SEIKOM ELECTRONIC

Operating instructions
FlowGuard® FT410

24 V AC/DC; 230 V AC; 110 V AC

Contents

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1. General information

1.1 Description Measuring principle

The FlowGuard® FT410 flow meter is a measuring device based on Faraday's law of electromagnetic induction. A voltage is induced when a conductive liquid flows through the magnetic field of the device. This voltage is recorded by two electrodes that are in direct contact with the liquid and evaluated by the electronics.

The FlowGuard® FT410 inductive flow meter is only suitable for measuring conductive liquids. The minimum conductivity is 20 µS/cm. The device has been designed for a measurement in which the velocity of the liquid is in the range between 0.01 - 10 m/s. The highest accuracy is achieved in a range between 1 - 10 m/s.

1.2 Characters and abbreviations

Warning!

Failure to do so may result in personal injury and/or destruction of the appliance. There may be a danger to life.

Attention!

Failure to do so may result in incorrect operation of the appliance or damage to property.

Info!

Non-compliance may affect the operation of the appliance or cause unwa n t e d appliance reactions.

Danger!

There is a risk of serious or fatal injury from electric shock if the safety instructions are not observed.

Warning!

A potentially dangerous situation may arise that can lead to burns from hot surfaces or liquids if they are not avoided

2. Transportation, packaging and storage

2.1 Transportation

Inspect the appliance for any transport damage. Report any obvious damage immediately. The transport and storage temperature must be between -10 ... 50°C.

2.2 Packaging

The packaging should only be removed immediately before installation. Please keep the packaging as it offers optimum protection during transportation (e.g. changing installation location, return shipment).

2.3 Storage

The following influences should be avoided during prolonged storage:

1. Direct sunlight or proximity to hot objects
2. Mechanical vibrations, mechanical shock (hard standing)
3. Soot, steam, dust and corrosive gases

The transportation and storage temperature must be between -10 … 50°C. If possible, store the device in its original packaging or in suitable packaging.

3. Safetv instructions

Further important safety instructions can be found in the individual chapters.

3.1 Intended use of the product

The sensor is designed and constructed exclusively for the intended use described here and may only be used for this purpose. The technical specifications in these operating instructions must be observed. Improper handling or operation of the device outside the technical specifications requires immediate decommissioning and inspection by the manufacturer. If the appliance is moved from a cold to a warm environment, condensation may cause the appliance to malfunction. Wait for the appliance temperature to adjust to room temperature before restarting. Claims of any kind are excluded in the event of improper use.

3.2 Personnel qualification

Risk of injury due to inadequate qualifications: Improper handling can lead to considerable personal injury and damage to property. The activities described in these operating instructions may only be carried out by qualified personnel with the qualifications described below. Keep unqualified personnel away from the danger zones.

To install and commission the sensor, these persons must be familiar with the applicable country-specific directives and standards and have the appropriate qualifications. They must have knowledge of measurement and control technology, be familiar with electrical circuits and be able to carry out the work described and recognize possible hazards.

independently. Depending on the operating conditions, other knowledge may also b e required, e.g. aggressive media.

3.3 Special dangers

Comply with the country-specific regulations (e.g. standards) and observe the applicable standards and guidelines for special applications (e.g. for hazardous media such as acetylene, flammable or toxic substances and for refrigeration systems and compressors).

Failure to observe the relevant regulations can result in serious personal injury and damage to property!

Protection against electrostatic discharge (ESD) is required. The proper use of grounded work surfaces and personal armbands is required when working with open circuits (printed circuit boards) to prevent damage to sensitive electronic components from electrostatic discharge.

Danger to life due to electric current. There is an immediate danger to life if live parts are touched. Electrical appliances may only be installed and fitted by qualified electricians. When operating with a defective power supply unit (e.g. short circuit from mains voltage to output voltage), life-threatening voltages can occur on the device.

Residual media in dismantled devices can endanger people, the environment and equipment. Sufficient precautionary measures must be taken. This device must not be used in safety or emergency stop facilities. Incorrect use of the appliance can lead to injuries. In the event of a fault, aggressive media at extreme temperatures and under high pressure or vacuum may be present on the appliance.

4. Commissioning

4.1 Pipe installation

Relevant information for selecting the position. In the case of a separate version, the cable must not be extended or shortened.

4.2 Outdoor conditions

It is necessary to protect the sensor from the direct effects of weather conditions such as direct sunlight, rain, snow or frost. If the sensor is installed outdoors, SEIKOM Electronic recommends attaching a protective device with a canopy to the device to prevent damage.

4.3 Sources of interference

The most common sources of interference in the sensor's measurement deviations include

- The pumps or pipe bends, if they are close together or at different levels. These elements must be located outside the respective inlet and outlet sections (see chapter 4 Installation examples)
- Sudden changes in the pipe sections if they were not constructed at an angle of $\alpha \leq 16°$ (α is the angle between the beveled walls of the pipe adapters).
- Incorrectly centered gaskets, gaskets with a small internal diameter or gaskets made of a material that is too soft and which are pressed into the inside of the pipe after the flanges have been tightened can lead to measurement deviations.
- Anything that could disrupt the flow of liquid, e.g. a built-in resistance thermometer or similar. - Pipe branches, T-pieces, bends, fittings and butterfly valves, shut-off valves, control valves, butterfly valves and non-return valves, pipe outlets of the tanks, heat exchangers and filters can lead to the deviations. There must be no strong electromagnetic field in the vicinity of the appliance

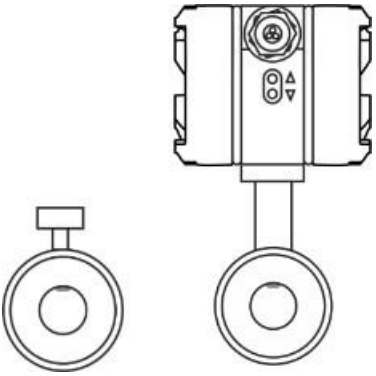
4.3.1. Vibrations

It is recommended to install a support for the connecting pipes on both sides of the appliance. The level and range of vibrations must be below 2.2g in the frequency range from 20 to 50 Hz in accordance with the IEC 068-2-34 standard.

