

Installation and Operating Instructions

Differential-Pressure Flow Meter

DDM-DS11

DDM-DS11-MS1

DDM-DS11-MS2



Kirchner und Tochter

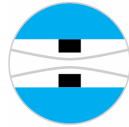
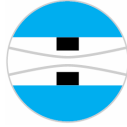


Table of Contents

1.	Foreword.....	3
2.	Safety.....	3
2.1.	Symbol and meaning.....	3
2.2.	General safety directions and exemption from liability.....	3
2.3.	Intended use.....	3
2.4.	Operator and operating personnel.....	3
2.5.	Regulations and guidelines.....	4
2.6.	Notice as required by the hazardous materials directive.....	4
3.	Transport and storage.....	4
4.	Installation.....	5
4.1.	DDM-DS11 with screw connections.....	5
4.2.	DDM-DS11 mounted between flanges.....	6
4.3.	Modification.....	7
4.3.1.	Turning the gauge.....	8
4.3.2.	Turning the gauge round.....	9
4.3.3.	Installation variant DDM-DS11 with screw connections.....	10
4.3.4.	Installation variant DDM-DS11 mounted between flanges.....	10
5.	Start-up.....	11
6.	Note on change of operating data on gas service.....	11
7.	Indicator part DS11.....	11
7.1.	Zero correction.....	11
7.2.	Setting the operating point of limit switches MS1 and MS2.....	12
7.3.	Electrical connection of limit switches MS1 and MS2.....	12
8.	Service.....	12
9.	Disposal.....	12
10.	Technical data.....	13
10.1.	Dimensions for DDM-DS11 with screw connections.....	14
10.2.	Dimensions for DDM-DS11 mounted between flanges.....	15
10.3.	Flow rates for water.....	16
10.3.1.	Connection with screw connections.....	16
10.3.2.	Connection for mounting between flanges.....	16
10.4.	Flow rates for air.....	17
10.4.1.	Connection with screw connections.....	17
10.4.2.	Connection for mounting between flanges.....	17
10.5.	Technical Data of Microswitches.....	18



1. Foreword

These Installation and Operating Instructions are applicable to Series DDM-DS11 devices. 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 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 differential-pressure flow meter. Failure to comply with these instructions can lead to hazardous situations for Man and Beast and also to damage to property, for which Kirchner und Tochter disclaims all liability.

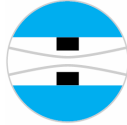
The Operator is required to rule out potentially hazardous situations through voltage and released media energy.

2.3. Intended use

The DDM-DS11 differential-pressure flow meters are designed for measuring and monitoring the flow of liquids and gases. They may be installed in the pipeline only between flanges or using threaded pipe connections. Straight, unimpeded lengths of pipe runs must be a minimum of 6 times the nominal diameter upstream of the location and a minimum of 4 times the nominal diameter downstream of the location. The required version of the DDM-DS11 device should be selected on the basis of the nominal diameter and nominal pressure at the location as well as the type of medium. The indicator part can be equipped with one or two microswitches. The limit values stated in Section "Technical data" should not be exceeded.

2.4. 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.



2.5. 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.

2.6. Notice as required by the hazardous materials directive

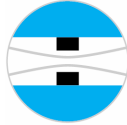
In accordance with the law concerning handling of waste (critical waste) and the hazardous materials directive (general duty to protect), we would point out that all flow meters returned to Kirchner und Tochter for repair are required to be free from any and all hazardous substances (alkaline solutions,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



