



# Magnetic Inductive Flow Sensor **induQ**<sup>®</sup>

Series VMZ



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## 0 About this operating manual

- The operating manual is aimed at specialists and semi-skilled personnel.
- Before each step, read through the relevant advice carefully and keep to the specified order.
- Thoroughly read and understand the information in the section "Safety instructions".

If you have any problems or questions, please contact your supplier or contact us directly at:



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### Hazard signs and other symbols used:



**WARNING! / CAUTION! Risk of injury!**

This sign indicates dangers that cause personal injuries that can lead to health defects or cause considerable damage to property.



**CAUTION! Electric current!**

This sign indicates dangers which could arise from handling of electric current.



**CAUTION! Material damage!**

This sign indicates actions which could lead to possible damage to material or environmental damage.



**ADHERE TO OPERATING MANUAL!**



**NOTICE!**

This symbol indicates important notices, tips or information.



**NO DOMESTIC WASTE!**

The device must not be disposed of together with domestic waste.



Pay attention to and comply with information that is marked with this symbol.



Follow the specified instructions and steps. Adhere to the given order.



Check the specified points or notices.



Reference to another section, document or source.

- Item.

## 1 Device description

The induQ® of the VMZ series from Sika, is a non-contact flow sensor. The measurement is performed using magnetic induction and works without any moving parts.

The VMZ is used for measuring or metering water and aqueous solutions. The compact design and independence from the intake and discharge sections allows the VMZ to be used under a variety of conditions.

### Components:

- ① Sensor housing:  
The sensor housing consists of plastic and has the IP65 degree of protection.
- ② Electrical connection:  
The electrical connection is made via 4-pin plug M12x1.
- ③ Operation / flow indicator LED.
- ④ Type plate with flow direction (marking)
- ⑤ Process connection:  
The process connections are available in different sizes.



### Versions\*:

The VMZ is available in different nominal sizes from DN 3 to DN 25.

The versions can be configured differently. Further information can be found in our catalogues at [catalogues.sika.net](http://catalogues.sika.net).

### Scope of delivery and accessories:

Before installing the device, check that the delivered items and ordered accessories:

Scope of delivery:

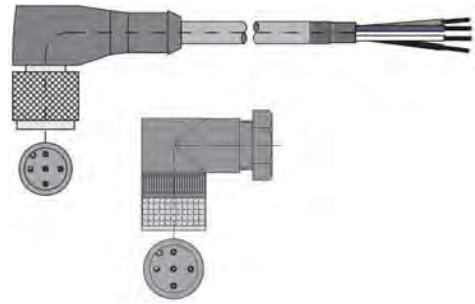
- 1x VMZ as ordered.
- 1x Operating manual.
- 1x Packaging.



\* Customised versions available on request.

Accessories:

- Connection cable with moulded M12x1 coupling socket.
- M12x1 coupling socket as component.



## 1.1 Intended use

The magnetic inductive flow sensor VMZ must only be used for measuring and metering liquids with a minimum conductivity of 20  $\mu\text{S}/\text{cm}$ .



### **WARNING! No safety component!**

The magnetic inductive flow sensor of the series VMZ are not safety components in accordance with Directive 2006-42-EC (Machine Directive).

↳ Never use the VMZ as a safety component.

The operational safety of the device supplied is only guaranteed by intended use. The specified limits (→ § 9 "Technical data") may under no circumstances be exceeded.

Before installing the device, check that the wetted materials of the device are compatible with the media being used (→ § 9.2 "Materials table").

Measuring tube empty (or partially filled). / Conductivity too low.



The green LED may blink irregularly if the measuring tube of the VMZ is empty or partially filled or if the conductivity of the fluid being used is too low. Random pulses will be present at the output, but they do not represent an actual flow.

↳ Ensure that the measuring tube of the VMZ is always completely filled (→ § 4.1 "Installation instructions").

↳ Ensure that the conductivity of the fluid is at least 20  $\mu\text{S}/\text{cm}$ .

## 1.2 Exclusion of liability

We accept no liability for any damage or malfunctions resulting from incorrect installation, inappropriate use of the device or failure to follow the instructions in this operating manual.

