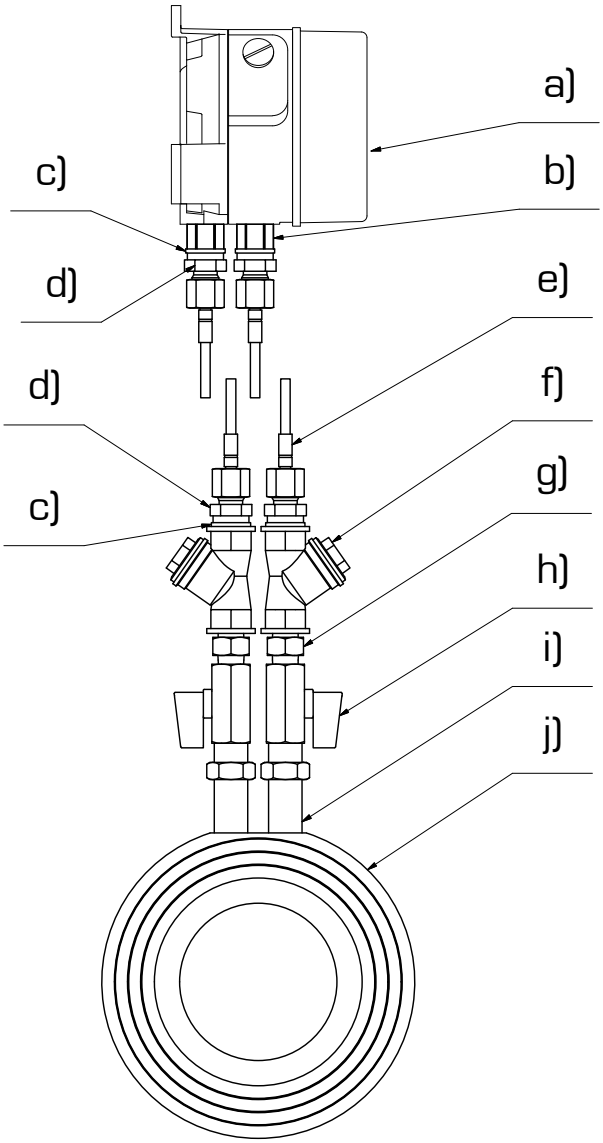

Fig. 6

Scope of delivery:

a) indicator part with fastening brackets for wall mounting.

b) double threaded nipple G¼ i/a, 2 pcs

c) sealing ring, 4 pcs

d) screwed socket G¼ - M14x1,5 a/a, 4 pcs

e) hose connection (l = 1500 mm), 2 pcs

f) dirt trap, 2 pcs

g) detachable double threaded nipple, R¼ a, 2 pcs

h) ball valve, 2 pcs

i) connection part, 2pcs

j) orifice

Assembly

The preassembled indicator part and the pre-assembled orifice unit are connected via the Minimess hoses. Look for the **+** and **–** marks on the indicator part and the orifice unit. Connect the **+** side with **+** and the **–** side with **–** !

The indicator part (with fastening brackets Fig. 7 for wall mounting) can be installed by the customer in a location that is vibration-free. As a rule, these are concrete buttresses.