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

3. Transport and storage

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

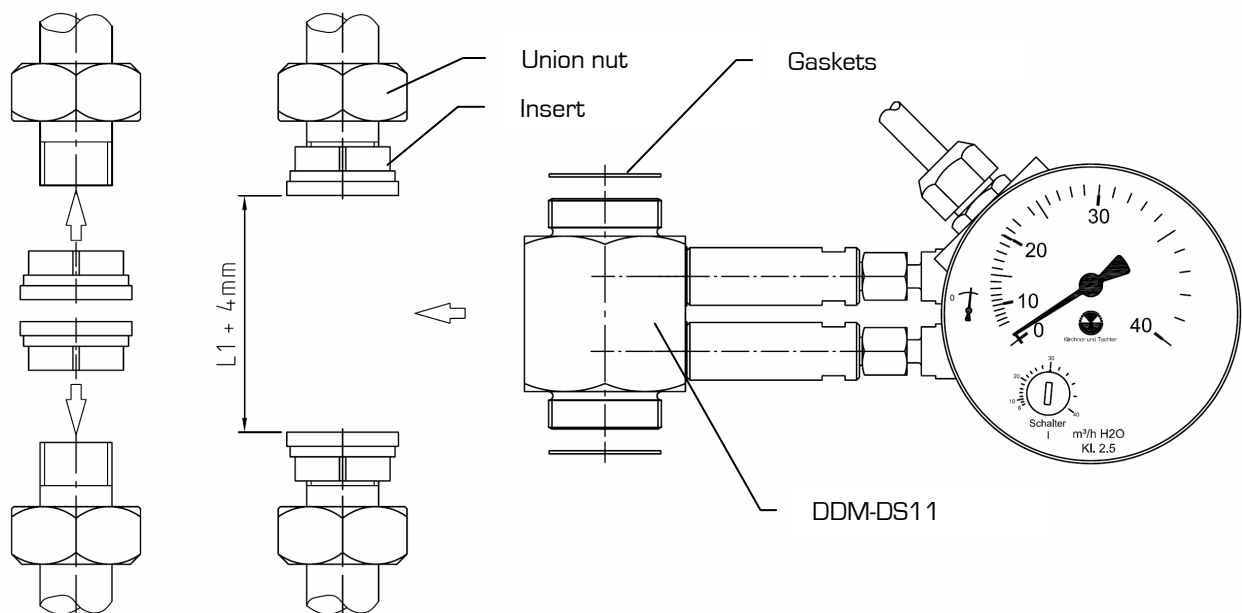


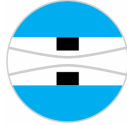
4. Installation

4.1. DDM-DS11 with screw connections

The measuring device is screwed into the pipeline between two inserts that are supplied with the device. The straight, unimpeded inlet and outlet runs should be a minimum of 6 x DN upstream and a minimum of 4 x DN downstream of the location. Between the inserts, leave a gap of $L1 + 4\text{mm}$ for the gaskets. The dimensions for L1 are given on page 14.

- Cut appropriate threads on the pipe ends (in accordance with the order). Make sure that the ends of the pipe are in alignment.
- Unscrew the union nuts from the DDM-DS11 and slide these on to the pipe ends, with the thread facing towards the device.
- Screw the insert to the pipe ends using suitable packing material.
- Position the DDM-DS11 together with the two gaskets between the pipe ends and screw the union nuts tight.
- Pay attention to the direction of flow (see arrow on the device).

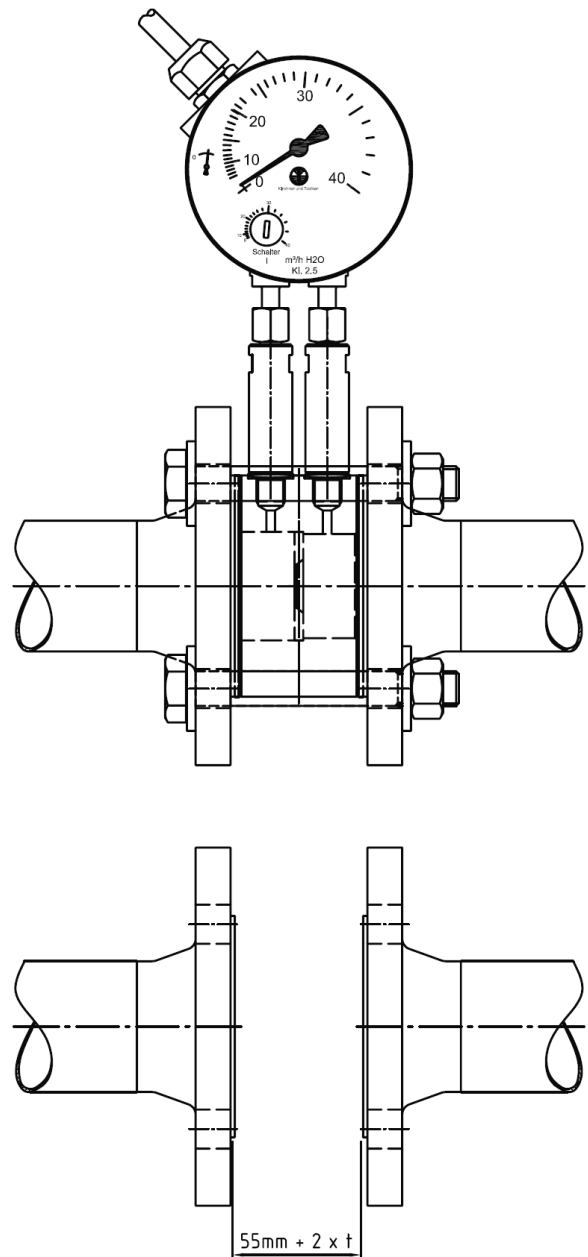


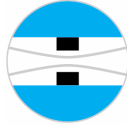


4.2. DDM-DS11 mounted between flanges

The flow meter is mounted between flanges to DIN EN 1092-1 (Type 11 or Type 13). The straight, unimpeded pipe run should be a minimum of 6 x DN upstream and a minimum of 4 x DN downstream of the location. The distance between the flanges should be 55 mm for the ring plus twice the thickness of the gaskets to be used. Make sure that the flanges are in alignment and the sealing faces are parallel to each other. Check that the flanges at the location agree with the details given in the order (standard and pressure rating).

- The distance between the flanges should be 55mm + 2 x t (thickness of gaskets used).
- Fit half of the screw connections to the interflange connection,
- Mount the orifice, together with the gaskets fitted on both sides, between the two prepared flanges.
- Assemble the remaining screw connections.
- When tightening the screws, make sure that orifice and gaskets are concentric and in alignment with the pipeline.
- Fasten all screw connections uniformly in diagonally opposed sequence.