## 2 Safety instructions



Before you install the VMZ, read through this operating manual carefully. If the instructions contained within it are not followed, in particular the safety guidelines, this could result in danger for people, the environment, and the device and the system it is connected to.

The VMZ correspond to the state-of-the-art technology. This concerns the accuracy, the operating mode and the safe operation of the device.

In order to guarantee that the device operates safely, the operator must act competently and be conscious of safety issues.

SIKA provides support for the use of its products either personally or via relevant literature. The customer verifies that our product is fit for purpose based on our technical information. The customer performs customer- and application-specific tests to ensure that the product is suitable for the intended use. With this verification all hazards and risks are transferred to our customers; our warranty is not valid.

### Qualified personnel:

- ⚠ The personnel who are charged for the installation, operation and maintenance of the VMZ must hold a relevant qualification. This can be based on training or relevant tuition. The personnel must be aware of this operating manual and have access to it at all times.
- ⚠ The electrical connection should only be carried out by a fully qualified electrician.

### General safety instructions:

- ⚠ In all work, the existing national regulations for accident prevention and safety in the workplace must be complied with. Any internal regulations of the operator must also be complied with, even if these are not mentioned in this manual.
- ⚠ Degree of protection according to EN 60529:  
Please ensure that the ambient conditions at the site of use does not exceed the requirements for the stated protection rating (→ § 9 "Technical data").
- ⚠ Only use the VMZ if it is in perfect condition. Damaged or faulty devices must be checked without delay and, if necessary, replaced.
- ⚠ When fitting, connecting and removing the VMZ use only suitable appropriate tools.
- ⚠ Do not remove or obliterate type plates or other markings on the device, as otherwise the warranty is rendered null and void.

### Special safety instructions:

Warnings that are specifically relevant to individual operating procedures or activities can be found at the beginning of the relevant sections of this operating manual.

### 3 Construction and function

#### Construction:

The measuring tube with its earthing sleeves and electrodes passes through the sensor housing and forms the external process connection of the VMZ.

A magnetic field for the measurement process is generated inside the sensor housing, which also contains the sensor and signal conditioning circuitry.

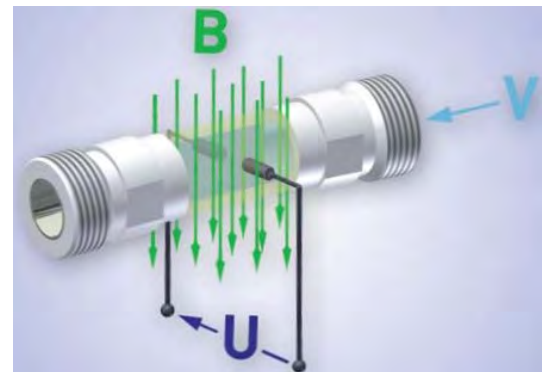
The two stainless steel electrodes are located in the middle of the measuring tube between the earthing sleeves. The VMZ does not need any moving parts to make measurements. The inside of the measuring tube is completely open, allowing the fluid to flow unhindered through the measuring tube.



#### Function:

The magnetic inductive flow sensor functions according to the induction principle:

The measuring tube is located in a magnetic field ( $B$ ). If an electrically conductive medium ( $V$ ) flows through the measuring tube and, therefore, at right angles to the magnetic field, a voltage ( $U$ ) which is proportional to the mean flow velocity will be induced in the medium and subsequently picked up by the two electrodes.



### 4 Installation of VMZ

Before installing, check that

- the wetted materials of the device are suitable for the media being used (→ § 9.2 "Materials table").
- the equipment is switched off and is in a safe and de-energised state.
- the equipment is depressurised and has cooled down.



#### SUITABLE TOOLS:

Use only suitable tools of the correct size.



## 4.1 Installation instructions

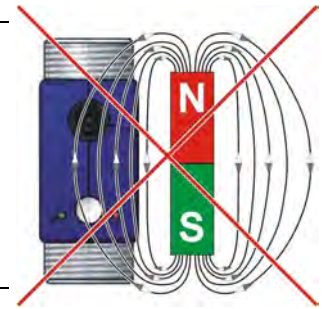
### CAUTION!