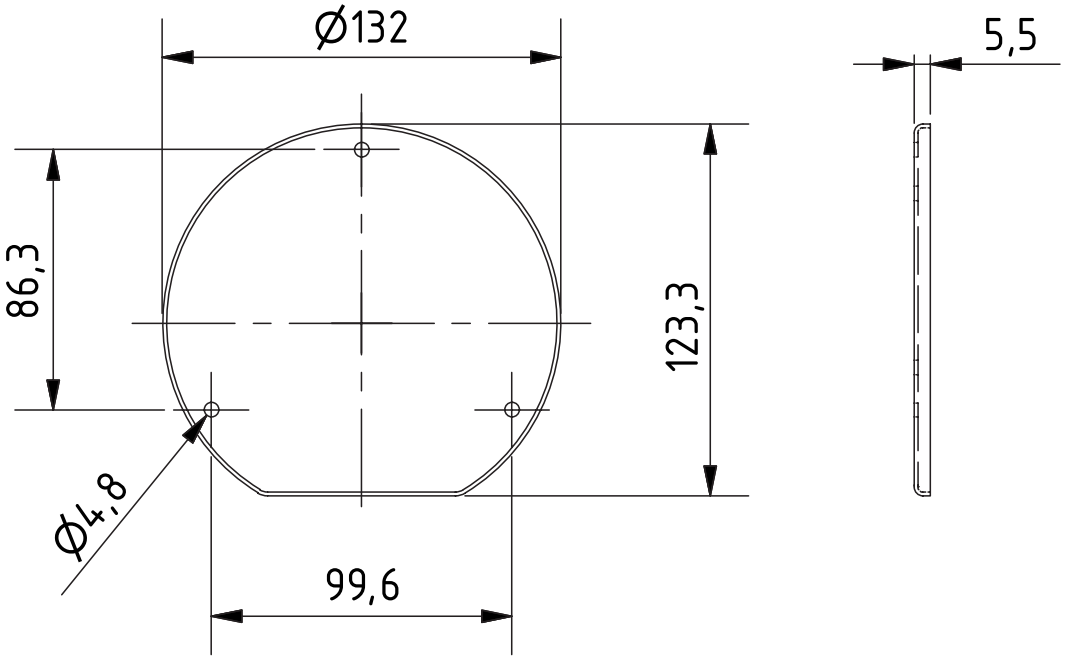

Fig. 7

Notes on operation:

To ensure serviceability of hoses and so as not to shorten their useful life by exposing them to additional stresses, be aware of the following:

- When in use, hose lines should never be subjected to tensile, torsional or compressive stresses.
- Avoid damage through external mechanical, thermal or chemical influence.
- Do not paint over hose lines.

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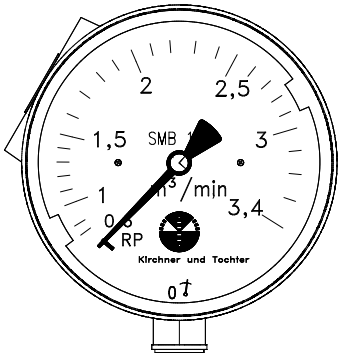
6 Commissioning

Please note all instructions carefully to avoid damage to the flowmeter. Before start-up, vent the hose lines up to a point directly in front of the indicator part.

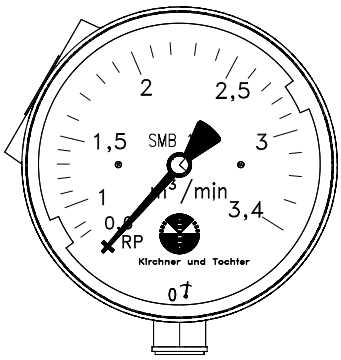
6.1 Zero-point adjustment



zero point OK

zero point not OK

In case the hand of the dial gauge is not within the range of the rest position marked RP with the flow cut off, the sprinkler measuring orifice has to be readjusted as follows:



Adjust zero point to the rest position

Fig. 8

1. Close both ball valves
2. Disconnect display between items 7 and 5 (fig. 12) from the meter
3. Remove screws (3, fig. 9) from the display
4. Remove the transparent cover
5. Adjust the pointer by means of the zero adjustment screw (4) in the middle of the black bar (Fig. 8)
6. Replace the cover
7. Insert and tighten the screws

Important:

The zero point setting can only be carried out with the display part free of pressure. Thus, zero point errors can be detected due to clogged pressure lines.