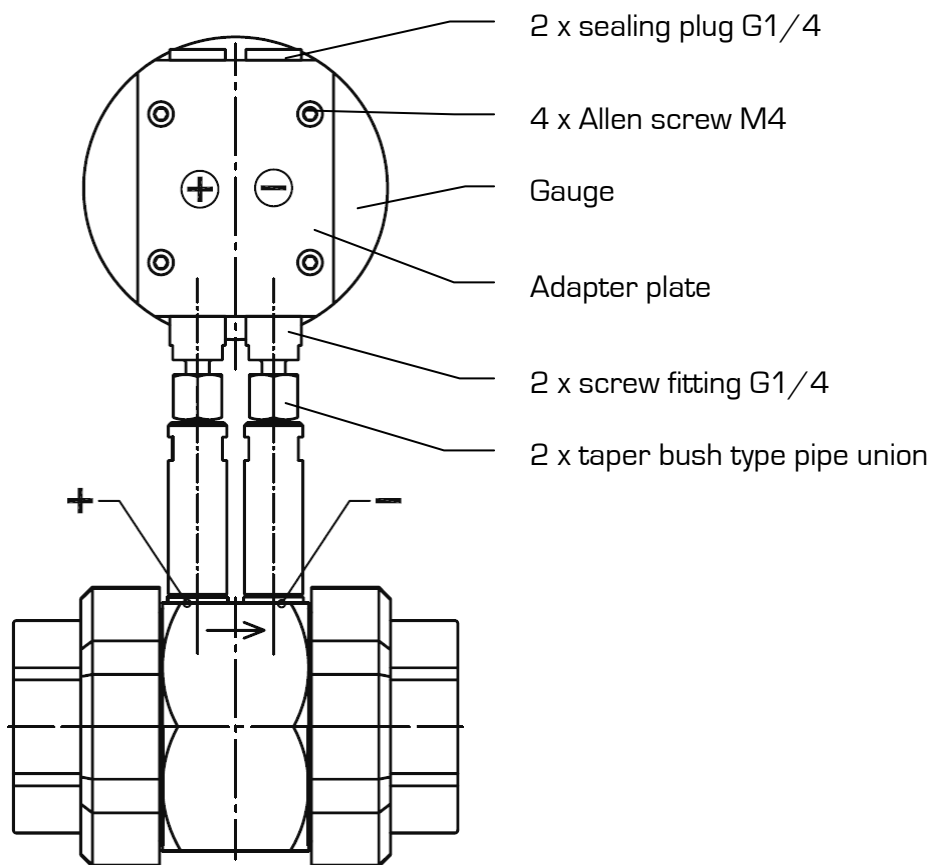




4.3. Modification

The devices are delivered in ready assembled condition to customer specifications (for a customer-specific installation situation). However, a field modification for different installation situations is easily possible and requires little effort. All that needs to be borne in mind is that the "+" and "-" connections should not be transposed. Markings are located:

- on the adapter plate (sticker), and
- on the orifice plates (stamped numbers and an arrow in the direction of flow)



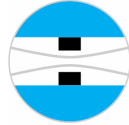
Only connections of same polarity may be joined together:

"+" to "+"
 "-" to "-"

Note:

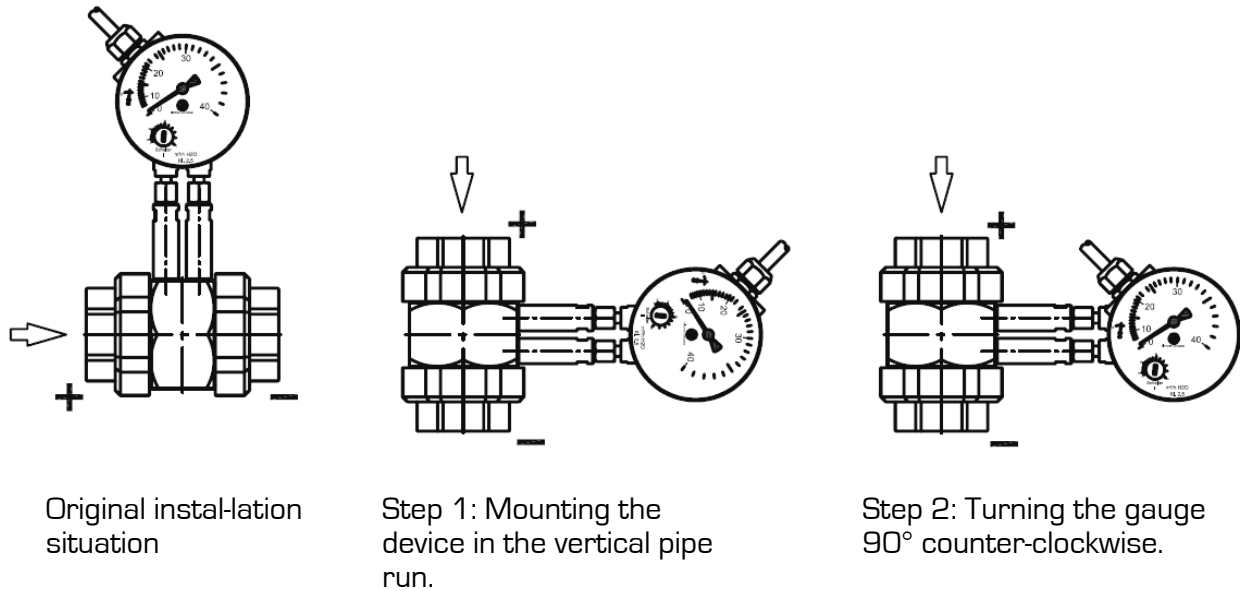
- 1) If "+" is connected to "-", the pointer in the gauge will turn anti-clockwise.
- 2) If the gauge is mounted correctly, but the orifice is not mounted correctly in the pipeline (flow from "-" to "+" counter to the direction of the arrow), the measured values will include substantial errors.

