

Operating instructions

DMIK



H₂O

FUNCTION

The flow sensor type DMIK operates on the magnetic-inductive principle.

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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 **Meister Strömungstechnik®**

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!	
	NO DOMESTIC WASTE! The device must not be disposed of together with domestic waste.	
		NOTICE! This symbol indicates important notices, tips or information.
		Pay attention to and comply with information that is marked with this symbol.

1 – DEVICE DESCRIPTION

The DMIK from Meister Strömungstechnik is a non-contact flow sensor. The measurement is performed using magnetic induction and works without any moving parts.

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

Versions:

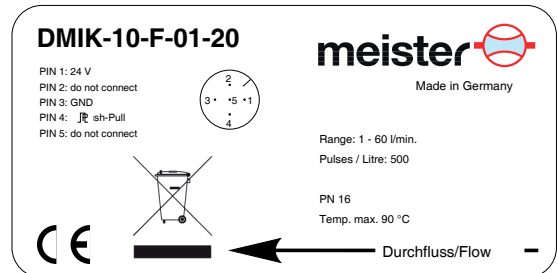
The DMIK is available in nominal sizes DN 7, DN 10 and DN 20.

The versions can be configured differently. Further information can be found in our datasheet.

Type plate:

The type plate sticker is located at the bottom side of the DMIK.

It contains the most important data, the connection diagram and the arrow for the flow direction.



1.1 – DELIVERY

All units have been carefully checked for their operational reliability before shipment.

- Immediately after receipt, please check the outer packaging for damages or any signs of improper handling.
 - Report any possible damages to the forwarder and your responsible sales representative. In such a case, state a description of the defect, the type and the serial number of the device.
- Report any in-transit damage immediately. Damage reported at a later date shall not be recognized.

Unpacking:

- Carefully unpack the unit to prevent any damage.
- Check the completeness of the delivery based on the delivery note.

1.2 – INTENDED USE

The magnetic inductive flow sensor DMIK must only be used for measuring and metering liquids with a minimum conductivity of 50 $\mu\text{S}/\text{cm}$.



WARNING! No safety component!

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

Never use the DMIK as a safety component.

The operational safety of the device supplied is only guaranteed by intended use. The specified limits (see 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 (see 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 DMIK 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 DMIK is always completely filled (see 4.1 "Installation instructions").

Ensure that the conductivity of the fluid is at least 50 $\mu\text{S}/\text{cm}$.

1.3 – 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 installing the DMIK, read through this operating manual carefully. If the instructions contained within are not followed, in particular the safety guidelines, this could result in danger for personnel, the environment, and the device and the system it is connected to.

The DMIK corresponds 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.

Meister Strömungstechnik 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 applicationspecific tests to ensure that the product is suitable for the intended use. With this verification all hazards and risks are transferred to our customers and our warranty expires.

Qualified personnel:



Personnel charged with the installation, commissioning, operation and maintenance of the DMIK must have a corresponding qualification. This can be done through training or appropriate instruction.



Personnel must be aware of the contents of these operating instructions and have access to the operating instructions at all times. The electrical connection may only be carried out by a 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 (see 9 "Technical data").



Prevent freezing of the medium in the device with appropriate measures.



Only use the DMIK 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 DMIK use only suitable tools.



Do not remove or obliterate device data plates or other markings on the device, as doing so will void the warranty.

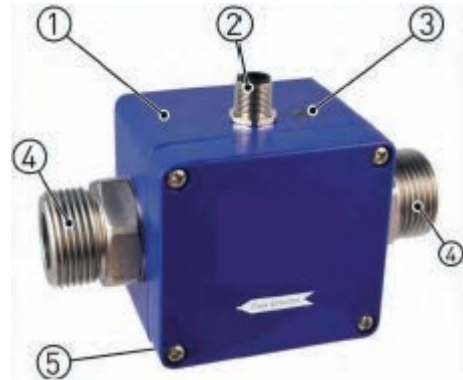
Special safety instructions:

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 - DESIGN AND FUNCTION

Components:

- 1: Housing:
The housing is made of die-cast aluminum and has an IP65 degree of protection.
- 2: Electrical connection:
The electrical connection is made via 5-pin plug M12x1.
- 3: Operation / flow indicator LED
- 4: Process connection:
The process connections are available in different sizes.
- 5: Device data plate (adhesive label)



Construction:

The measuring tube with the grounding sleeves and the electrodes runs through the housing and forms the process connections of the device on the outside.