4.3.2. Correct installation position

The flow meter must not be installed at the highest point of the pipe, as this point can fill with air. When measuring very slow liquids with $Q < 0.1$ m/s over a longer period of time, deposits of impurities can occur in the pipes. There should be sufficient pressure at the installation point. This prevents air or vapor bubbles from forming in the measured liquid. Air pockets can lead to incorrect measurement results. These gas bubbles can also form due to a sudden drop in pressure in the liquid. The control flaps or similar components should therefore be fitted downstream of the sensor.

For the same reason, the sensor should not be installed on the suction side of the pump. In addition, the flow meter should b e installed on a slightly rising or vertical pipe to prevent the formation of gas bubbles on the device when the medium is slow. If the flow meter is equipped with measuring electrodes only (2 or 3 electrodes placed outside the upper pipe profile), it is necessary that the device is continuously filled with the measuring liquid in order to avoid false measurement in case of an empty pipe. It is therefore advisable to install the sensor in such a way as to prevent the pipes from filling with air or gas. In the case of an open flow system, it is necessary that the device is mounted in the lower position of the U-profile so that the liquid cannot flow out of the device. If the sensor is equipped with an empty pipe test electrode (3rd or 4th electrode, fitted in the upper part of the measuring pipe), incorrect measurement due to filling of the pipes with air is excluded. However, this function should be activated in the parameter menu (empty pipe test).

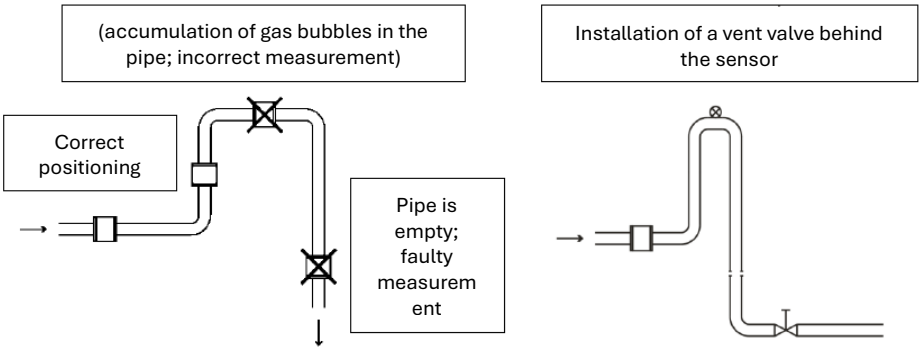


4.3.3. Installation examples

Trouble-free and accurate operation of the flow meter depends on the correct installation location, especially if the internal seal is made of PTFE or rubber and can be damaged by negative pressure. The most common methods of positioning are shown in the following illustrations:

Recommended positions for installation

Downpipe

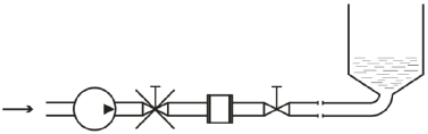


Horizontally arranged pipe

Positioning recommended in a slightly rising pipe

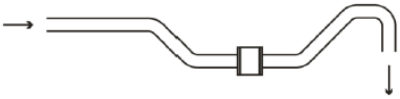
Long tube

Always install the control and shut-off components downstream of the sensor



Free inlet or outlet

Installation in a U-tube



Pumps

The flow meter must not be installed on the suction side of the pump

The flow of the medium in the sensor should be steady and without turbulence. For this reason, straight pipe sections with preferably the same diameter (permissible deviation 5%) as the flow meter are installed upstream and downstream of the sensor as a calming section. The minimum length of the straight pipes should be 5 x DN upstream of the sensor and 3 x DN downstream of the sensor.

It is not necessary to pay attention to the minimum length of the straight pipes if conical transitions with the angle $\alpha1,\alpha2 \leq 16°$ ($\alpha1$ - angle before the sensor, $\alpha2$ - angle after the sensor) are used and their inside diameter corresponds to the inside diameter of the measuring device (minimum deviation 5%). There should be no sources of interference for the flow in the pipe sections described. If such sources cannot be prevented, they must be located at a maximum distance upstream or downstream of the sensor. Otherwise, these sources would lead to an incorrect measurement.

4.3.4. Recommendation

If the flow in the pipes causes turbulence, the pipe sections should b e stabilized or a throttle valve installed. If mixing devices are used, the sensor should be installed before the mixing process or at a sufficient distance (30 x DN min.) after the mixing process. If plastic pipes or metal pipes with a non-conductive coating are used, earthing rings are required.