#### Risk of malfunction due to external magnetic fields!

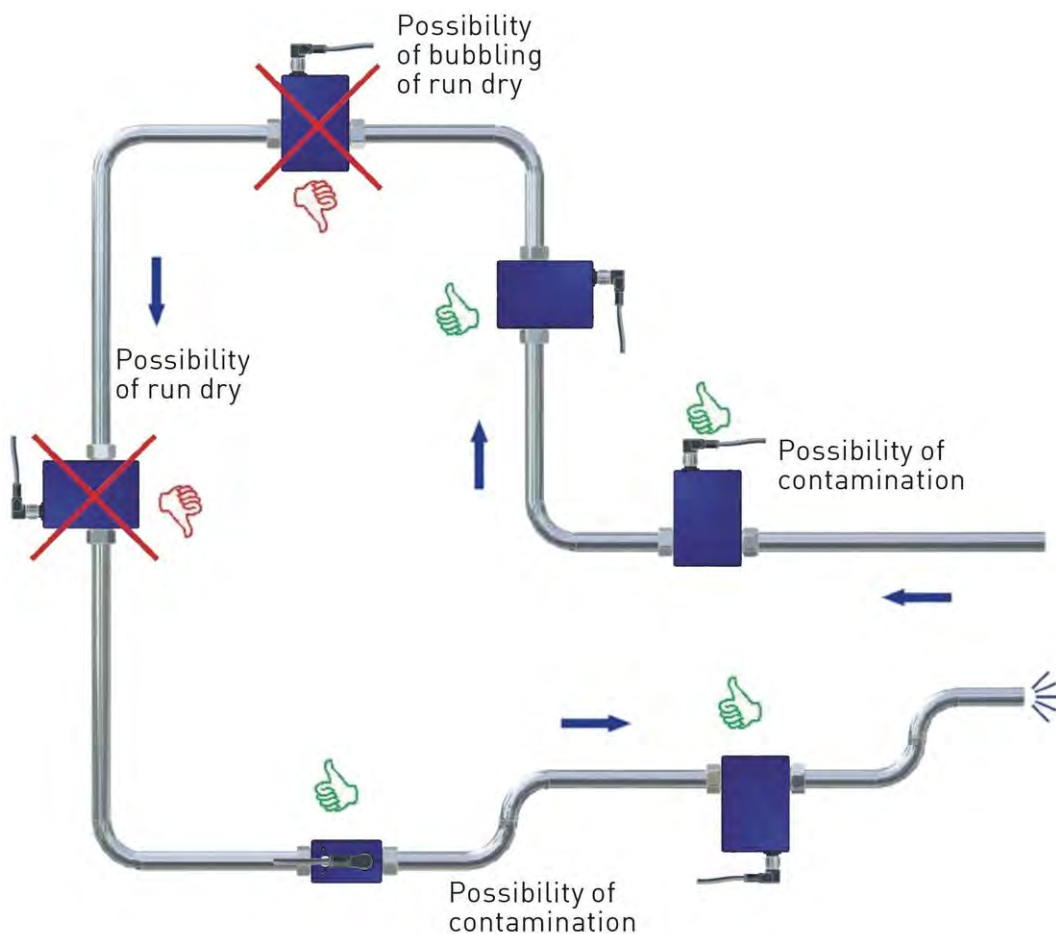


Magnetic fields close to the device can cause malfunctions and should be avoided.

- Ensure that no external magnetic fields are present at the installation site of the VMZ.



- The VMZ can always be installed anywhere along the pipeline. Straight sections of piping are preferable, however.



- Installation can occur in horizontal and vertical pipes. The flow sensor is only suitable for application in completely filled pipe systems.
- As a matter of principle magnetic inductive flow sensors are widely independent from the flow profile. An inlet section is not absolutely necessary. To reach a most highly accuracy of the measurement, you should use straight inlet and outlet sections according to the nominal width (DN). The inlet section has to be at least 10 x DN; the outlet section 5 x DN in order to achieve the specified accuracy.
- The inlet and outlet sections and the gaskets must have the same or a slightly larger inside diameter than the measuring tube in order to achieve the specified accuracy.



