MECON
FLOW-CONTROL-SYSTEMS

RE 251 Variable Area Flowmeter

Operating Instructions

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1 Safety Instructions

1.1 Intended use

The Series RE 251 Variable Area Flowmeters with a standard installation length of 250 mm are suitable for measuring the most diverse fluids and gases in closed pipelines thanks to the all-metal design.

The sturdy construction allows them to be used even under harsh conditions. Various types of flanges, enclosures, and floats meet the requirements of the pharmaceutical and chemical industry.

The devices are particularly suited for the measurement of:

- Water
- Fluids
- Corrosion-protection agents and lubricants
- Solvents
- Saturated and overheated steam
- Foodstuff, alcoholic beverages and tobacco
- Industrial gases

Warning!

The owner/operator is solely responsible for the use of the measuring devices in terms of their suitability, intended use, and particularly the corrosion resistance of the materials used with respect to the measured substance. In particular, it must be ensured that the selected materials of the parts of the measuring device contacting the media are suitable for the process media used.

The manufacturer is not liable for damage caused by improper use of these devices.

Caution!

Hot process media can result in hot surfaces!
A risk of burns exists when surface temperatures exceed +60 °C.

- ***Take suitable safety precautions, such as contact protection.***
- ***The contact protection must be designed in a way that the maximum ambient temperature on the device is not exceeded.***

No external loads must impact the measuring device. The flowmeters are primarily designed for static applications.

The device may only be operated within the pressure and voltage limits specified on the nameplate. Always check before exchanging a device that the flowmeter is free of hazardous substances and pressures.

1.2 Certifications

CE symbol

By affixing the CE symbol, the manufacturer confirms that the type RE 251 flowmeter meets the applicable legal requirements of the following EC Directives:
The most dangerous permitted media are the gases and fluids of group 1.

- Pressure Equipment Directive 97/23/EC
- Low Voltage Directive 2006/95/EC

1.3 Manufacturer's safety instructions

The manufacturer cannot be held liable for damage resulting from the use of the device, including but not limited to direct, indirect, or incidentally occurring damage and consequential damage.

The warranty in accordance with the relevant product documentation and our General Terms and Conditions shall apply for every product purchased from the manufacturer.

The manufacturer reserves the right to revise the contents of the documents, including the exclusion of liability, without prior announcement and shall not be held liable in any way for possible consequences of such changes.

The owner/operator is solely responsible for determining whether the measuring devices are suited for the respective purpose. MECON GmbH shall assume no liability for consequences of misuse or for modifications or repairs which were made by the customer without prior consultation.

In the case of a complaint, the parts in question must be returned to us if no other agreements have been made.

In order to prevent injury to the user or damage to the device, it is imperative that you carefully read the information in these instructions before commissioning the device.

This manual is intended for the correct installation, operation, and maintenance of the devices.

Special designs and models adapted for particular applications are not a part of this documentation.

2 Device Description

2.1 Scope of delivery

1 Flowmeter RE 251
2 Operating Instructions
3 Certificates (optional)

Fig. 1 Scope of delivery

Information!
Please use the packing list to check the delivery for completeness.