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4.3.5. Compact design

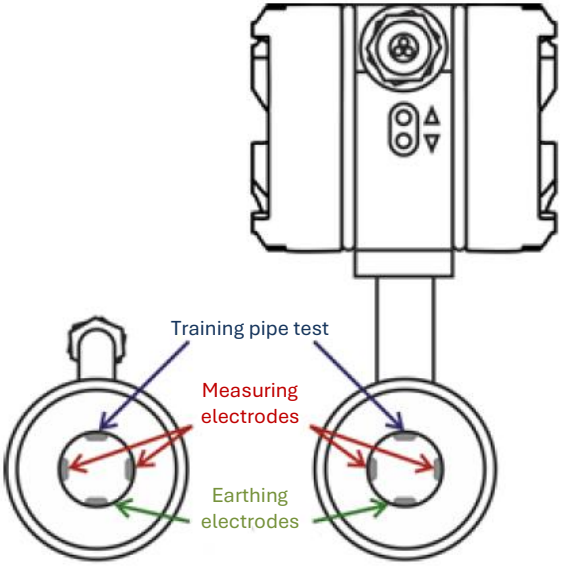
The following points are particularly important for the compact design:

- The maximum temperature of the medium (max. +90° C, please refer to the lining data sheet). If the temperature is exceeded, this can lead to incorrect measurement or even destruction of the appliance. CIP cleaning processes are possible with the PTFE lining.
- When installing the device, do not lift or suspend the flow meter by the evaluation unit (connection head).
- If the measuring device is exposed to high vibrations, a compact version should not be used.

The user is responsible for the appropriate use of the measuring devices.

4.3.6. Pipe installation

The inductive flow meter can be installed in any position in the vertical pipeline. If the flow meter is installed in a horizontal pipe, care should be taken to ensure that the measuring electrodes are also in the horizontal position. If the flow meter is equipped with earthing electrodes or empty pipe test electrodes, it should be installed in the upright position if possible. This means that the earthing electrode is located in the lower area and the test electrode in the upper area.

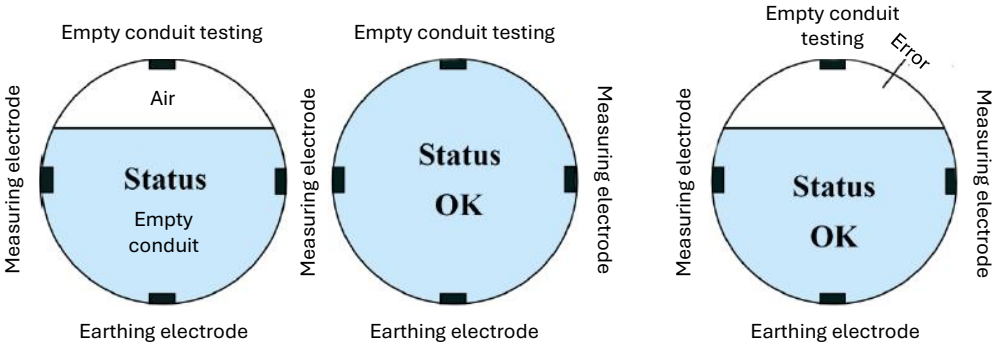


Installation and positioning of the measuring electrodes in the flow sensor.

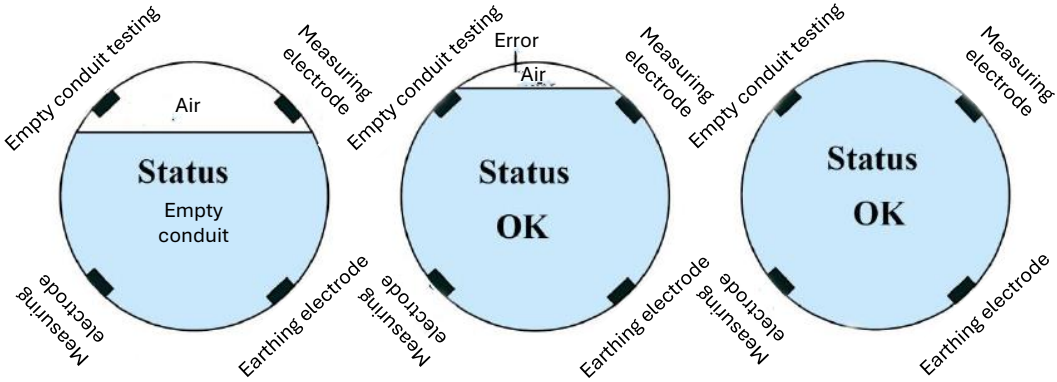
The measuring accuracy is maintained in this way. As soon as the electrode is covered with the liquid again, the error message disappears and the flow meter starts measuring again.

Measurement error due to incorrect mounting installation

1) Correct installation (the flow sensor should be installed in any position in vertical pipelines.



2) Incorrect installation (device set up at an angle, empty test - ON)



2) Incorrect installation (device set up at an angle, empty test - ON)