- If two or more VMZ devices are used side by side, maintain a separation of at least 2.5 cm between adjacent devices. If adjacent devices are too close together, operation of both devices may be impaired due to mutual interference.



## 4.2 Assembly

The VMZ is installed directly into the pipeline. The compact design and light weight of the unit make wall-mounting unnecessary.



### IMPORTANT NOTICES:

- Only use suitable gaskets for installation.
  - Observe the flow direction indicated on the type plate.
  - Observe the mounting dimensions (→ § 9.4 "Dimensions").
- ↪ Select an appropriate location for installation (→ § 4.1 "Installation instructions").
- To ensure the best possible measuring accuracy, a vertical installation position with increasing flow is preferable (no collecting of dirt deposits).
- ↪ Install the appropriate screwed connections at the installation location.
- ↪ Insert the VMZ together with the gaskets.
- ↪ Screw the union nuts of the screwed connection onto the process connections of the VMZ.
- ↪ Tighten both union nuts with a maximum torque of 5 Nm.



### CAUTION! Material damage! Maximum torque 5 Nm.

While tightening, counter the VMZ only by hand!  
If you use an open-end or a pipe wrench, the VMZ can be damaged.



## 5 Electrical connection

The electrical connection of the VMZ is via the 4-pin plug M12x1 at the top.

The corresponding connection cables with moulded coupling socket are available in various lengths included in the range of SiKA accessories.



### CAUTION! Electric current!

The electrical connection should only be carried out by a fully qualified electrician.

↳ De-energize the electrical system before connecting the VMZ.

### Connection and wiring:

- ↳ Screw the coupling socket of the connection cable to the plug of the VMZ.
- ↳ Tighten the knurled nut of the coupling socket with a maximum torque of 1 Nm.
- ↳ Connect the connection cables according to the following wiring diagrams.

Pin assignment:

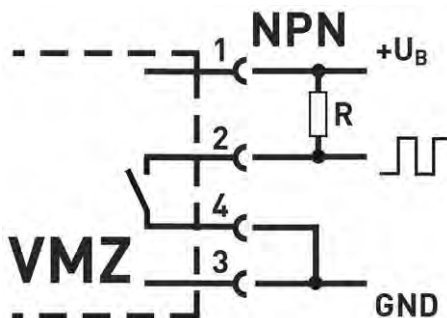


Pin 1: +U<sub>B</sub>

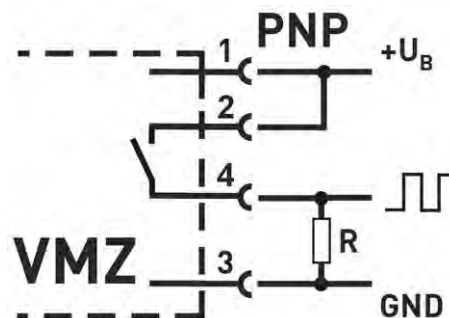
Pin 3: GND

Pin 2 / 4: Frequency output NPN/PNP

Pin configuration with  
NPN frequency output:



PNP frequency output:



Pull-up- / pull-down-resistors **R**.

We recommend using resistors of ~1 kΩ (12V) respectively ~2,2 kΩ (24V) and 0.25 W for the pull-up / pull-down wiring.

↳ Please note that the maximum signal current of 25 mA will not be exceeded.



## 6 Commissioning and measuring operation

Before switching on the VMZ for the first time, please follow the instructions in the following section.

### 6.1 Commissioning

Check that

- the VMZ has been installed correctly and that all screw connections are sealed.
- the electrical wiring has been connected properly.
- the measuring system is vented by flushing.

↪ Switch on the supply voltage.

The red LED lights permanently. The VMZ is ready for use and goes into measuring operation.