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

The two stainless steel electrodes are located in the middle of the measuring tube between the earthing sleeves.

The DMIK does not need any moving parts for the measuring process. The inside of the measuring tube is completely open, allowing the fluid to flow unhindered through the measuring tube.



Function:

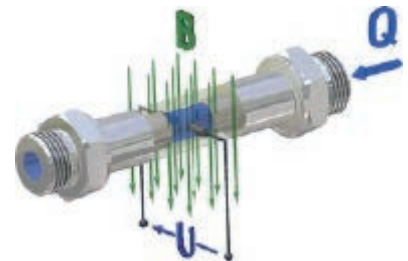
The magnetic inductive flow sensor operates in accordance with the principle of induction, i.e. a DC voltage is generated by the movement of a conductor in a magnetic field:

The measuring tube of the DMIK is located in a magnetic field (B).

An electrically conductive liquid (Q) flows through the measuring tube. The positive and negative charge carriers are deflected in opposite directions. A voltage perpendicular to the magnet field is generated and picked up by the two electrodes.

The resulting induced voltage is proportional to the mean flow velocity of the liquid.

The electronics of the DMIK converts the induced voltage to a flow-proportional frequency signal.



4 - INSTALLATION OF DMIK

Before installing, check that

the wetted materials of the device are suitable for the liquid being used (see 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



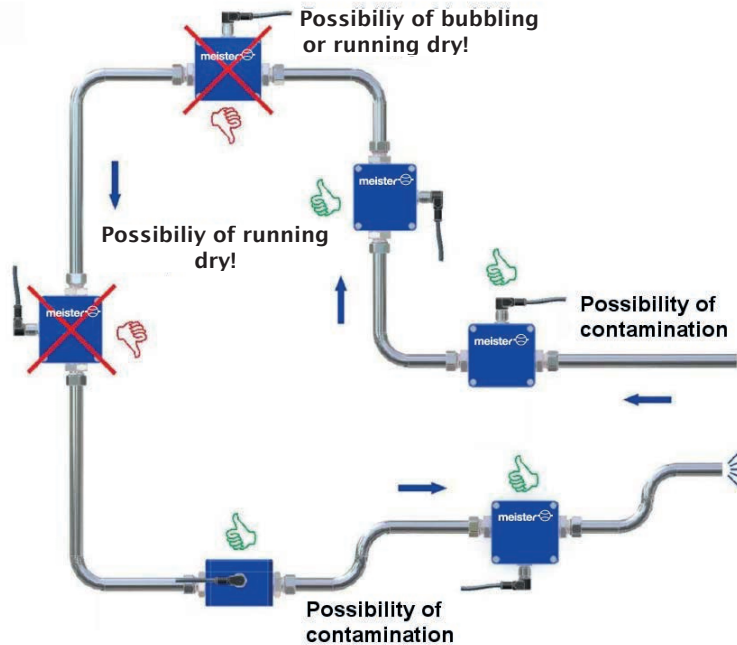
CAUTION! Risk of malfunction due to external magnetic fields!

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 DMIK.



The DMIK can be installed anywhere in 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 achieve maximum measuring accuracy, unimpeded flow sections of the nominal width (DN) should be used. An unimpeded flow section of 10xDN (rated width) should be maintained before the device, and an unimpeded flow section of 5xDN should be maintained after the device 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.