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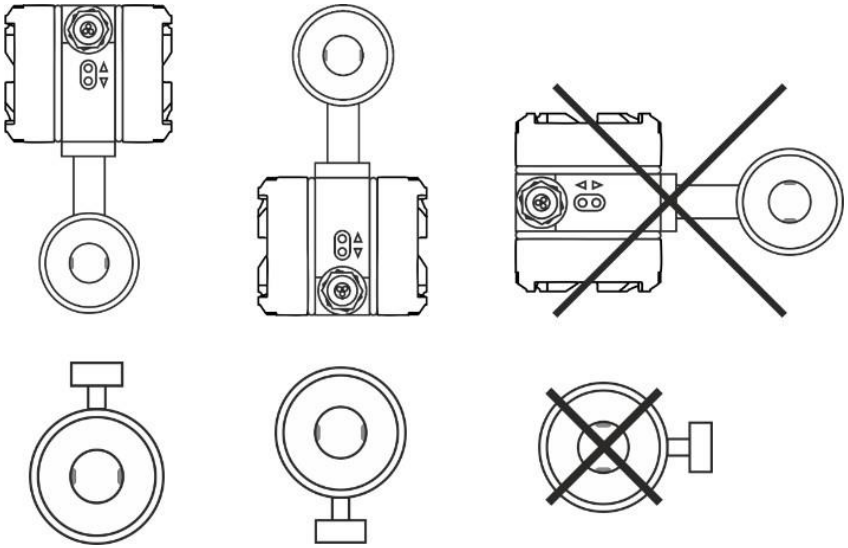
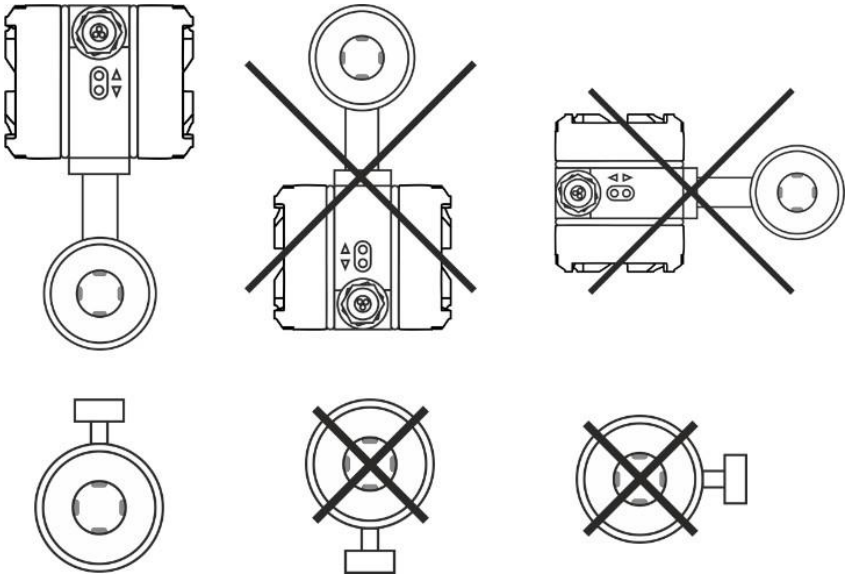
- In the version without the earthing electrode and/or empty conduit test electrode (2 electrodes)

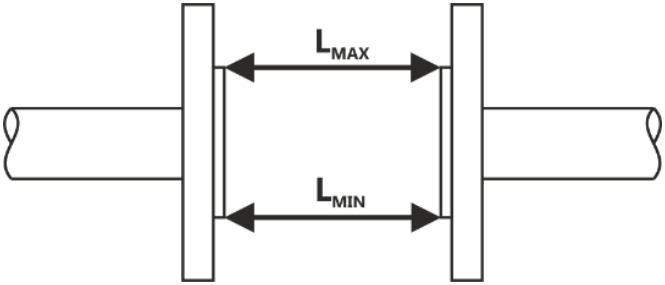


- In the version with the earthing electrode and/or empty conduit test electrode (3/4 electrodes)



The sensor is mounted by fixing it between the counter flanges (sandwich design), which are welded to the pipe (5DN upstream and 3dDN downstream in the direction of flow). The measured medium should flow through the sensor in the direction indicated by the arrow.

If the meter flanges are screwed to the pipe flanges, it is important to ensure that the holes for fastening are exactly aligned (at the same time, this alignment must not be achieved by tightening the fastening screws, as this can lead to leaks later due to a change in temperature and the pipe can also burst). The difference between the LMAX and LMIN distances between the two sealing surfaces on the flanges must not be greater than 0.5 mm.



In the same way, the mating positions of the holes for the connecting screws should be observed and there should be sufficient space for them behind the flanges. SEIKOM Electronic recommends using a suitable welding adapter for welding in order to avoid damaging the flow meter. The welding current must not flow through the device during electric welding. The flow sensor is only installed once the welding, painting and construction work has been completed. If the sensor has a fiber rubber seal, this should be smeared with graphite oil or graphite grease before installation.

If a threaded connection is used, the thread should always be checked when tightening to avoid twisting the sensor. This should be avoided during installation:

- Dropping the sensor on the floor (damage to the sensor electronics)
- Contamination of electrodes (do not touch the electrodes as this causes them to become dirty)
- Inserting the additional gasket between the flanges (incorrect measurement)

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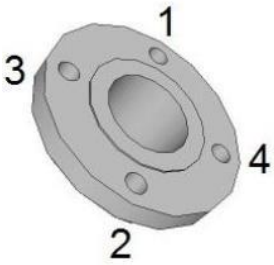
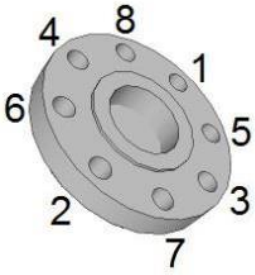
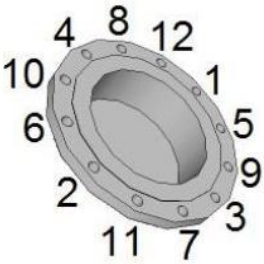
Tightening torques

The connecting bolts and nuts should b e tightened evenly and crossed (see illustration) to ensure optimum installation.