The modification procedure is independent of the connection method (screwed pipe connections or mounting between flanges).



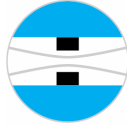
4.3.1. Turning the gauge

The following example shows the procedure for changing the position of a gauge that has been mounted for the "left to right" direction of flow to the "top to bottom" direction of flow:



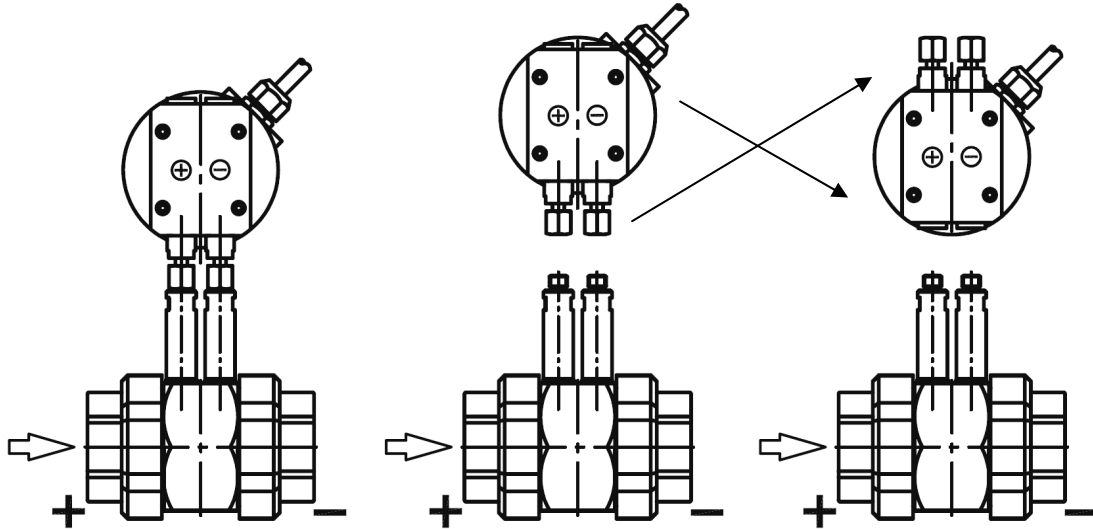
To turn the gauge (Step 2), remove the 4 Allen screws from the back of the gauge (see Figure in Section 4.3). The gauge can then be turned in steps of 90°. When refastening the Allen screws, make sure the O-rings are seated correctly between adapter plate and the back of the gauge.

Note: Turning the gauge (by detaching the Allen screws) will not cause polarity reversal!



4.3.2. Turning the gauge round

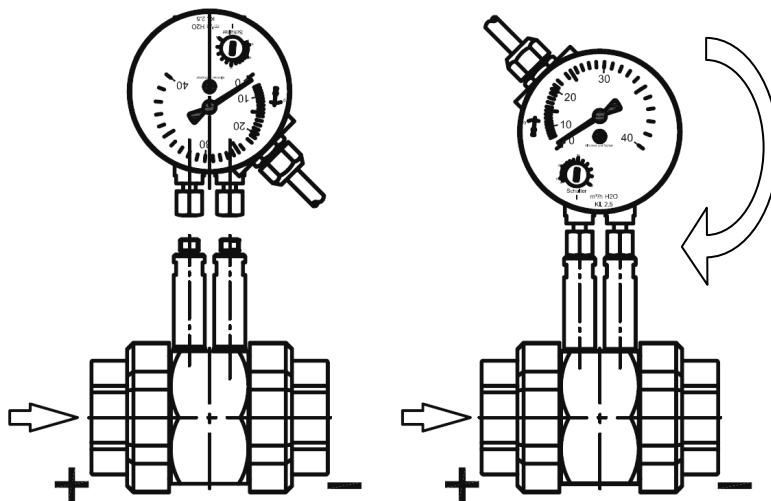
To turn the gauge so that it faces in the opposite direction, proceed as follows (**Note: be aware of "+" and "-" signs!!! Incorrect polarity will cause the pointer in the gauge to move counter-clockwise**):



Original installation situation.

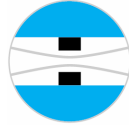
Step 1: Detach the taper bush type pipe union.

Step 2: Swap over sealing plugs and screw fittings.