4.2 - INSTALLATION INTO THE PIPELINE

The DMIK is installed directly into the pipeline. The compact design and light weight of the unit make wallmounting unnecessary.



IMPORTANT NOTICES:

- Only use suitable gaskets for installation.
- Observe the flow direction indicated on the DMIK.
- Observe the mounting dimensions (see 9.5 "Dimensions").

Select an appropriate location for installation (see 4.1 "Installation instructions").

To ensure the best possible measuring accuracy, a vertical installation position with upward flow is preferable (avoiding collection of dirt and debris).

Install the appropriate screwed connections at the installation location.

Insert the DMIK together with the gaskets.

Screw the union nuts of the screwed connection onto the process connections of the DMIK.





CAUTION! Material damage!
Observe proper tightening torque.

While tightening, hold the process connection of the device locked.
Failure to do so can damage the DMIK!

Maximum Torque		
DMIK 7 (G 1/2")	DMIK 10 (G 3/4")	DMIK 20 (G 1")
15 Nm	15 Nm	30 Nm

Tighten both union nuts.

When tightening, use a spanner (AF 27 or AF 34) to counter the process connection on the hexagon in place.



5 - ELECTRICAL CONNECTION

The electrical connection of the DMIK is via the 5-pin plug M12x1 at the top of the housing.

The wiring of the DMIK depends on the ordered version. A distinction is made between frequency and analogue output, as well as basic and optional wiring.



CAUTION! Electric current!

The electrical connection must only be performed by a fully qualified electrician.

De-energize the electrical system before connecting the DMIK.



CAUTION! Material damage and fire hazard!

Exceeding the specified limits will cause damage to the electronics. Without current limiting, there is a fire hazard due to overheating of the device.

Connect the DMIK only to a power source with limited power.

Optional wirings:

Depending on the version, an analogue output can be optionally connected.

Connecting cable:

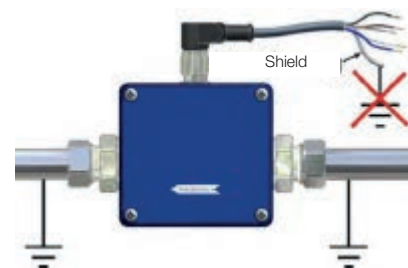
Suitable connection cables with moulded coupling socket are available in various lengths included in the range of Meister accessories. The shielding is already connected with the knurled nut.



IMPORTANT! Shielding required!

- Use only shielded connection cables.
- The shield of the connection cable should not be grounded.

We recommend grounding the pipes directly before and behind the DMIK (see Figure right).



IMPORTANT NOTICE:

Observe the temperature resistance of the connecting cable (see 9 "Technical data") at high media temperatures. If the temperature resistance is smaller than the medium temperature, the cable may not be directly laid on the pipe.

Connection 5-pin plug M12x1:

Screw the coupling socket of the connection cable to the plug of the DMIK.

Tighten the knurled nut of the coupling socket with a maximum torque of 1 Nm.

5.1 - WIRING

Pin assignment:

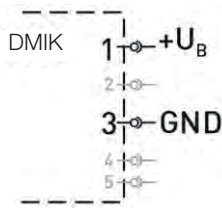
The pin assignment differs according to the chosen configuration of the device.



Possible pin assignment:

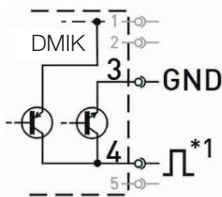
- Pin 1: $+U_B$
- Pin 2: n. c. (not connected) / Analogue U/I
- Pin 3: **GND**
- Pin 4: Frequency
- Pin 5: n. c. (not connected) / d. n. c. (do not connect)

Supply voltage:

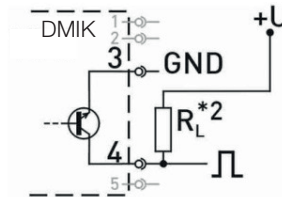


DMIK with frequency output:

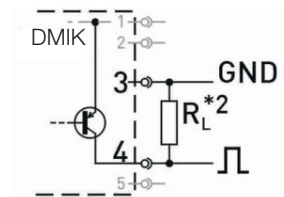
Push-Pull:



NPN Open Collector:



PNP Open Collector:

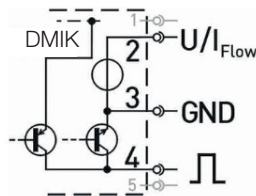


*1: Push-Pull switching outputs of several DMIK may not be connected in parallel.