Diameter		PN 10			PN 16	
DN	Screws	Tightening torque [Nm]		Screws	Tightening torque [Nm]	
		Rubber	PTFE		Rubber	PTFE
10	4 x M12	10	15	4 x M12	10	15
15		15	20		15	20
20		20	25		20	25
25		20	25		20	25
32	4 x M16	20	25	4 x M16	20	35
40		20	25		20	35
50		20	45		20	45
65		20	46		20	46
80	8 x M16	20	48	8 x M16	20	48
100		20	50		20	50
125		20	80		20	65
150	8 x M20	24	90	8 x M20	27	90
200		27	115	12 x M20	35	80
250	12 x M20	35	95	12 x M24	55	100
300		50	100		80	110
350	16 x M20	60	70	16 x M24	95	105
400	16 x M24	75	120	16 x M27	140	150

Diameter	PN 25			PN 40		
DN	Screws	Tightening torque [Nm]		Screws	Tightening torque [Nm]	
		Rubber	PTFE		Rubber	PTFE
10	4 x M12	15	15	4 x M12	15	15
15		20	20		25	25
20		25	25		25	25
25		25	25		25	25
32	4 x M16	25	35	4 x M16	25	40
40		25	35		35	50
50		35	45		35	60
65	8 x M16	35	46	8 x M16	45	55
80		40	48		45	60
100	8 x M20	40	55	8 x M20	50	75
125	8 x M24	50	110	8 x M24	70	120
150		57	115		75	136
200	12 x M24	68	100	12 x M27	85	145
250	12 x M27	88	120	12 x M30	105	220
300	16 x M27	95	125	16 x M30	115	250
350	16 x M30	115	200	16 x M33	140	-
400	16 x M33	135	255	16 x M36	165	-

When using a tube made of corundum or thermoplastic, the same torques apply as when using the PTFE tube according to the specified pressure series.

Threaded connection (EN 10226-1):

Nominal diameter DN	Process connection	Tightening torque [Nm]
10	3/8"	8
15	½"	10
20	¾"	21
25	1"	31
32	1 ¼"	60
40	1 ½"	80
50	2"	5
65	2 ½"	6
80	3"	15
100	4"	14

The screws are tightened in three stages: first the screws are tightened to 50% of the recommended torque, then to 80% and later to 100% of the maximum torque.

It is recommended to check the tightened screws within the next 24 hours.

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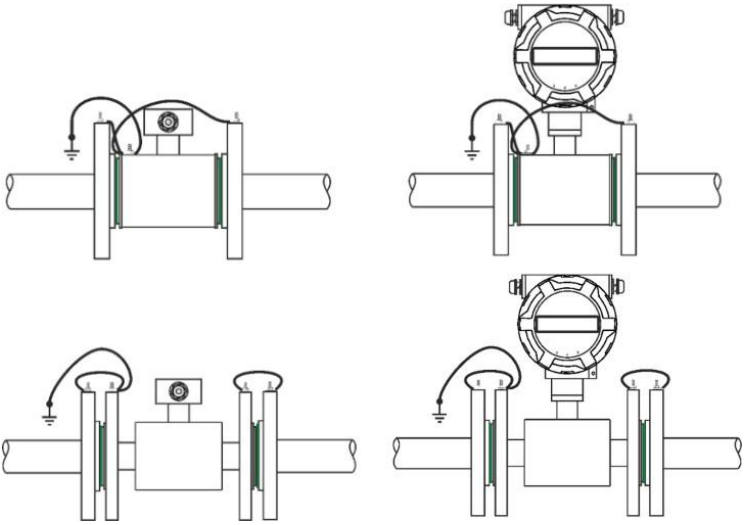
Earthing

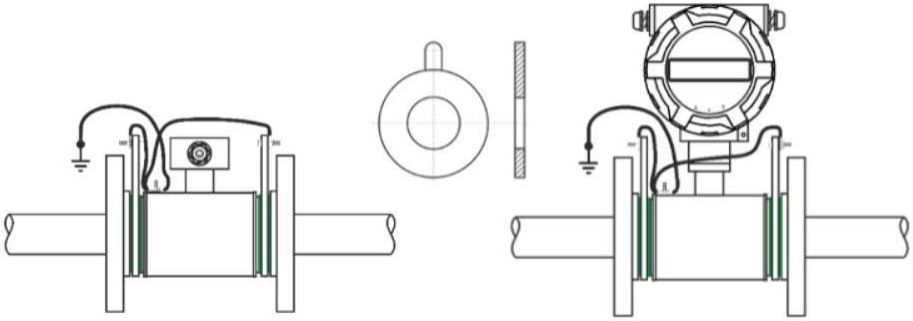
Each flow sensor must be earthed. The earthing cable must not transmit interference voltage, i.e. this cable must not be used for earthing other sensors at the same time.

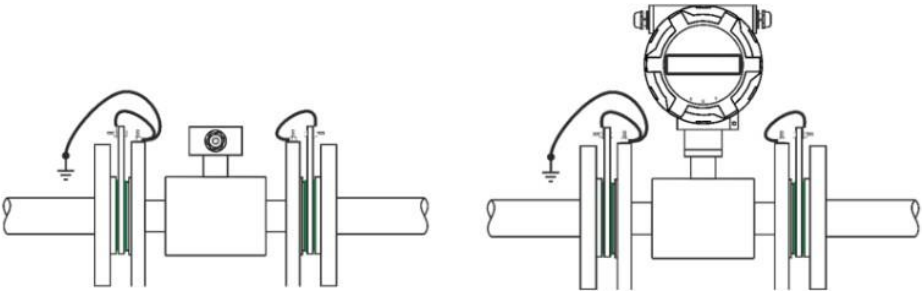
The sensor is equipped with an earthing screw, a washer and a stainless steel M5 nut. These must be connected to the earthing cable. If it is not ensured that the mating flanges are in direct contact with the measured liquid and are conductive, it is recommended to use earthing rings.