2.2 Device design

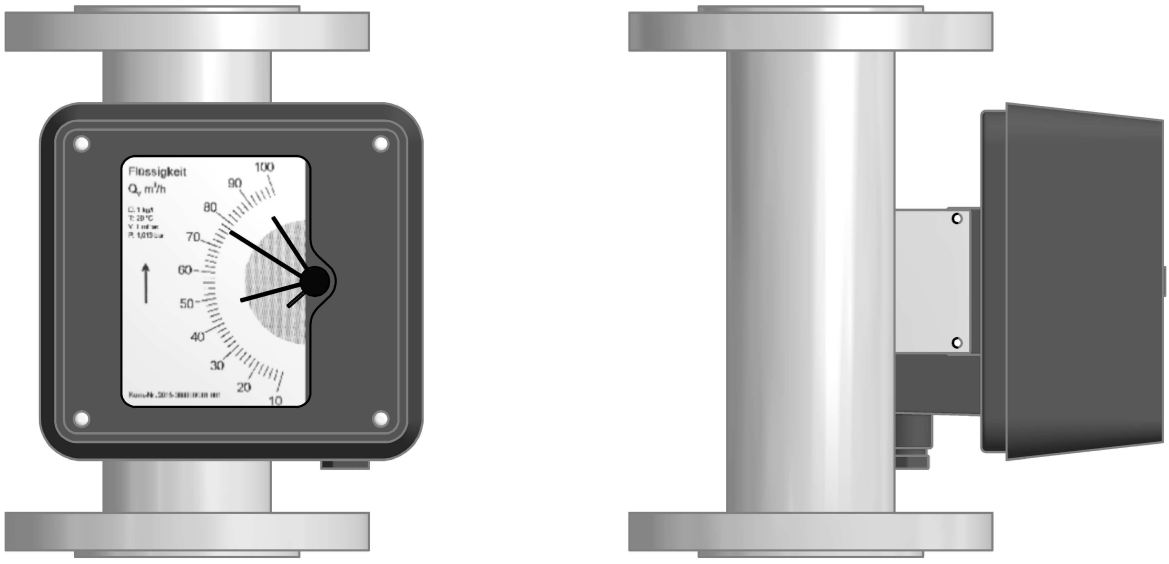


Fig. 2 Aluminum display unit

The measured value is displayed directly on the scale.

2.3 Nameplate

Important!

Please use the nameplate to check whether the device delivered matches your order.

Particularly check whether the correct voltage is specified.

Fig. 3 Nameplate RE 251 CF-S

①	Model	Designation code
②	Serial No.	
③	Process connection	
④	Material	
⑤	PS	Maximum permissible operating pressure in bar at +20 °C
⑥	Pmax at Tmax	Maximum permissible operating pressure at Tmax in bar
⑦	TS	Temperature range of the medium in °C
⑧	Protection	Protection class EN 60529: IP65
⑨	Contact	
⑩	CE	CE symbol / classification according to the PED

3 Installation and Operation

3.1 Installation instructions

Information!

All devices are carefully checked for proper function before they are shipped. Carefully check the packaging for damage or signs of improper handling immediately upon receipt.

Report any damage to the shipper and to your responsible sales representative. In such a case, please provide a description of the defect and the device type and serial number.

Information!

Carefully unpack the device to prevent damage.

Information!

Use the packing list to check the completeness of the delivery. Use the nameplate to check whether the flowmeter delivered matches your order. Particularly for devices with electrical components, check whether the correct power supply is specified.

3.2 Installation

The following points must be observed when devices are installed in the pipeline:

- Remove the transport guard from the fixture.
- Verify before the installation that the float can move freely in the fixture without tilting. The pointer must smoothly follow the float motion.
- If the float is manually moved to the end position, the pointer must be above the end value of the scale.
- The flowmeter must be installed vertically – flow direction from bottom to top. Also refer to Directive VDI/VDE 3513 Part 3 for installation recommendations.
- The installation in the pipeline must be carried out without tension; therefore the pipelines must be centrally positioned and aligned.
- Avoid a corrosive atmosphere; it may be necessary to ensure adequate ventilation.
- Ensure an installation clearance of at least 200 mm from parts affecting the magnet, for example, solenoid valves and ferromagnetic parts such as steel brackets.
- Please ensure a lateral distance of at least 300 mm between two adjacent devices. The installation clearance of the devices can be reduced by one device length in each case by staggered mounting.
- Select an installation site which allows for reliable reading of the displayed values and provides sufficient space for maintenance work.

- No inlet route upstream of the device or outlet route downstream of the device is required for a linear flow profile. In the case of a strongly asymmetrical flow profile, additional measures (e.g., inlet routes, flow straighteners) with a length of a least 250 mm can be practical to ensure the measurement precision.
- Do not install unilaterally constrictive fixtures upstream of the device.
- Ensure that the pipeline is securely mounted to prevent vibrations and oscillations of the device.
- The nominal width of the sensor and that of the connected pipeline must be identical.
- The screws and seals used must be selected to match the connection's pressure level and the minimum temperature.
- Ensure that the installation opening within the pipeline corresponds to the dimensions of the device plus two seals.
- The pipeline must be cleaned by flushing or blowing out before the device is installed.
- The surface roughness of the flange sealing surfaces must correspond to the seals used.
- **Do not use steel brackets on the device!**

Particularities when measuring gas flows:

- Valves must be installed downstream of the device when pabs > 1.013 bar and generally upstream of the device when pabs = 1.013 bar (free outflow).
- Install a throttle directly downstream of the measuring device to prevent compression vibrations during the measurement.
- In order to avoid incorrect measurements, select the arrangement in a way that the operating pressure in the measuring device corresponds to the reference pressure of the calibration.