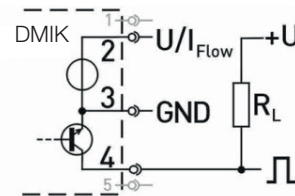
*2: Recommendation Pull-Up / Pull-Down resistance $R_L \sim 5 \text{ k}\Omega$

Use of frequency and analogue output:

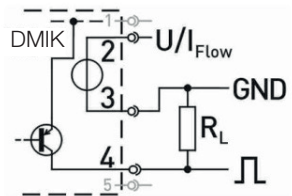
Push-Pull:



NPN Open Collector:



PNP Open Collector:



Recommendation for resistance $R_L \sim 5 \text{ k}\Omega$

6 - COMMISSIONING AND MEASURING MODE

Before initially starting up the DMIK please follow the instructions in the following section.

6.1 - COMMISSIONING

Check that

the DMIK has been installed correctly and that all screw connections are tight.

the electrical wiring has been connected properly.

the measuring system is vented by flushing.

6.2 – SWITCHING ON AND OFF

The DMIK has no switch and can therefore not be switched on and off independently. Switching on and off takes place via the connected supply voltage.

Switch on the supply voltage.

The green LED lights up once for ≈ 1 s.
The DMIK is ready and goes into measuring mode.

6.3 – MEASURING MODE

In measuring mode, the green LED flashes proportional to the measured flow.



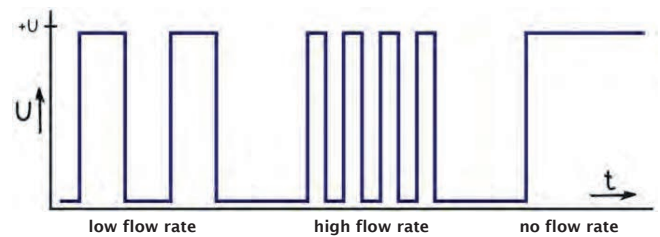
The human eye cannot detect the flashing any longer from a frequency of $\approx 30 \dots 40$ Hz. In that case the green LED seems to be lit permanently.



The following subsections only apply to devices which have the correspondent functionality.

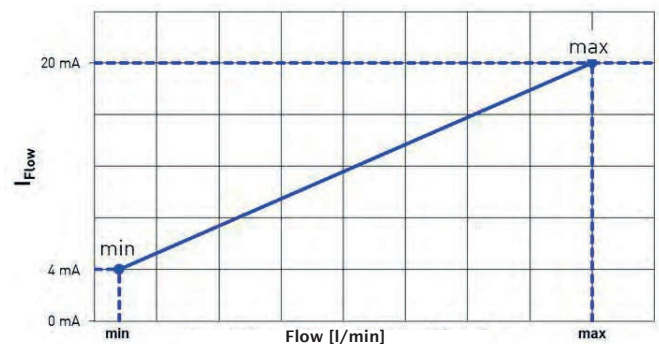
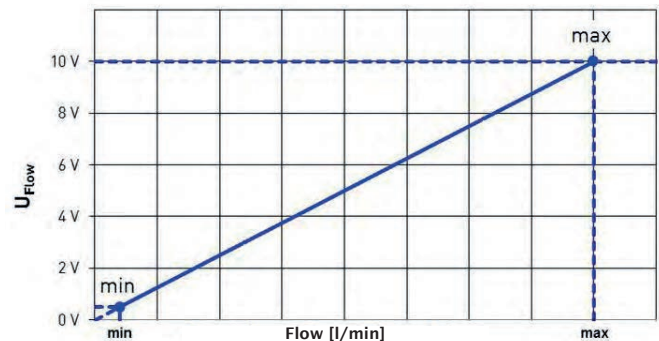
DMIK with frequency output:

The DMIK provides, according to the version, a flow proportional NPN, PNP or Push-Pull square wave signal. The frequency of the pulse output changes according to the flow (see Figure right).