Earthing rings - only if ordered.

The earthing rings are used when plastic pipes or metal pipes with an internal plastic coating are used. The conductive stainless steel rings establish a conductive connection with the measuring liquid. The sensor is equipped with an earthing screw and earthing cable. This cable must be connected to the earthing rings for earthing.





Pipeline with high temperature

If the temperature of the measuring liquid is higher than 100°C, it is necessary to compensate for the forces caused by linear expansion. If a short pipe is used, a flexible gasket should be used. If a long piece of pipe is used, flexible components such as bends should be used.

Electrodes

The electrode material should correspond to the chemical properties of the medium. The electrodes must not have any deposits, otherwise the formation of deposits can affect the measurement accuracy or even lead to the measurement being interrupted. The electrodes do not need to be cleaned when the device is delivered unless there is an obvious deposit. In this case, the electrodes should be cleaned with a soft cloth. Ideally, it is not necessary to clean the electrodes during operation, as self-cleaning by the flow of the medium is sufficient.

PTFE, PFA, EFTE Coating

The installation is carried out at the lowest point of the pipes to avoid negative pressure. The PTFE coating must not be damaged under any circumstances. The protective caps must only be removed shortly before installation between the flanges.

Installation check

The sensor should be checked after installation:

- With the help of the label/documentation, the installation location corresponds to the permissible installation conditions (pressure, temperature, etc.)
- Does the direction of the arrow on the label correspond to the direction of flow of the measured liquid?
- The correct position of the measuring electrodes (horizontal)
- The correct position of the empty conduit detection electrode (top)
- All connections (screws) firmly tightened
- The earthing rings used, their correct use and application
- Correct sensor earthing
- Protection of the sensor against vibrations and mechanical stresses
- The serial numbers match

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4.4 Electrical connection

! This work may only be carried out by a competent person with the appropriate electrical engineering qualifications.

If this is not the case, the warranty will be void.

The device should be switched off if the evaluation unit is to be opened.

4.4.1. Cabling

In the case of a separate design, the connecting cable must not be shortened or extended.

The signal cable of the separate sensor must not be laid parallel to voltage distributors, motors, electromagnets, frequency converters or similar sources with electromagnetic fields.

The seal must be kept intact and clean to ensure that the cover of the evaluation unit is tight.

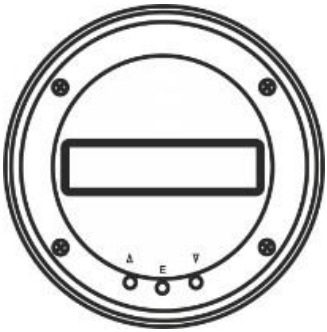
Evaluation unit

Standard power supply:	230V / 50÷60Hz
Other power supply possible:	Direct voltage 24VAC/DC / 250mA

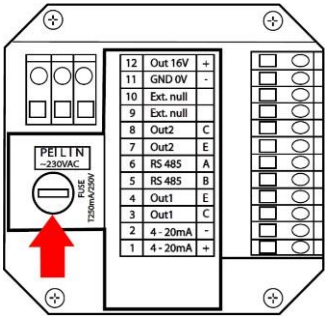
The signal inputs and outputs of the sensor may only be connected to the evaluation units that have a safe voltage.

The evaluation unit consists of 2 components:

- Measuring element (front panel with a display unit)



- Input/output and power supply board

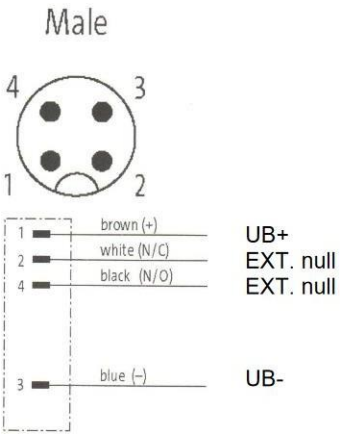


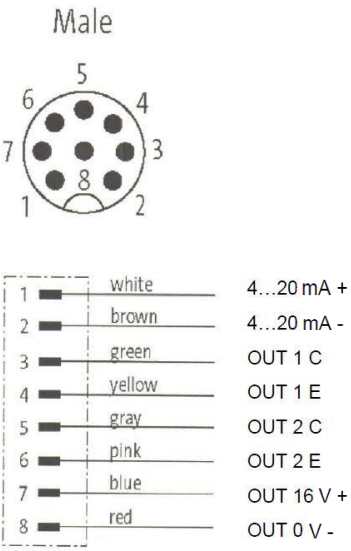
Note: the connections of the terminal strip are described on the inside of the cover. Standard connection:

Terminal 1 and 2	Current output 4÷20 mA
Terminal 3 and 4	Pulse output OUT IMP
Terminal 5 and 6	RS485 communication
Terminals 7 and 8	Output 2
Terminals 9 and 10	Ext. zero, reset user volume rV terminals (resettable counter) via external button
Terminals 11 and 12	Output voltage 16 V / 100 mA (power supply for switching to active current and pulse outputs)
Terminal L, N, PE	Supply voltage 230 V AC (standard) or 24 V AC/ V DC version

Under no circumstances should the cabling form loops or similar. A separate cable should always be used for the power supply. Unused plugs should be secured with insulation or a plastic cover.