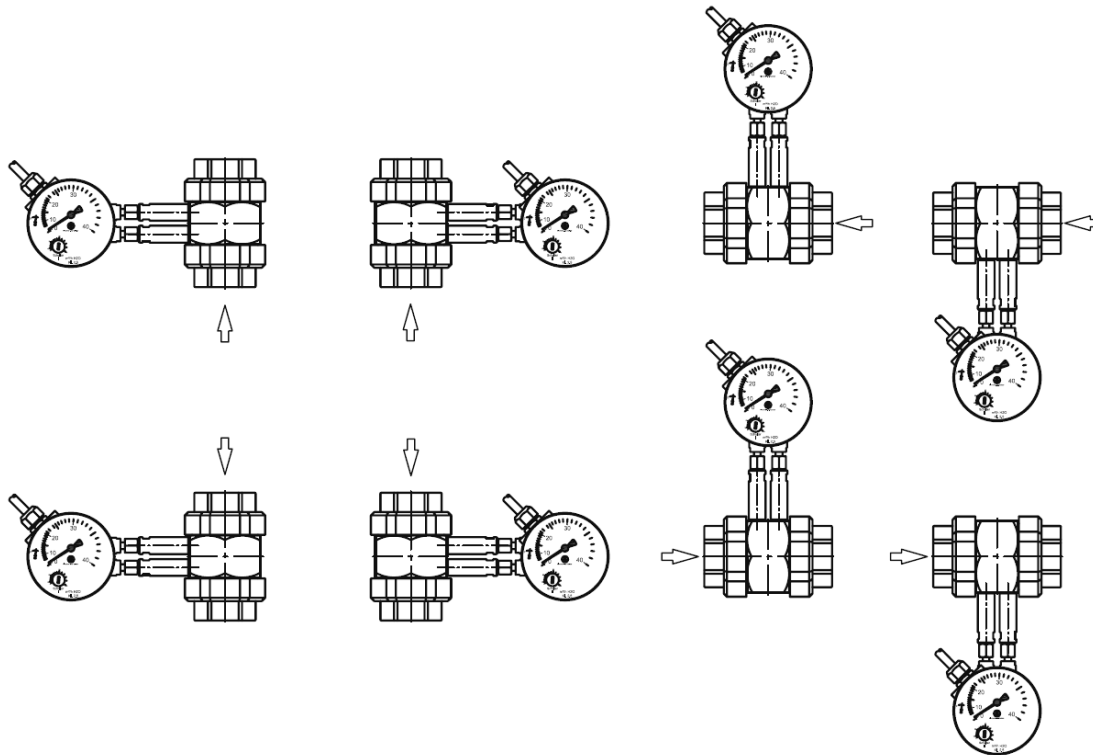
Step 3: Connect the gauge to the orifice plate. **Observe polarity: "+" to "+" and "-" to "-"!!!**

Step 4: Turn the gauge through 180° [see 4.3.1].



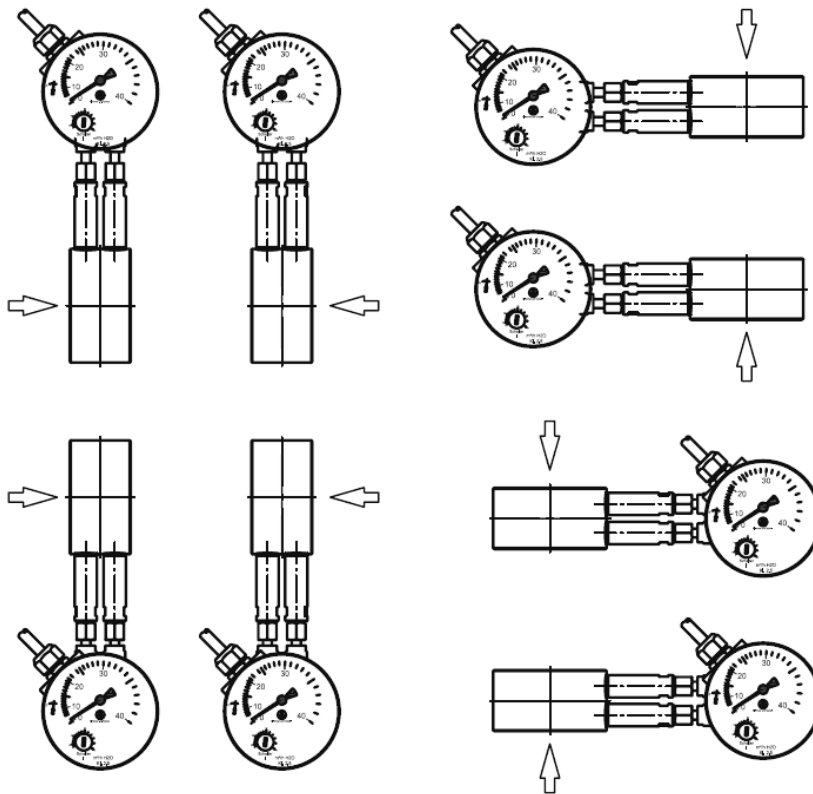
DDM-DS11

4.3.3. Installation variant DDM-DS11 with screw connections

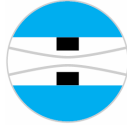


Direction of flow symbolized by the arrow.

4.3.4. Installation variant DDM-DS11 mounted between flanges



Direction of flow symbolized by the arrow.