### 6.2 Measuring operation

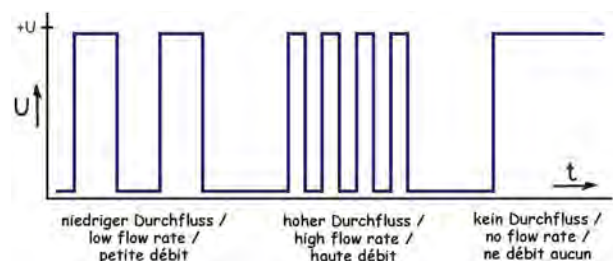
The red LED is constantly lit to indicate that the VMZ is operational.

The green LED blinks according to the frequency of the output signal.

This blinking is not perceptible to the human eye at frequencies above 30 to 40 Hz, so the green LED appears to be constantly lit.

#### Frequency output:

The frequency output provides a flow-proportional PNP/NPN square wave signal.



## 7 Maintenance and cleaning

#### Maintenance:

The VMZ is maintenance-free and cannot be repaired by the user. In case of a defect, the device must be replaced or sent back the manufacturer for repair.



#### CAUTION! Material damage!

When opening the device, critical parts or components can be damage.

↪ Never open the device and perform any repair yourself.

#### Cleaning:

Clean the VMZ with a dry or slightly damp lint-free cloth. Do not use sharp objects or aggressive agents for cleaning.

## 8 Disassembly and disposal



### CAUTION! Risk of injury!

Never remove the device from a plant in operation.

↪ Make sure that the plant is shut down professionally.

### Before disassembly:

Prior to disassembly, ensure that

- the equipment is switched off and is in a safe and de-energised state.
- the equipment is depressurised and has cooled down.

### Disassembly:

- ↪ Remove the electrical connectors.
- ↪ Remove the VMZ using suitable tools.

### Disposal:



### NO HOUSEHOLD WASTE!

The VMZ consists of various different materials. He must not be disposed of with household waste.

- ↪ Take the VMZ to your local recycling plant
- or
- ↪ send the VMZ back to your supplier or to SiKA.



## 9 Technical data

The technical data of customised versions may differ from the data in these instructions. Please observe the information specified on the type plate.

### 9.1 Characteristics VMZ

Type	VMZ 030	VMZ 081	VMZ 082	VMZ 153	VMZ 204	VMZ 205	VMZ 256
<b>Measurement device characteristics</b>							
Flow range [l/min]	0.1...2	0.25...5	1...20	2.5...50	5...100	10...200	12.5...250
Accuracy*	1% of reading						
Repeatability	1%						
Output signal starting from [l/min]	0.05	0.1	0.25	1	2	4	5
Max. flow rate [l/min]	2.5	6	25	60	120	240	300
Response time	< 100 ms						
Indications	red LED = Supply voltage • green LED = Flow						
<b>Output signal characteristics</b>							
<b>Frequency output:</b>							
- Pulse rate / K-Factor** [pulses/l]	10 000	4000	1000	400	200	100	80
- Resolution** [ml/pulse]	0.1	0.25	1.0	2.5	5.0	10.0	12.5
- Signal shape	Square wave signal • duty cycle 50:50 can be connected as PNP or NPN open collector						
- Signal current	≤ 25 mA						
<b>Electrical characteristics</b>							
Supply voltage	24 V <sub>DC</sub> ±15% or 12 V <sub>DC</sub> ±15%						
Power consumption	0.6 W						
Electrical protection measures	short-circuit proof • protected against polarity reversal						
Electrical connection	4-pin-plug M12x1						
Degree of protection (EN 60529)	IP 65 (only with a connected coupling)						
<b>Process variables</b>							
Medium to measure	Water and other conductive liquids						
- Conductivity	> 20 µS/cm						
- Temperature	-10...60 °C (not freezing)						
Ambient temperature	5...60 °C						
Nominal diameter	DN 3	DN 8	DN 15	DN 20	DN 25		
Inner diameter	3 mm	8 mm	14 mm	18 mm	25 mm		
Max. working pressure (at ... °C)	10 bar (20 °C) • 8 bar (40 °C) • 6 bar (60 °C) higher pressure ratings on demand						
Process connection	G $\frac{3}{8}$ B male thread	G $\frac{1}{2}$ B male thread	G $\frac{3}{4}$ B male thread	G1 B male thread	G1 $\frac{1}{4}$ B male thread		