Solenoid filter

Particularly ferromagnetic particles such as welding beads in the measured substance can cause the measuring device to fail. The use of magnetic filters is recommended if such particles cannot be ruled out in normal operation. The filter should be installed upstream of the measuring device.

A magnetic filter is not part of the device's scope of delivery.

3.3 Operation

Just like other devices of this series, the variable area flowmeter RE 251 operates according to the floating-body principle:

The measuring unit consists of a metal tube with a measuring ring, in which a float can move up and down. The conical float is raised by the measured substance floating from bottom to top. In this process, the ring gap increases until a balance is set between the weight force F_G, the buoyancy force F_A and the force F_S due to the flow resistance.

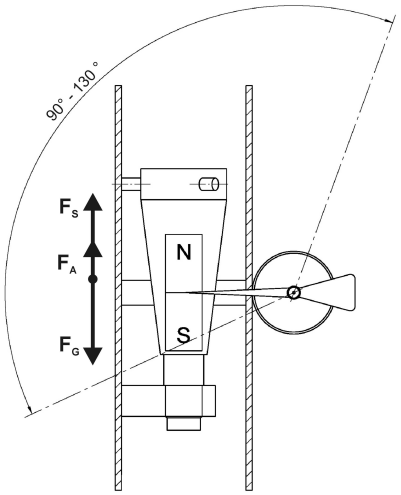


Fig. 4 Functional principle of the RE 251

3.4 Classification in accordance with the Pressure Equipment Directive (PED) (97/23/EC)

Process connection

EN1092-1	ANSI B16.5	Permissible media	Class
DN 15	½″	Group 1 gases and fluids	Art. 3.3
DN 20	¾″	Group 1 gases and fluids	Art. 3.3
DN 25	1″	Group 1 gases and fluids	Art. 3.3
DN 32	1 ¼″	Group 1 gases and fluids	II
DN 40	1 ½″	Group 1 gases and fluids	II
DN 50	2 ″	Group 1 gases and fluids	II
DN 65	2 ½″	Group 1 gases and fluids	II
DN 80	3″	Group 1 gases and fluids	II
DN 100	4″	Group 1 gases and fluids	II

Process connection	Permissible media	Class
G ½	Group 1 gases and fluids	Art. 3.3
G ¾	Group 1 gases and fluids	Art. 3.3
G 1	Group 1 gases and fluids	Art. 3.3
G 1¼	Group 1 gases and fluids	II
G 1½	Group 1 gases and fluids	II
G 2	Group 1 gases and fluids	II
NPT ½″	Group 1 gases and fluids	II
NPT ¾″	Group 1 gases and fluids	II
NPT 1½″	Group 1 gases and fluids	II
NPT 2″	Group 1 gases and fluids	II

4 Commissioning

4.1 Standard device

- Make sure that the actual operating conditions (pressure and temperature) do not exceed the limits specified on the nameplate.
- Avoid float impacts!

  It is therefore recommended that the device be commissioned with a closed shut-off valve, with the operating pressure being set by slowly opening the valve. Solenoid valves in particular are not recommended in this context.
- When measuring fluids, ensure careful venting of the pipeline to prevent pressure surges due to gas bubbles.

  When new systems are commissioned, residues can deposit on the float in increased amounts. If this occurs, we recommend cleaning the device after a relatively short period of time.
- When using the devices in the lowest measuring range, the devices must be briefly started up at a high flow rate to allow the float to level off.

Particularities when measuring gas flows:

- Valves must be installed downstream of the device when pabs > 1.013 bar and generally upstream of the device when pabs = 1.013 bar (free outflow).
- Install a throttle directly downstream of the measuring device to prevent compression vibrations during the measurement.
- In order to avoid incorrect measurements, select the arrangement in a way that the operating pressure in the measuring device corresponds to the reference pressure of the calibration.
- When gases are measured, the operating pressure must be slowly increased to prevent pressure surges.