5. Start-up

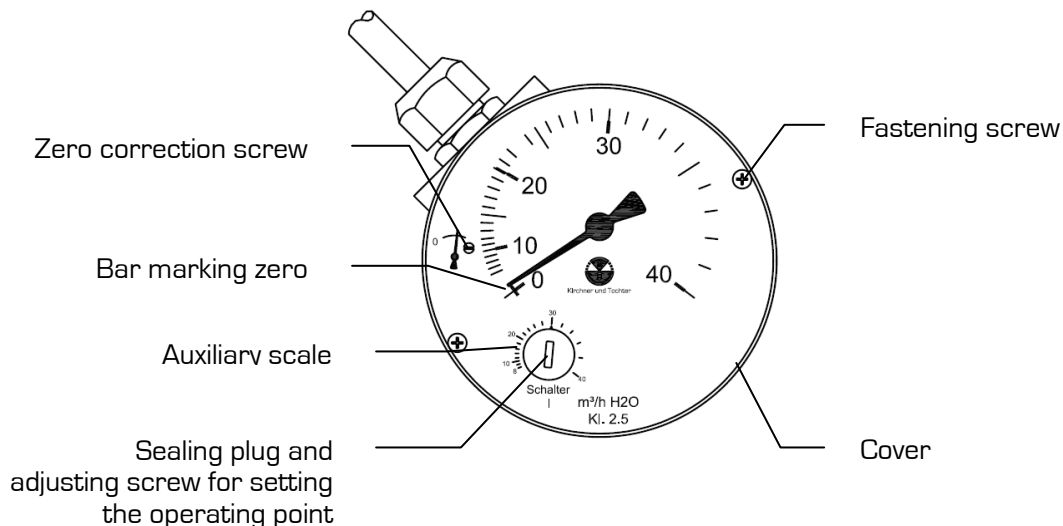
The device must be properly installed before it is started up. Carry out the following before initial start-up:

- Pressurize the measuring line
- Test the leak-tightness of all components of the measuring orifice.

6. Note on change of operating data on gas service

On devices for gas service, gauge readings are only correct when the operating conditions at the measuring point (density, operating pressure and operating temperature) are the same as the values marked on the scale.

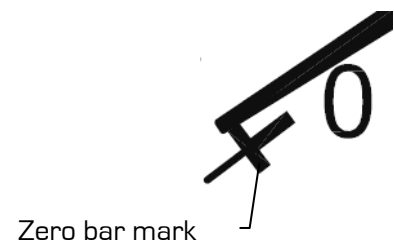
7. Indicator part DS11

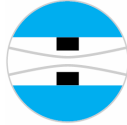


7.1. Zero correction

Should the pointer in the gauge not be located in the area of the zero bar when flow is "off", the indicator will need to be readjusted as follows:

- Depressurize the measuring cell.
- Undo the two fastening screws on the cover and remove cover.
- Use the zero correction screw to set the measured-value pointer to the scale zero.
- Refit the cover.





7.2. Setting the operating point of limit switches MS1 and MS2

The DS11 indicator can be equipped with up to two contacts.

MS1 single-gap changeover contact
MS2 double-gap changeover contact

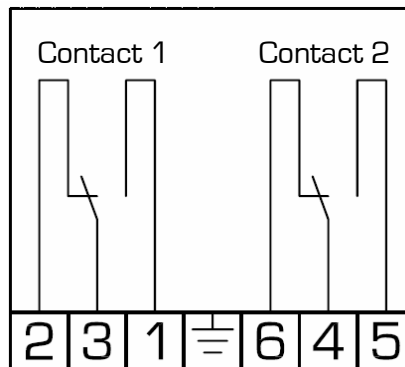
To set the operating point, proceed as follows:

- Detach the sealing plug above the contact adjusting screw in the cover. The contact adjusting screw is now freely accessible to adjust the operating point.
- The auxiliary scale enables adjustment of the operating point over 270° with a setting accuracy of $\pm 5\%$.
- Check the set operating point by way of the volumetric flow rate of your plant.
- Screw the sealing plug back in again.

7.3. Electrical connection of limit switches MS1 and MS2

Depending on the version, terminal assignment is either via a numbered cable or a cable junction box as shown in the illustration.

Terminal assignment:

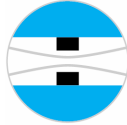


8. Service

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, you are kindly requested to coordinate the return of devices with our sales department, Tel. +49 (0) 2065-96090.

9. Disposal

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



10. Technical data

Materials DDM-DS11 mounted between flanges

Connection	between flanges to DIN EN 1092-1
Mounting between flanges	Type 11 or Type 13
Ring	S355J2G3, optionally stainless steel 1.4301
Orifice plate	stainless steel 1.4571

Materials DDM-DS11 with screw connections

Connection	DDM-DS11 for screw connection consisting of nut and insert to EN 10226-1 (ISO 7 - 1)
Threaded joint	malleable cast iron, galvanized
Screw fittings	brass
Orifice plate	NBR, others on request
Gaskets	

Materials of fastenings between orifice plate and gauge

Straight screw-in fitting 1/4"	nickel-plated brass or stainless steel 1.4571
Screw fitting G1/4 - dia.8	nickel-plated brass or stainless steel 1.4571
Olives, union nuts	galvanized steel or stainless steel 1.4571
Steel washers	galvanized steel with NBR gasket