\* test conditions: Water 23 °C

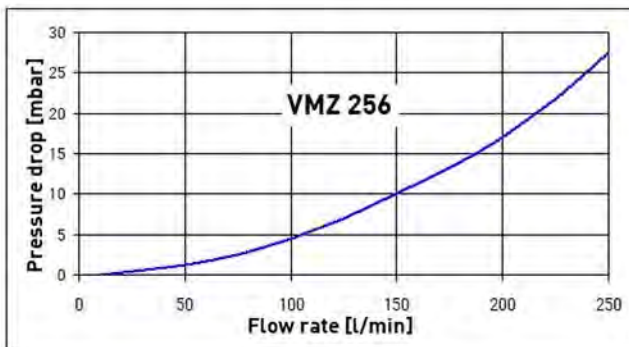
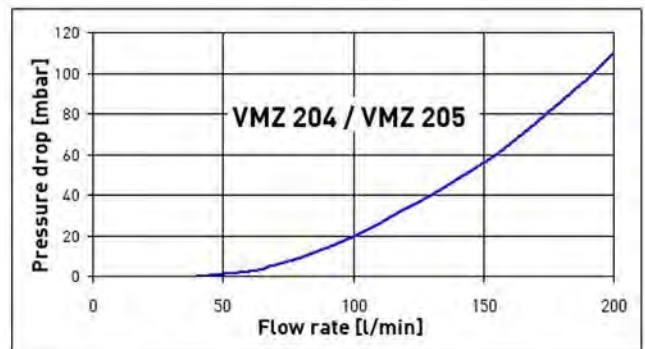
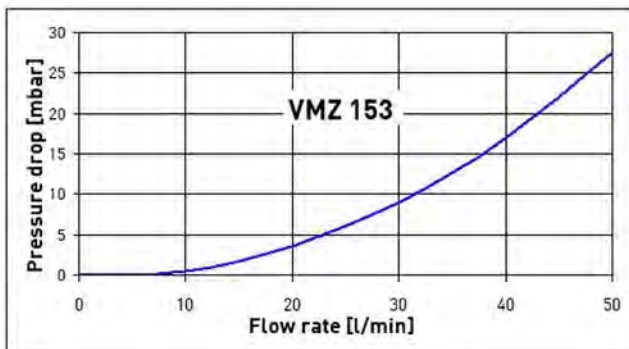
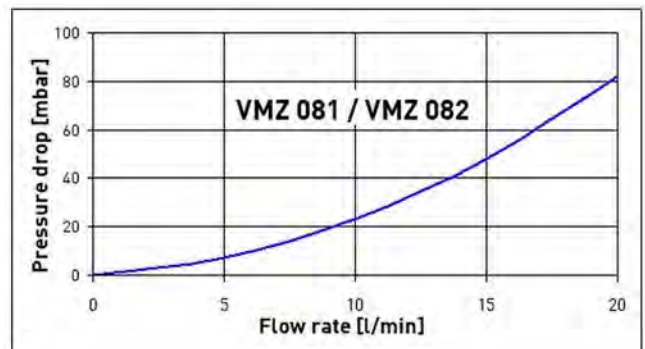
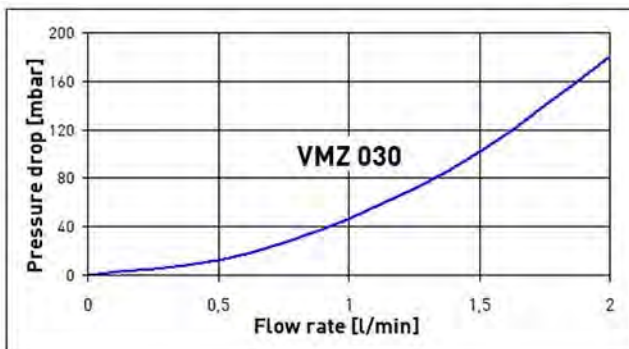
\*\* other pulse rate / resolution on request.

optional: Output signal with lower frequency, designed specifically for connection to digital PLC inputs.