6.2 Initial startup

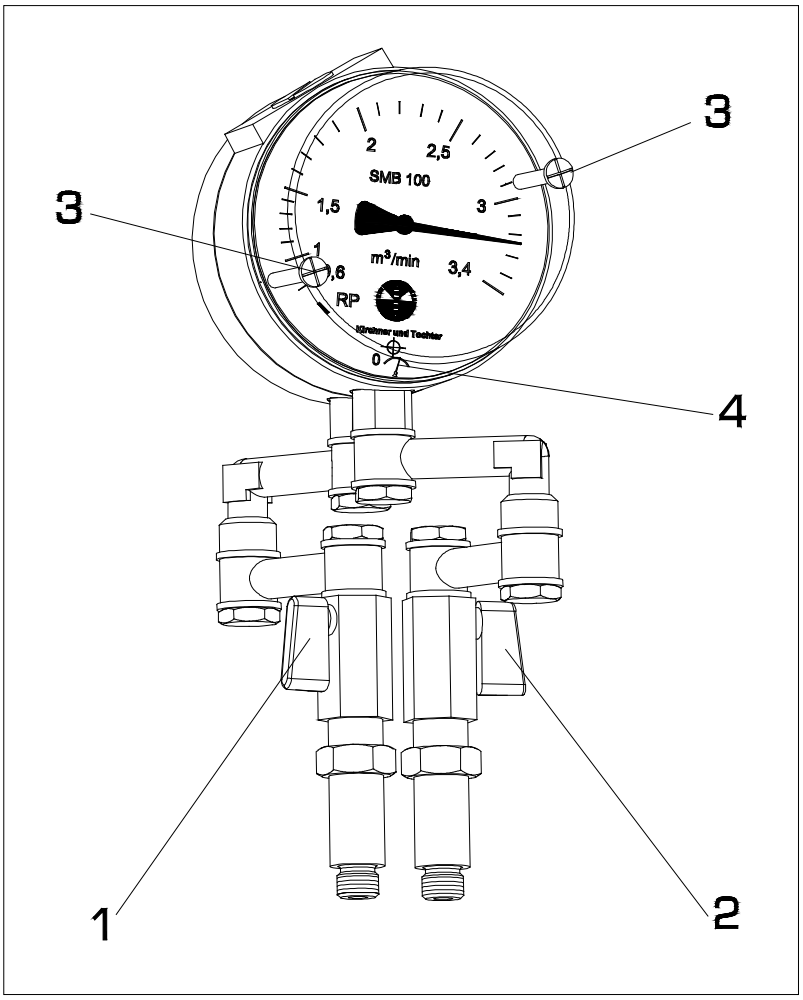


Fig. 9

The correct installation is a prerequisite for commissioning.
The following steps have to be followed for the initial startup:

1. Close the ball valves (1 and 2)
2. Pressurize measuring line
3. Open the ball valves (1 and 2) simultaneously
4. Check the tightness of all sprinkler meter components

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7 Maintenance

The sprinkler measuring orifice is maintenance-free. In order to warrant a reliable operation and a long service life of the device, we recommend regular checks of the device, such as:

1. check of the display
2. remove deposits inside the nozzles of the banjo bolts
3. check of the joints between orifice ring and display part
4. If Minimess hose connection is employed: check filter in strainer regularly.
5. The exact checking cycles are determined by the VdS regulations and are to be adjusted depending on the operating and surrounding conditions.

8 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.

9 Disposal

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

10 Technical data

10.1 Type series

SMB	scaling in m³/min
SMB-OE	scaling in %
SMB-...-Minimess	display with hose connection

10.2 General technical data

VdS approval	no.: G 4990049
Measuring principle	differential pressure measuring at the orifice
Scale	m³/min or % (SMB-OE)
Measuring accuracy	2,5 % at the approved full scale range value 5,0 % at the approved measuring range start value The inter-values for the permitted measuring accuracy are the result by linear interpolation.
Max. working pressure	16 bar
Terms of installation	VdS guideline CEA 4001 section 7.4
Connection	intermediate flange installation PN 16 in accordance with DIN EN 1092-1

10.3 Materials

Part	Material
Orifice	aluminium, hard coated
Screwed connections	nickel-plated brass, 1.4308
Ball valves	nickel-plated brass
Dial gauge	aluminium, coated

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10.4 Measuring and accuracy

Measuring range SMB

DN	Measuring range [m³/min]			VdS approved measuring range [m³/min] (% with SMB-OE)			max. deviation in the approved full scale range [m³/min]	[%]
80	0,4	–	2,1	0,6 (28,5 %)	–	2,1 (100 %)	± 0,0525	± 2,5
100	0,6	–	3,4	1 (29,4 %)	–	3,4 (100 %)	± 0,085	± 2,5
150	1,4	–	7,25	2 (27,58 %)	–	7,25 (100 %)	± 0,18125	± 2,5
200	2,6	–	12,35	4 (32,35 %)	–	12,35 (100 %)	± 0,30875	± 2,5
250	3	–	18,12	4 (22,85 %)	–	18,12 (100 %)	± 0,453	± 2,5

2,5 % at the approved full scale range value

5,0 % at the approved measuring range start value

The inter-values for the permitted measuring accuracy are the result by linear interpolation.