Materials of DS11 gauge

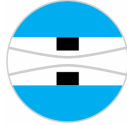
Pressure cell	aluminium GkAlSi12 (Cu) with HART-COAT surface protection
Measuring diaphragm	NBR
Cover	Makrolon

Differential pressures and pressure resistance DDM-DS11

Differential pressure for liquids	250 mbar
Differential pressure for gases	200 mbar
Pressure loss for liquids	approx. 100-150 mbar
Pressure loss for gases	approx. 80-120 mbar
Pressure resistance	PN 16

Technical data of DS11 gauge

Measuring principle	differential pressure measurement at orifice DDM
Allowable ambient temperature	-10...+70°C
Allowable process temperature	70°C
Degree of protection	IP54 to DIN 40 050
Measuring accuracy	+/- 2.5% of full-scale value

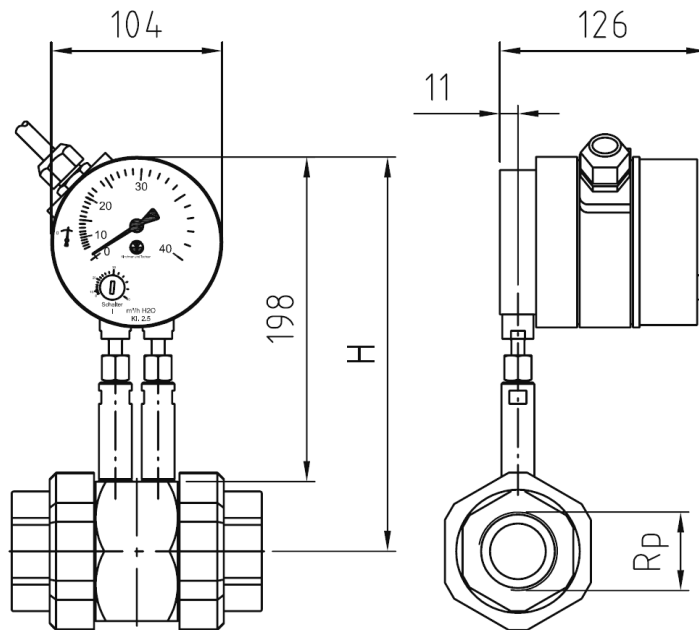
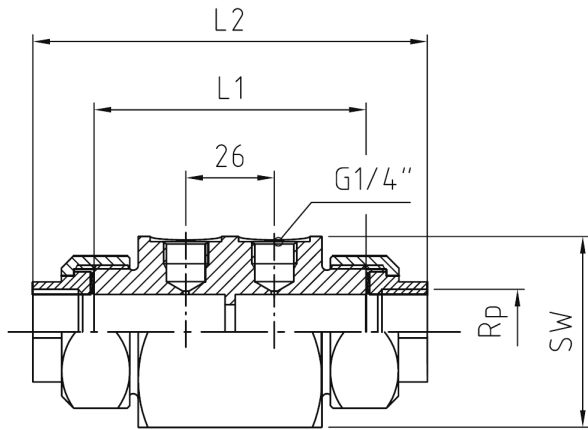


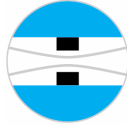
DDM-DS11

10.1. Dimensions for DDM-DS11 with screw connections

Rp ^{*)}	L1	L2	SW	H
1/4	80	124	41	218,5
3/8	80	128	46	221
1/2	80	128	46	221
3/4	80	128	50	223
1	80	136	60	228
1 1/4	80	146	70	233
1 1/2	80	149	70	233
2	90	164	85	240,5

*) Inside diameter made after details provided of inside pipe diameter.



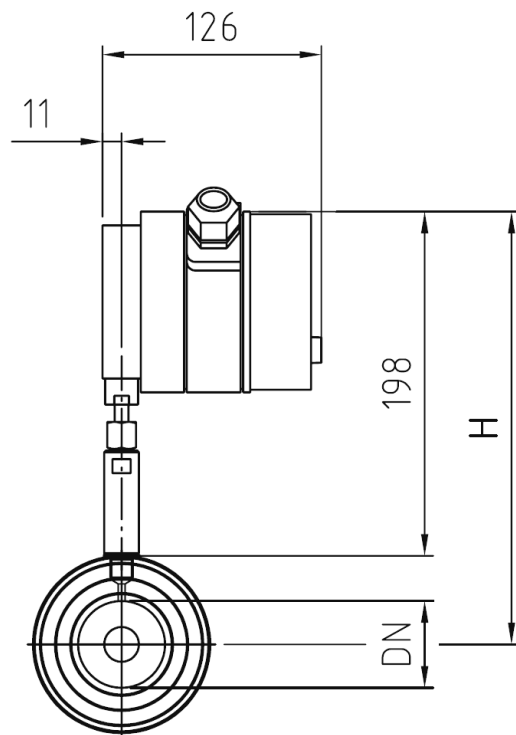
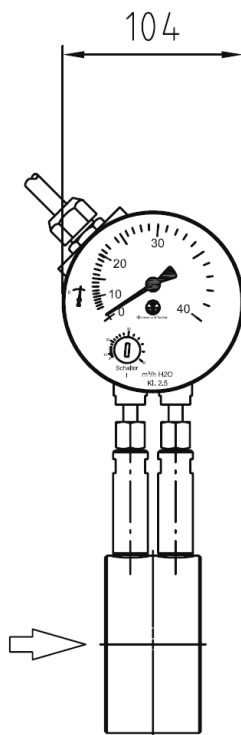
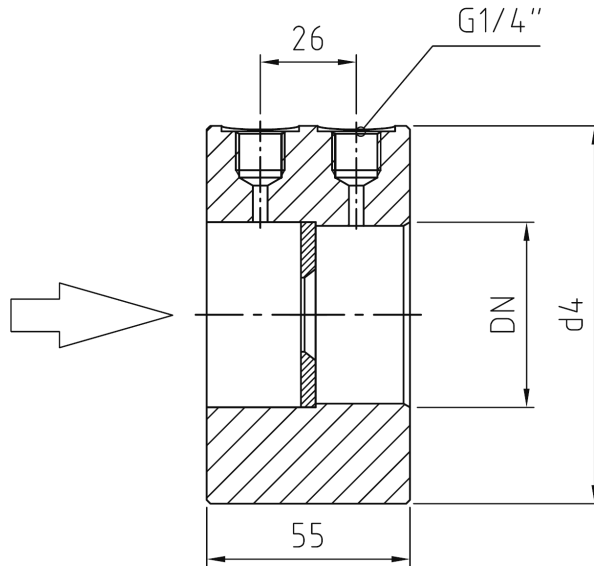