DMIK with analogue output:

According to the configuration of the DMIK, the analogue output provides a voltage or current signal. This signal is proportional to the measured flow.



7 – MAINTENANCE AND CLEANING

Maintenance:

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



CAUTION! Material damage!

If the device is opened, critical parts or components can be damaged.

Never open the device and perform any repair yourself.

Cleaning:

Clean the DMIK with a dry or slightly damp lintfree cloth. Do not use sharp objects or aggressive agents for cleaning.

7.1 – RETURN SHIPMENT TO THE MANUFACTURER

Due to legal requirements placed on environmental protection and occupational safety and health and to maintain the health and safety of our employees, all devices returned to Meister Strömungstechnik for repair must be free of toxic and hazardous substances. That also applies to cavities in the devices. If necessary, the customer must neutralise or purge the unit before return to Meister Strömungstechnik. For products being returned, regardless of the reason, the currently valid provisions of the returns policy set by Meister Strömungstechnik will apply. Return shipments which do not comply with the returns policy may be refused by Meister Strömungstechnik at the expense of the consignor.



WARNING! Risk of injury due to insufficient cleaning!

The operating company is responsible for all damages and harm of any kind, in particular physical injuries (e.g. caustic burns or toxic contaminations), decontamination measures, disposal etc. that can be attributed to insufficient cleaning of the measuring instrument.

Comply with the instructions below before returning the device.

The following measures must be taken before sending in the device to Meister Strömungstechnik for repair:

Clean the device thoroughly. This is of extreme importance if the medium is hazardous to health, i.e. caustic, toxic, carcinogenic or radioactive etc.

Remove all residues of the media and pay special attention to sealing grooves and slits.

Attach a note describing the malfunction, state the application field and the chemical/physical properties of the media.

To initiate a return procedure, please visit our website:

<http://www.meister-flow.de/en/returns-rma/>

Please follow the instructions on the procedure for sending returns:

http://www.meister-flow.de/wp-content/uploads/2015/04/RMA_engl..pdf

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 DMIK using suitable tools.

Disposal:



NO HOUSEHOLD WASTE!

The DMIK consists of various different materials. It must not be disposed of with household waste.

Take the DMIK to your local recycling plant.



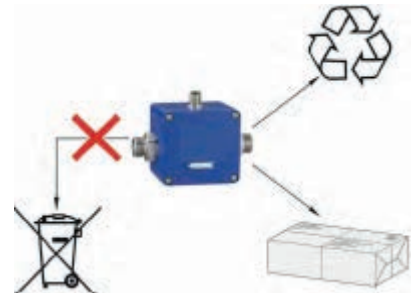
Danger to the environment due to incorrect disposal!

Potential risk to the environment may arise due to incorrect disposal.

- Have electrical scrap, electronic components, lubricants and other supplies disposed of by approved specialists
- In case of doubt, get information on environmentally safe disposal from the local authority or special disposal expert

or

Send the DMIK back to your supplier or to Meister Strömungstechnik. For products being returned, regardless of the reason, the currently valid provisions of the returns policy set by Meister Strömungstechnik will apply. Return shipments which do not comply with the returns policy may be refused by Meister Strömungstechnik at the expense of the consignor.