4.2 Adjusting the magnetic spring contact

The magnetic spring contact is set by a spring-loaded adjusting wheel on the front of the display unit. The switching point of the magnetic spring contact can be set by pressing and turning the adjusting wheel.

5 Technical Data

5.1 Technical data

General data

Application	Flow measurement of fluids and gases
Measuring principle	Float / float measurement
Direction of flow	Vertical – from bottom to top

Measurement precision *

Directive	VDI / VDE, Sheet 2 (qG = 50%)
Fluids	G 1.6
Gases	G 2.0
Reproducibility	0.5 % of the MBE

* A deviation of the operating temperature from the temperature for which the calibration was made will result in a corresponding error.

Materials

Parts in contact with the media	Stainless steel
Flange	Stainless steel
Fixture	Stainless steel
Float + guide	Stainless steel
Base plate	Aluminum
Cover	Vestamid

5.2 Pressure and temperature limits

Pressure

Max. medium	DN 15 - DN 100	PN 160 (optional up to 400 bar)
Pressure PS	½" - 4"	580 psi (optional up to 5800 psi)
Min. operating pressure		> 2 x pressure loss (see measuring range)

Temperature

Max. TS	-40 °C to +120 °C
With temperature shielding	-40 °C to +200 °C

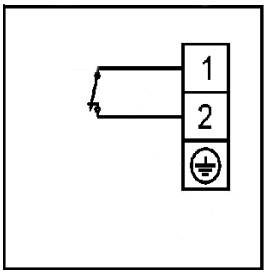
Protection class (DIN EN 60529)

Display unit	IP65

Magnetic spring contact

Switching principle	Magnetic spring contact, double contact
Connection	Device connector DIN 43650
Max. switching frequency	5/min
Max. switching power	AC 250 / 1A / 50VA DC 250V / 1A / 30W The power rating applies to the resistive load
Hysteresis	±3 % of the upper limit of the measured range
Ambient temperature	-20 °C to +70 °C

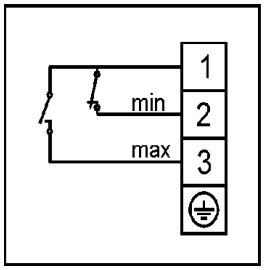
Magnetic spring contact
Single contact



Connection:
Device connector
as per DIN 43650

***Fig.* 5** RE 251, contact, terminal diagram, single contact

Magnetic spring contact
Double contact (Standard)

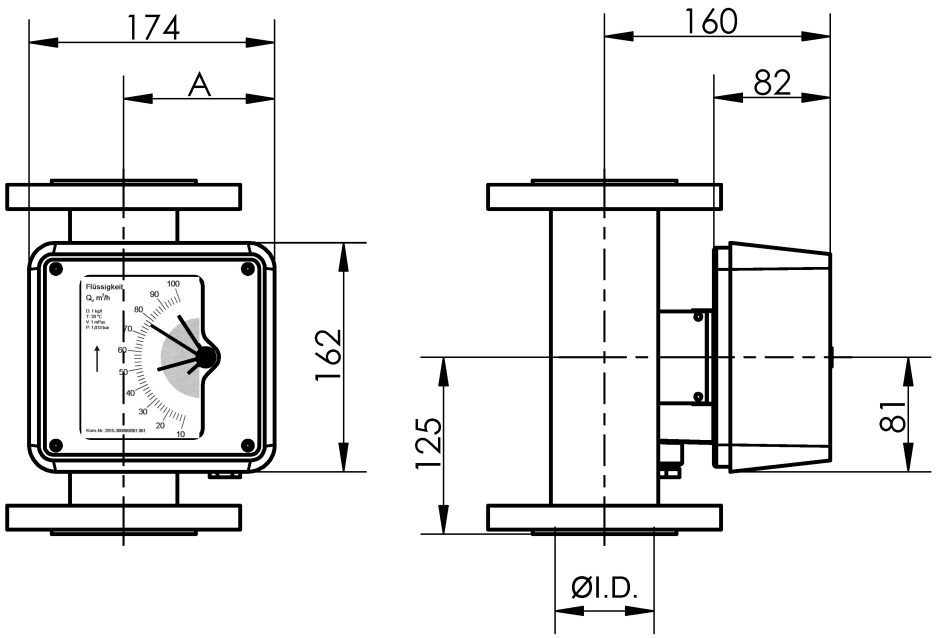


Connection:
Device connector
as per DIN 43650

***Fig.* 6** RE 251, contact, terminal diagram, double contact

5.3 Dimensions and weights

Standard version (aluminum display unit)