Measuring range SMB-OE

DN80 Indication		DN100 Indication		DN150 Indication		DN200 Indication		DN250 Indication	
%	[m³/min]	%	[m³/min]	%	[m³/min]	%	[m³/min]	%	[m³/min]
100,00	2,10	100,00	3,40	100,00	7,25	100,00	12,35	100,00	18,12
90,00	1,89	90,00	3,06	90,00	6,53	90,00	11,12	90,00	16,31
80,00	1,68	80,00	2,72	80,00	5,80	80,00	9,88	80,00	14,50
70,00	1,47	70,00	2,38	70,00	5,08	70,00	8,65	70,00	12,68
60,00	1,26	60,00	2,04	60,00	4,35	60,00	7,41	60,00	10,87
50,00	1,05	50,00	1,70	50,00	3,63	50,00	6,18	50,00	9,06
40,00	0,84	40,00	1,36	40,00	2,90	40,00	4,94	40,00	7,25
30,00	0,63	30,00	1,02	30,00	2,18	30,00	3,71	30,00	5,44
28,57	0,60	29,41	1,00	27,59	2,00	32,39	4,00	22,08	4,00

10.5 Inlet and outlet paths

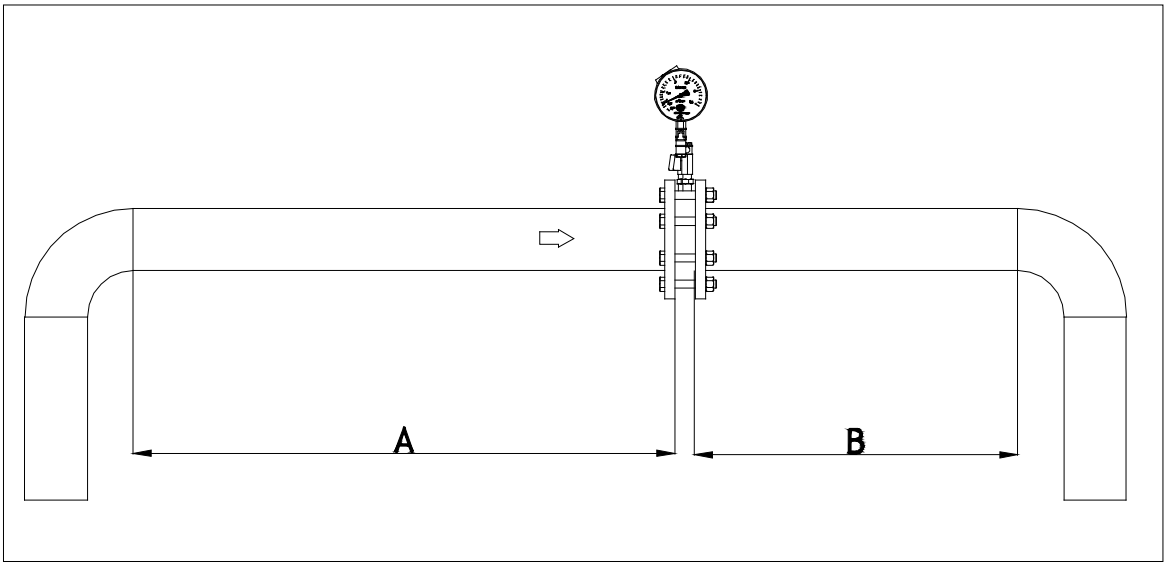

Fig. 10

The optimum accuracy is obtained, if the pipe configuration conforms to the VdS guidelines. The following inlet and outlet sections that must not contain any valves, knees, elbows, changes in cross-section or similar, apply to the various SMB models.