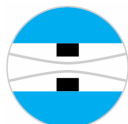
DDM-DS11

10.2. Dimensions for DDM-DS11 mounted between flanges

DN ^{*)}	d4	H
50	102	249
65	122	259
80	138	267
100	158	277
125	188	292
150	212	304
200	268	332

*) Inside diameter made after details provided of pipe inside diameter.





10.3. Flow rates for water

10.3.1. Connection with screw connections

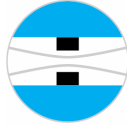
Rp	Min. measuring range [m ³ /h] H ₂ O			Max. measuring range [m ³ /h] H ₂ O		
1/4"	0,05	-	0,3	0,2	-	1,2
3/8"	0,05	-	0,4	0,4	-	2,3
1/2"	0,1	-	0,7	0,75	-	4,5
3/4"	0,2	-	1,3	1,4	-	8,5
1"	0,35	-	2	2,25	-	13,5
1 1/4"	0,6	-	3,5	4	-	24
1 1/2"	0,85	-	5	5,35	-	32
2"	1,25	-	7,5	8,65	-	52

Other measuring ranges on request

10.3.2. Connection for mounting between flanges

DN	Min. measuring range [m ³ /h] H ₂ O			Max. measuring range [m ³ /h] H ₂ O		
50	1,2	-	7	8,7	-	52
65	2	-	12	13	-	78
80	3	-	18	19,7	-	118
100	4,7	-	28	30,7	-	184
125	7,3	-	44	48	-	288
150	10,7	-	64	68,8	-	413
200	18,8	-	113	122,5	-	735

Other measuring ranges on request.



10.4. Flow rates for air

10.4.1. Connection with screw connections

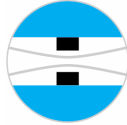
Rp	Min. measuring range [m ³ /h] air ¹⁾	Max. measuring range [m ³ /h] air ¹⁾
1/4	0,5 - 3	1,3 - 8
3/8	0,8 - 5	2,3 - 14
1/2	1,0 - 6	3,5 - 21
3/4	1,3 - 8	7,5 - 45
1	2,0 - 12	9,0 - 54
1 1/4	4,0 - 24	18,0 - 108
1 1/2	5,8 - 35	25,0 - 150
2	8,3 - 50	45,0 - 270

¹⁾ at STP (0°C and 1013 mbar)
In-between ranges possible

10.4.2. Connection for mounting between flanges

DN	Min. measuring range [m ³ /h] air ¹⁾	Max. measuring range [m ³ /h] air ¹⁾
50	9 - 54	45 - 270
65	13,5 - 81	83 - 500
80	20 - 120	125 - 750
100	35 - 210	142 - 850
125	60 - 360	292 - 1750
150	75 - 450	433 - 2600
200	125 - 750	667 - 4000

¹⁾ at STP (0°C and 1013 mbar)
In-between ranges possible

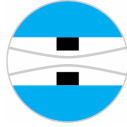


10.5. Technical data of microswitches

Contact Output	1 or 2 microswitches
Adjustment of switching points	external adjustment by standard value scales; smallest adjustable value: approx. 5% of full scale range
Switching hysteresis	approx. 2,5% of full scale
Load data/contacts	$U \sim \text{max.} = 250\text{V AC}$, $I \text{ max.} = 5 \text{ A}$, $P \text{ max.} = 250 \text{ VA}$ $U = \text{max.} = 30\text{V DC}$, $I = \text{max.} = 0,4 \text{ A}$, $P \text{ max.} = 10\text{W}$
Electrical connection	prewired numbered cable 2,5m; optionally terminal box

Low Voltage Directive

The DS11 gauge meets the protection requirements of the low-voltage directive 72/23/EEC.



The equipment from Kirchner und Tochter 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 increasing demands.



Kirchner und Tochter