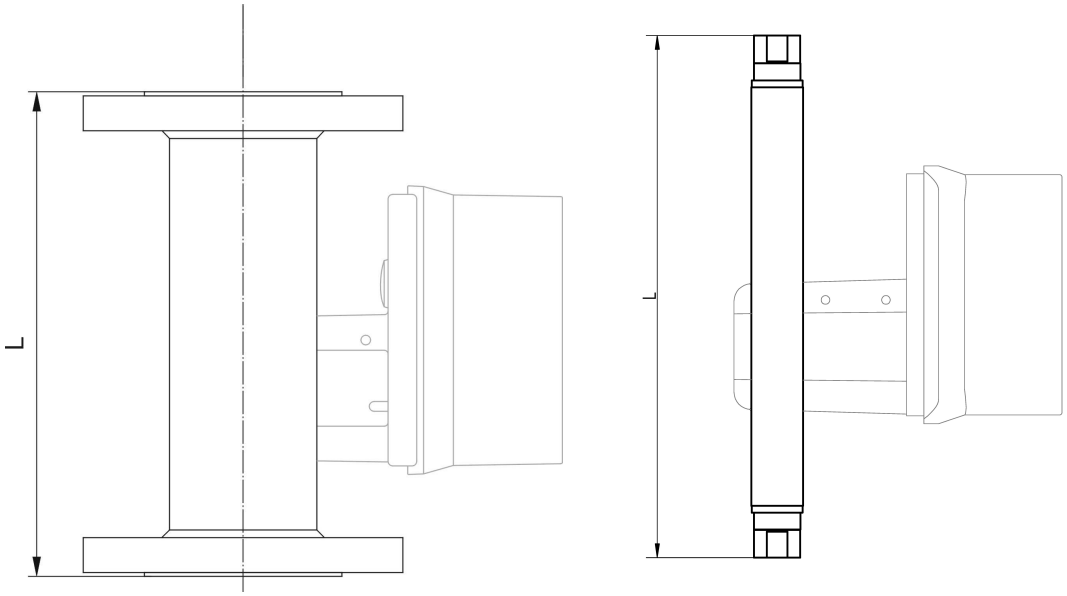


Nominal width	ANSI	Ø I.D (mm)	A (mm)	Weight (kg)
DN 15	½"	26	74	3.0
DN 20	¾"	26	74	3.0
DN 25	1"	32	77	4.2
DN 32	1¼"	32	77	5.2
DN 40	1½"	32	77	6.0
DN 50	2"	70	97	7.5
DN 65	2½"	70	97	8.5
DN 80	3"	102	113	13.0
DN 100	4"	125	126	18.0

* Installation length L: Page 15

Connection		A (mm)	Weight (kg)
G ½	Internal thread overall length 300 mm	26	2.5
G ¾	Internal thread overall length 300 mm	26	2.5
G 1	Internal thread overall length 300 mm	32	3.5
G 1¼	Internal thread overall length 300 mm	32	3.5
G 1½	Internal thread overall length 300 mm	97	6.0
G 2	Internal thread overall length 300 mm	97	6.0
NPT ½"	Internal thread overall length 300 mm	26	2.5
NPT 1"	Internal thread overall length 300 mm	26	2.5
NPT ¾"	Internal thread overall length 300 mm	32	3.5
NPT 1¼"	Internal thread overall length 300 mm	32	3.5
NPT 1½"	Internal thread overall length 300 mm	97	6.0
NPT 2"	Internal thread overall length 300 mm	97	6.0