## 9.2 Materials table

Component	Material	Component-wetted
Housing	ABS	
Measuring tube - VMZ___DE___ - VMZ___PE___	POM PVDF	X
Process connections - VMZ___DE___ - VMZ___PE___	POM PVDF	X
O-ring	EPDM	X
Electrodes	Stainless steel 316L	X
Grounding rings	Stainless steel 316L	X

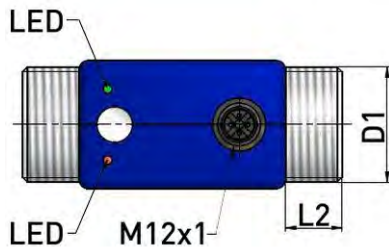
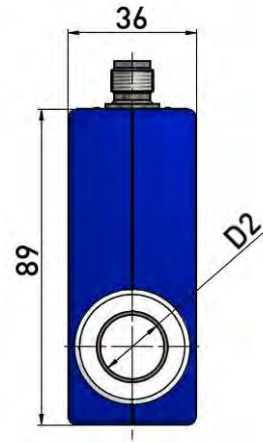
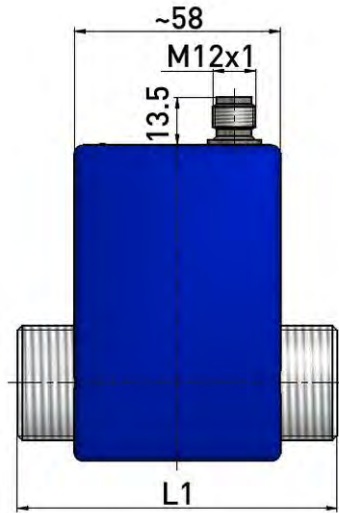
## 9.3 Pressure drop





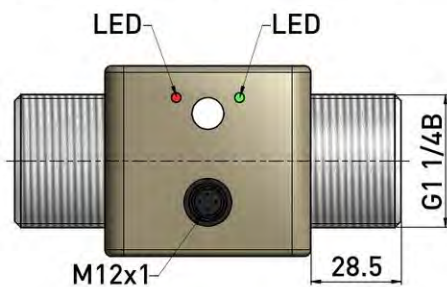
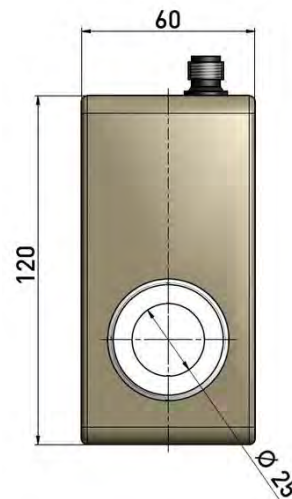
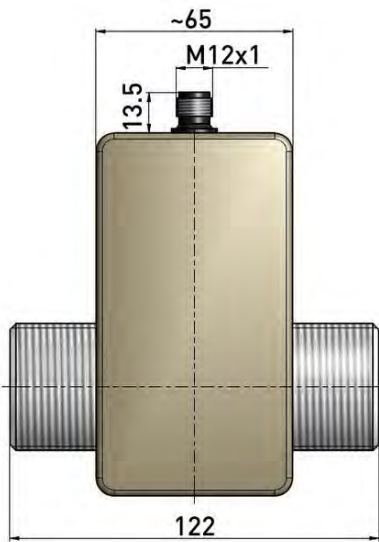
9.4 Dimensions

DN 3 / DN 8 / DN 15 / DN 20:



Type	L1	L2	D1	D2
VMZ 030	85	13.3	G $\frac{3}{8}$ B	Ø 3
VMZ 081	85	13.3	G $\frac{1}{2}$ B	Ø 8
VMZ 082	85	13.3	G $\frac{1}{2}$ B	Ø 8
VMZ 153	90	16	G $\frac{3}{4}$ B	Ø 14
VMZ 204	90	16	G1 B	Ø 18
VMZ 205	90	16	G1 B	Ø 18

VMZ DN 25:





Mechanical measuring instruments




Flow measuring instruments




Electronic measuring- & calibration instruments




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