9 – TECHNICAL DATA

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

9.1 – CHARACTERISTICS DMIK

Type	DMIK-7	DMIK-10	DMIK-20
Measurement device characteristics			
Measuring range	0,5 - 30,0 l/min	1 - 60 l/min	5 - 250 l/min
Accuracy ⁽¹⁾ (Frequency output)	±1,5 % of measured value / ±0,3 % of full scale value		
Repeatability ⁽¹⁾	1 %		
Output signal starting from	≈ 0,4 l/min	≈ 0,9 l/min	≈ 4 l/min
Response time frequency / frequency + analogue)	< 500 ms / < 800 ms		
Flow indication	LED green, flow proportional flashing		
Output signal characteristics			
Frequency output:			
Pulse rate (optional) ⁽²⁾	1000 pulses/l 1 - 2000 pulses/l	500 pulses/l 1 - 1000 pulses/l	100 pulses/l 1 - 200 pulses/l
Resolution (optional) ⁽²⁾	1,0 ml/pulse 1000 - 0,5 ml/pulse	2,0 ml/pulse 1000 - 1 ml/pulse	10 ml/pulse 1000 - 5 ml/pulse
Signal shape	Square wave signal / duty cycle 50:50 Push-Pull / NPN open collector (o.c.) / PNP o.c.		
Signal current	≤ 100 mA, current limited		
Analog output 4...20 mA (optional):			
Signal current corresponds to flow of ⁽³⁾ maximum load	0 - 30 l/min	0 - 60 l/min 250 Ω to GND	0 - 250 l/min
Analog output 0...10 V (optional):			
Signal voltage corresponds to flow of ⁽³⁾	0 - 30 l/min	0 - 60 l/min	0 - 250 l/min
Electrical characteristics			
Supply voltage	24 V _{DC} ±10%		
Current consumption	≤ 150 mA		
Electrical connection	5-pin plug M12x1		
Degree of protection (DIN EN 60529)	IP 65 (with attached coupling socket)		
Process variables			
Medium to measure:	Water and other conductive liquids		
Conductivity	> 50 µS/cm		
Temperature	5 - 90 °C		
Ambient temperature	5...Tmax °C (see 9.4) ⁽⁴⁾		
Nominal diameter	DN 7	DN 10	DN 20
Nominal pressure	PN 16		
Process connection	G½" - ISO 228 male	G½" - ISO 228 male G¾" - ISO 228 male	G1" - ISO 228 male

⁽¹⁾ Test conditions: Water 23 °C at 150 ±100 µS/cm; Standard pulse rate.

⁽²⁾ factory setting

⁽³⁾ other ranges on request

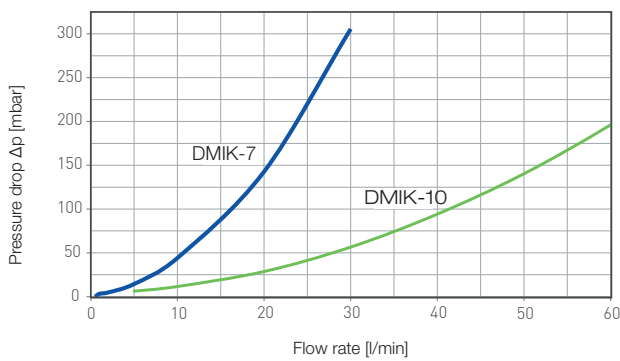
⁽⁴⁾ The maximum ambient temperature depends on the temperature of the medium and the wiring of the DMIK.

9.2 - MATERIALS TABLE

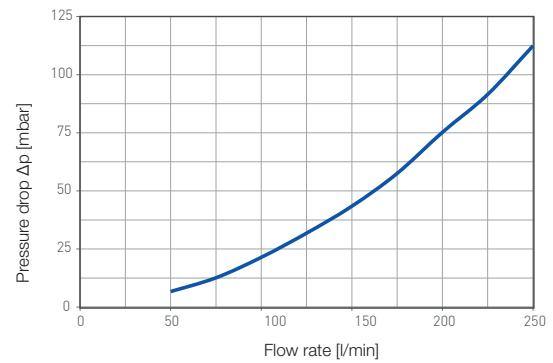
Component	Material	Wetted component
Housing	Aluminium die casting	
Measuring tube	PEEK-GF30	x
Electrodes	Stainless steel 1.4571	x
Gaskets	EPDM / FKM (optional)	x
Process connections	Stainless steel 1.4571	x