Installation length L

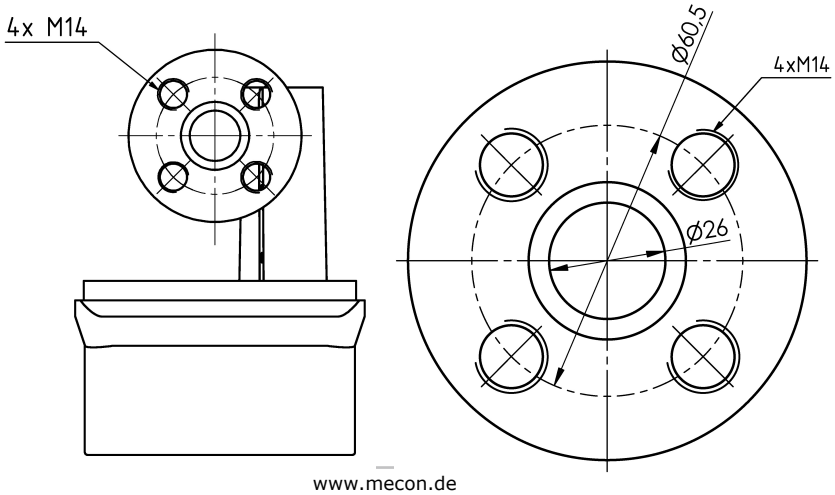


The installation length L for the threaded connection is: 300 mm.

Pressure rating

Nominal width	PN 16	PN 40	ANSI B16.5 150 RF	150 lbs
DN 15	◇	250	½"	250
DN 20	◇	250	¾"	250
DN 25	◇	250	1"	250
DN 32	◇	250	1 ¼"	250
DN 40	◇	250	1 ½"	250
DN 50	◇	250	2"	250
DN 65	250	◇	2 ½"	250
DN 80	◇	250	3"	250
DN 100	250	◇	4"	250

Particularity of ANSI B16.5 ½" for upper limit of the measured range: 1000 / 1600 / 2500 / 4000 l/h:



6 Electrical Connections

6.1 Safety instructions

Caution!

Work on electrical connections may be performed by trained specialists only. Make absolutely sure that the power supply is shut off.

The locally applicable health and safety regulations must be complied with under all circumstances. Note the electrical data specified on the nameplate.

6.2 Degree of protection

The display unit produced from Vestamid meets all requirements of protection class IP65.

Caution!

After service and maintenance work has been performed on the device, the owner/operator must once again verify and ensure the protection class.

The following requirements must therefore be absolutely complied with:

- The display unit's fastening screws must be firmly tightened.
- None of the seals (display unit and cable screw-connections) may be damaged. Defective seals must be replaced.
- The cable screw connections must be tightened and free of damage.
- The cables must be laid as a loop before the cable screw-connection to prevent moisture from penetrating the display unit.

7 Identification Key

Specific part for versions CF-S (stainless steel)

The identification key consists of the following elements:

7ME5820 - 2 ☐ ☐ ☐ ☐ - 0 B ☐ ☐

① ② ③ ④ ⑤ ⑥

① Nominal width

A	DN 15	(1/2" ANSI)
F	DN 20	(3/4" ANSI)
B	DN 25	(1" ANSI)
G	DN 32	(1 1/4" ANSI)
H	DN 40	(1 1/2" ANSI)
C	DN 50	(2" ANSI)
J	DN 65	(2 1/2" ANSI)
D	DN 80	(3" ANSI)
E	DN 100	(4" ANSI)

②

	Measuring cone nominal width	**Measuring range end value**								
	l/h	15	20	25	32	40	50	65	80	100
C	40	●	●	●	●	●				
D	70	●	●	●	●	●				
E	100	●	●	●	●	●				
F	160	●	●	●	●	●				
G	250	●	●	●	●	●				
H	400	●	●	●	●	●				
J	600	●	●	●	●	●				
K	1000	●	●	●	●	●	●	●		
L	1600	●	●	●	●	●	●	●		
M	2500	●	●	●	●	●	●	●		
N	4000	●	●	●	●	●	●	●		
P	6300				●	●	●	●		
Q	10000						●	●		
R	16000						●	●	●	●
S	20000						●	●	●	●
T	25000						●	●	●	●
U	40000							●	●	●
V	50000							●	●	●
W	63000									●
X	100000									●