When using pumps creating fluctuations in the volume flow (possible with centrifugal pumps driven by a diesel engine), we recommend to extend the inlet region of steady flow from 10 d to 18 d.

Should pulsation and vibration from pumps cause unsteady indicator readings, a separate Minimess hose connection (l = 1500 mm) can be fitted to an indicator part that is designed for wall mounting, see sec 5.4

Model	Min. inlet region of steady flow A [mm]	Min. outlet region of steady flow B [mm]
SMB 80	800	400
SMB 100	1000	500
SMB 150	1500	750
SMB 200	2000	1000
SMB 250	2500	1250

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10.6 Dimensions

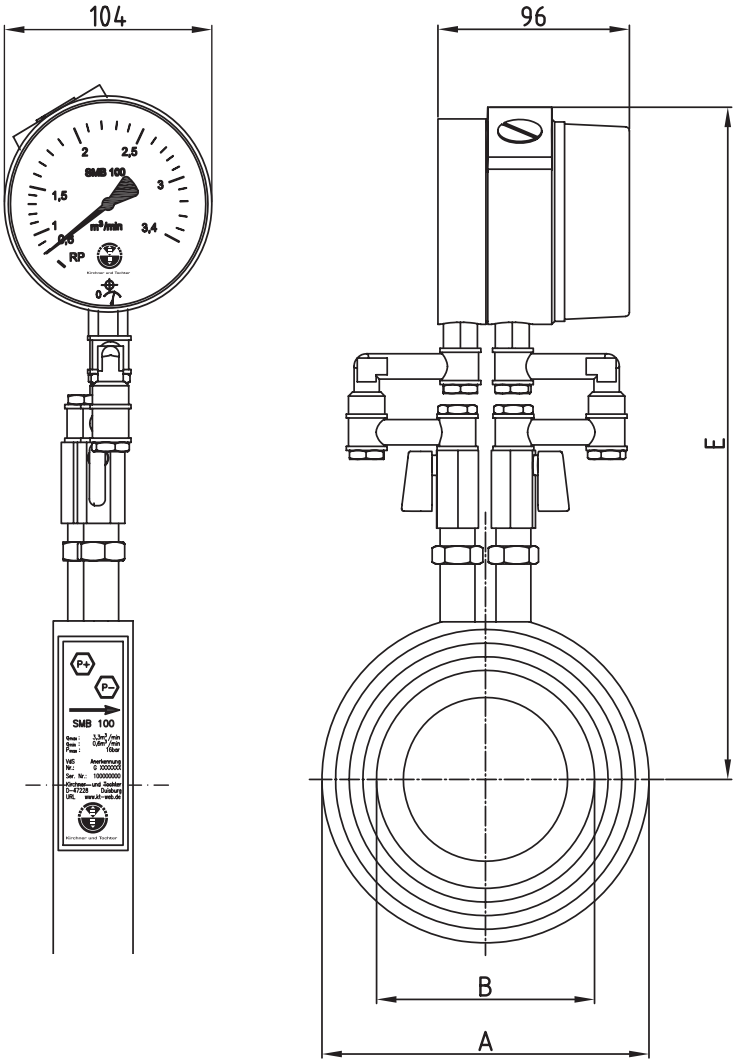

Fig. 11

Model	A [mm]	B [mm]	E [mm]
SMB 80	144	84,1	311
SMB 100	164	108,9	321
SMB 150	220	161,8	349
SMB 200	275	211,8	377
SMB 250	331	264,5	406

10.7 Installation kits

SMB installation kit	Quantity	Designator
DN 80	8	hexagon bolt DIN 931-M16x110-8.8 galvanized
	8	nut DIN 934-M16-8
	8	washer DIN 125-17-A2
DN 100	8	hexagon bolt DIN 931-M16x110-8.8 galvanized
	8	nut DIN 934-M16-8
	8	washer DIN 125-17-A2
DN 150	8	hexagon bolt DIN 931-M20x120-8.8 galvanized
	8	nut DIN 934-M16-8
	8	washer DIN 125-17-A2
DN 200	12	hexagon bolt DIN 931-M20x120-8.8 galvanized
	12	nut DIN 934-M20-8
	12	washer DIN 125-21-A2
DN 250	12	hexagon bolt DIN 931-M24x130-8.8 galvanized
	12	nut DIN 934-M24-8
	12	washer DIN 125-25-A2