4.4.2. M12 plug assignment

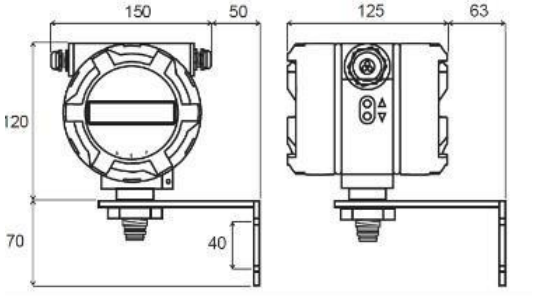




Installation of the separate flow meter evaluation unit

The HEAD version (85 mm) - this is a remote evaluation electronics unit (as per order).

First decide whether you want to mount the mounting bracket behind or below the electronics (the bracket with holes facing upwards or downwards). Mount the mounting bracket on the aluminum housing of the measuring device, place the device on the wall or on a structure as required and mark the holes in this position for mounting the bracket. Unscrew the bracket and fix it in the marked position, e.g. with dowels and screws. Screw the electronics onto the mounting bracket and connect the sensor cable to the plug. Attach the cable to the wall or structure so that it does not "hang" from the plug. Make a "drip loop" at the bottom so that no water drips onto the plug. Attach the conductors for the power supply and the outlets in a similar way. After installing all cables, rotate the electronics to the desired position and secure the device to the bracket by tightening the fastening nut.



4.5 Covering the power supply

Jumper J1 is located on the power supply board next to the metal cover. The jumper switches the computing mode to working mode. The main difference between the devices with and without jumper J1 is the controllability. In the device version with the jumper installed, the user can set almost all parameters. In the version without jumper, the user can only change the parameters that have no influence on the internal settings of the sensor.

4.6 Pulse output / flow switch contact OUT1 / OUT2

The OUT1 and OUT2 outputs are freely configurable and are realized by the optocoupler with an NPN switching transistor. The limit values of this optocoupler are 80 V/50 mA/100 mW max. The output can be connected as a passive or active output when using terminals 11 and 12. In active mode, the measuring device uses its internal, galvanically isolated 16 V power supply unit. In this case, the switching voltage for logic high is 16 V with the recommended current consumption of approx. 2 mA for the transmission of optocouplers. The output in the off state is in a high-impedance state, so it is necessary to use a pull-down or pull-up resistor to define the steady-state level.

Configuration:

1) The pulse output is used for remote transmission of volumetric pulses. The conversion constant can be varied as required via buttons or user software. The setting must be made so that the frequency at maximum flow rate is <400Hz.
2) The flow switch is used to monitor the flow value. If the set limit flow rate is exceeded, the contact is switched (contact-

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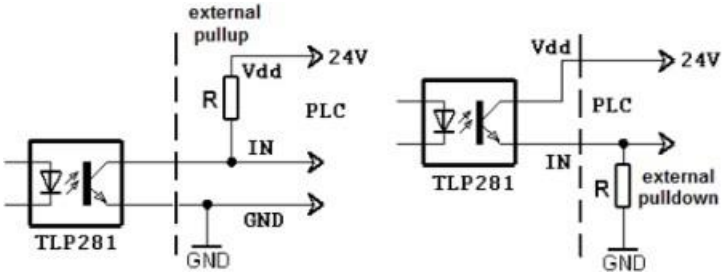
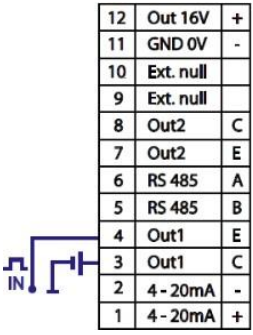
closing/opening). The degree of contact making and contact opening is different - the contact has a hysteresis. The hysteresis can be set in %.

3) The status output is used to evaluate the counter status - error, warning, fault, error + warning.

Connection example - passive pulse output:

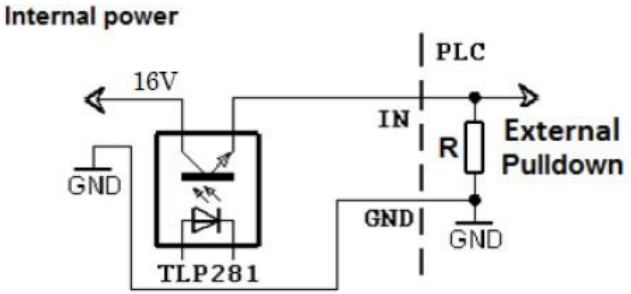


Terminal strip Cable connection:

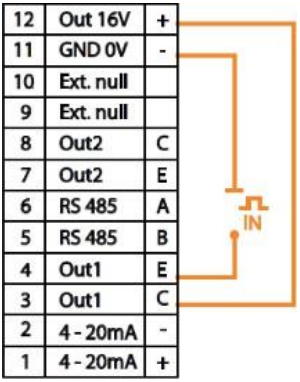


12	Out 16V	+
11	GND 0V	-
10	Ext. null	
9	Ext. null	
8	Out2	C
7	Out2	E
6	RS 485	A
5	RS 485	B
4	Out1	E
3	Out1	C
2	4 - 20mA	-
1	4 - 20mA	+

Connection example - active pulse output:



Terminal strip Cable connection:



Due to CTR≈100% and If = 2.5mA, it is necessary to select the collector current of up to 2.5 mA.