③ Flange connection standard

1	DIN EN 1092-1
2	ANSI B 16.5
3	Thread
9	Special connections (indicate other pressure levels in plain text)

④ **Temperature shielding**

0	without
1	with temperature shielding 125 °C to 200 °C

⑤ **Contact function**

for magnetic spring contacts:

B	single contact NO switch
C	single contact NC switch
D	close when the limit value is exceeded or fallen short of
E	open when the limit value is exceeded or fallen short of
G	close when the limit value is fallen short of, open when it is exceeded
H	open when the limit value is fallen short of, close when it is exceeded

⑥ **Calibration**

0	without calibration certificate
1	with calibration certificate
9	special calibration (1.0% accuracy)

⑦ **Additional designs**

Append order number with "**Z**" and add brief information:

Y01	specify in plain text: measured substance, measuring range, density, viscosity, operating temperature, operating pressure
Y04	silicon-free design
Y05	measured substance water, viscosity: 1 mPa.s (cp), density: 1 kg/l (62.43 lb/cft)
Y17	Stainless-steel nameplate
Y99	Specify special design in plain text
C12	Acceptance test B as per DIN 50049, Section 3.1 and EN 10204
FTH	Factory acceptance test to H protocol. Jaterial d Welding quality, Welding check, Calibra on Check

8 Service

8.1 Storage

Store the measuring device so that it is dry and free of dust.

Prevent continuous direct sunlight and heat.

Prevent external loads on the device.

The permissible storage temperatures for standard devices with electrical components range from -20 °C ... +40 °C.

8.2 Maintenance and cleaning

Although the devices are maintenance-free, we recommend routinely inspecting the flowmeter for signs of corrosion, mechanical wear, and damage.

We recommend making routine inspections at least once a year.

The device must be removed from the pipeline for in-depth inspection and cleaning.

Caution!

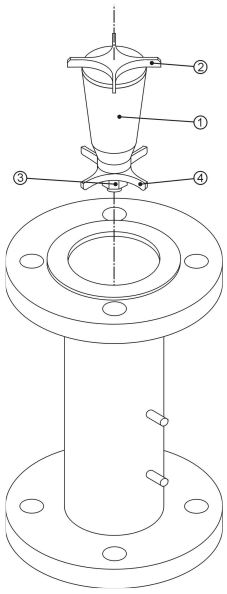
Appropriate safety precautions must be taken when removing the device from the pipeline. New seals must generally be used when the device is reinstalled in the pipeline.

8.3 Replacing the float

Devices with measuring ring

The float can be replaced by the customer for devices with standard measuring ranges of 5 - 50 l/h (gases: 0.15 - 1.5 m³/h):

- Remove the device from the pipeline.
- Secure the device so that the fixture does not become damaged.
- Secure the float (1) against twisting by fastening the lower guide star (4) with a suitable tool.
- Remove the self-locking nut (3) and take the lower guide star out of the fixture.
- Now remove the float upwards and out of the fixture.
- Install the new float into the fixture from above. In this process, carefully guide the lower end through the measuring ring.
- Place the lower guide star back onto the float and fasten it with the self-locking nut.
- Reinstall the device in the pipeline.



1 Float

2 Upper guide star

3 Self-locking nut

4 Lower guide star

Fig.7 Replacing the float

8.4 Returning the device to the manufacturer

Thanks to a careful manufacturing process and final inspections of the device, trouble-free operation of the RE 251 can be expected when it is installed and operated in accordance with these instructions.

Should it nevertheless become necessary to return the device to MECON GmbH, the following must be observed:

Caution!

Due to legal regulations on environmental protection and occupational safety and in order to ensure the health and safety of our employees, ***all devices returned to MECON GmbH must be free of toxic and hazardous substances. This also applies to the devices' cavities. If necessary, the customer should neutralize and rinse the device before returning it to MECON GmbH.***

The customer must confirm this by filling out a corresponding form which can be downloaded from the Mecon GmbH website:

www.mecon.de/de/Erklaerungen/Dekontaminationserklaerung.pdf

MECON Flow-Control-Systems Product Overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Baffle plate flowmeters
- Orifice flowmeters
- Flap flowmeters
- Flow controllers
- Level measurement
- Sludge-water removal

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