9.3 - PRESSURE DROP

DMIK 7 and DMIK 10:

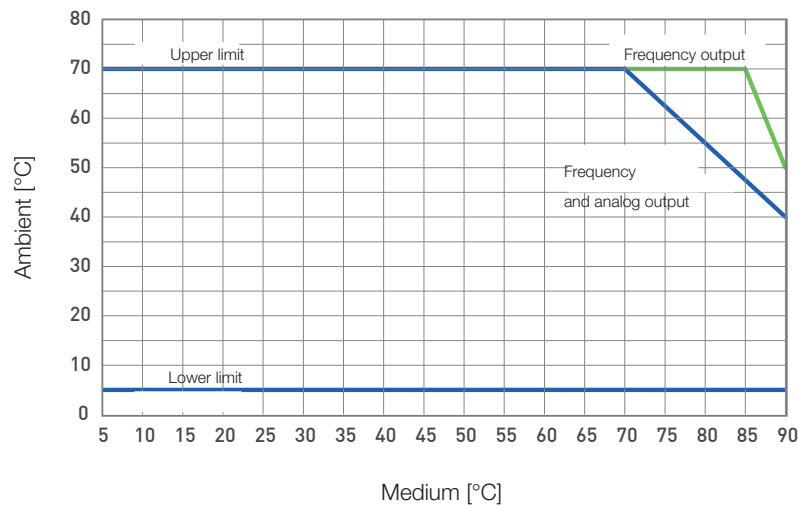


DMIK 20:



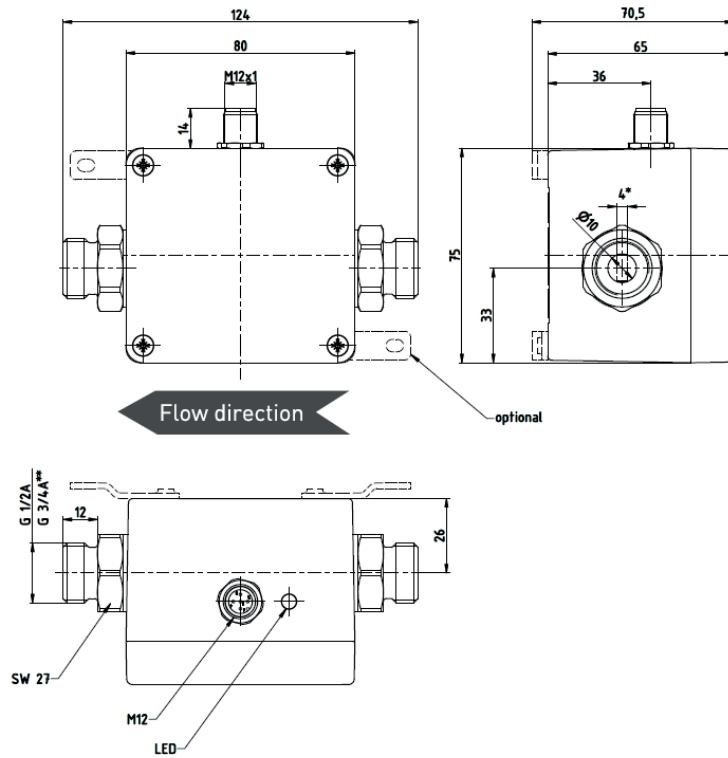
9.4 - TEMPERATURE LIMITS

The maximum ambient temperature depends on the medium temperature and the version of the DMIK.



9.5 - DIMENSIONS

DMIK-7 and DMIK-10



DMIK-20