10.8 Flange gaskets

Nominal widh	Quantity	Dimensions SIL 4400 gasket
DN 80	2	Ø143,5 x Ø86 x 2
DN 100	2	Ø163,5 x Ø111 x 2
DN 150	2	Ø219,5 x Ø164 x 2
DN 200	2	Ø274,5 x Ø213 x 2
DN 250	2	Ø330,5 x Ø266 x 2

included in scope of delivery

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11 Spare parts

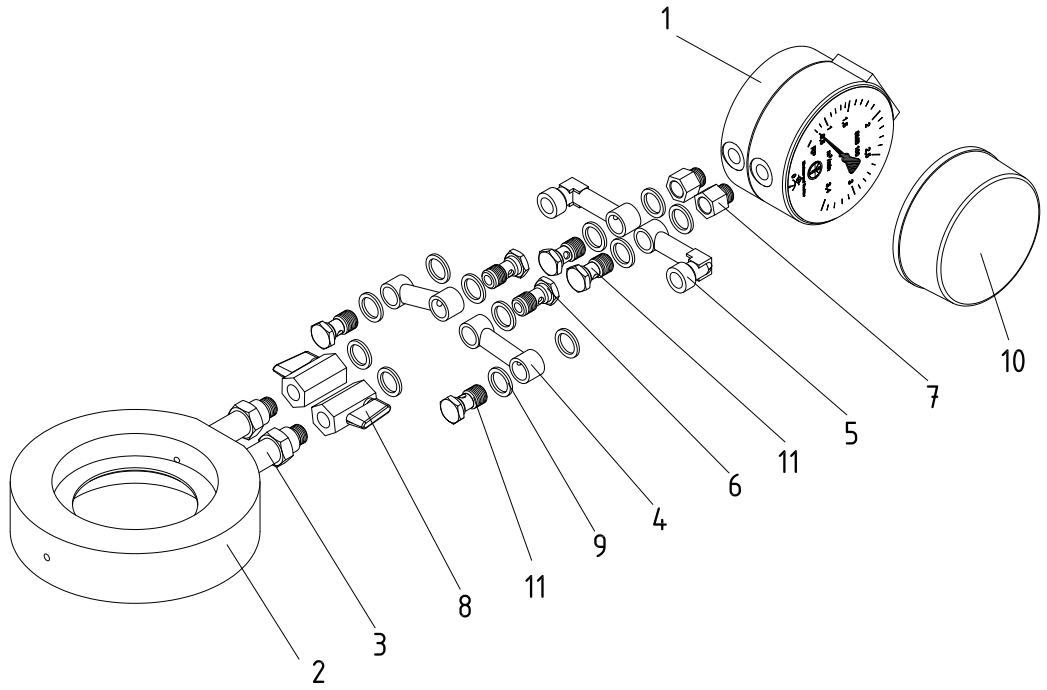

Fig. 12

Spare parts list

Pos.	Quantity	Designator	Material
1	1	Dial gauge	Al anodised
2	1	Measuring orifice	hard-coated Al
3	2	Joining piece	1.4571
4	2	Straight joint	1.4308
5	2	L-type joint	1.4308
6	2	Screw with damping insert	CuZn nickel-plated
7	2	Double-threaded nipple	CuZn nickel-plated
8	2	Ball valve	CuZn nickel-plated
9	12	Sealing ring	Steel, phosphatised/NBR
10	1	Clear-view cover	Acryl
11	4	Screw	CuZn nickel-plated
12	1	Assembly and operating instructions-	--

A) 1 orifice with joining pieces (Pos. 2, 3, 8, 9)
B) 1 set pre-assembled fittings (Pos. 4, 5, 6, 9, 11)
C) 1 dial gauge (Pos.1, 7, 10)
D) 1 set of sealing rings (Pos 9)
E) 2 strainers for Minimess hose connections

Spare parts are available at least 10 years after delivery.

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.

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