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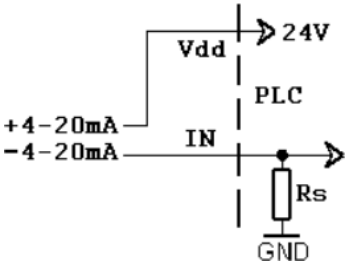
4.7 Current output

The FlowGuard® FT410 has a resolution of 16-bit with an update of the data every second. The converter is galvanically isolated from the sensor. With a passive current output, it is necessary to set up an external power supply. The voltage of the external power supply can be between 12 and 24 V. The resistance (load) of the current loop must not be greater than R= Ue / 0.02 (Ω; V).

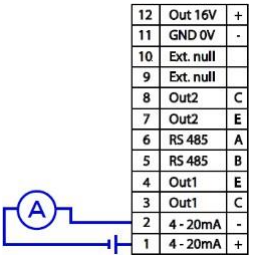
By default, the analog output is set so that the current is 20 mA at Qmax and 4 mA at minimum (creep suppression) or no flow. The parameterization can be set for all flow directions using the operating buttons and the menu. In the event of a power failure at the sensor, the current is 0 mA. If empty pipe monitoring is activated, the analog output for "empty pipe status" goes to approx. 2 ... 2.5 mA.

Wiring example current loop:

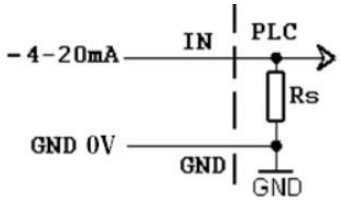
Passive current loop



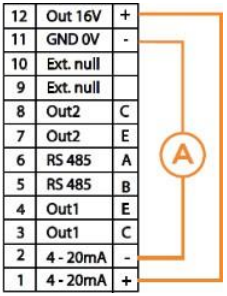
Terminal strip Cable connection:



Active current loop



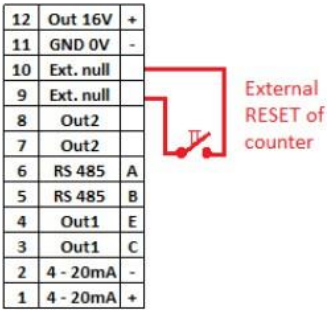
Terminal strip Cable connection:



4.8 Control input

External reset

The volumetric counter is zeroed via the external input PIN9 and PIN10, provided the jumpers on the power supply unit (as shown in the following illustration) are switched to the position. The input is isolated by an optocoupler. It can be managed by an external zeroing button connected to terminals 9 and 10.



4.9 Data output

With the optional RS485 interface, the FlowGuard® FT410 can provide the M-Bus protocol in accordance with EN 1434-3 or Modbus RTU.

4.10 IP degree of protection

The FlowGuard® FT410 flow meters meet at least all the requirements of protection class IP 65 (connection head IP67). To ensure that the degree of protection is maintained after installation, it is necessary to observe the following points:

- All seals must be clean and undamaged.
- If necessary, the sealing rings must be cleaned or replaced.
- The covers must be firmly tightened.
- The diameters of the connection cables have been selected according to the seals in the screw connections.
- Cable glands are firmly tightened.
- The cables leading into the cable glands should f o r m a "water loop", i.e. form a loop so that any condensation can drip off without running into the connection housing.
- All free cable plugs should be covered.
- Do not remove the sealing rings from the cable connectors.

4.11 Replacement of the glass tube fuse in the meter

Risk of electric shock! Uncovered components generate dangerous voltage. Before removing the cover, make sure that the meter is not live.

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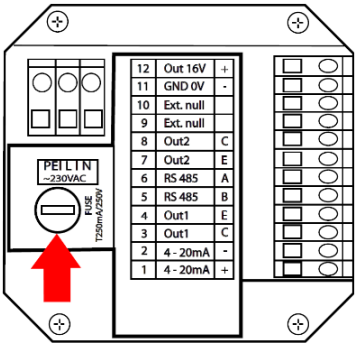
The device fuse is located on the power supply board and is replaced as follows:

1. Switch off the power supply.
2. Unscrew the rear cover of the meter housing.
3. Remove the protective cover and replace the appliance fuse (only use T250mA / 250V tube fuses)



4.12 Checking the wiring/installation

After the installation is complete, it is necessary to check:

- that the electrical cables have not been damaged.
- that the cables are plugged into the correct terminals.
- that the cables have not been connected to voltage.
- that the electrical voltage complies with the specified guidelines.
- that the "O" sealing rings are properly tightened after closing the appliance.

5. Operation

Before switching on the appliance, check that the flow sensor has been correctly installed and wired.

If an exact measurement (reference measurement) is to be carried out directly after installation, it is recommended to cover the measuring electrodes with water 1 or 2 days before installation. The water should be drained off directly before installation and the flow sensor installed immediately to prevent the electrodes from drying out.

Immediately after switching on the device, the green LED on the front display of the FlowGuard® FT410 lights up. The LED indicates that voltage is applied to the device and the flow meter is loading its data. As soon as the data has stabilized, the measurement begins.

5.1 Status of the device

The status of the measuring device is shown continuously on the display. In the event of a fault or failure, the operator is informed by a flashing display. The status displays of the meter are divided into 4 main groups:

1) OK	everything in order (OK)
2) Warning	the flow meter is measuring, but some parameters are out of tolerance
3) Error	Error, the sensor does not perform a measurement
4) Empty pipe	if the "Empty conduit test" function is activated

Flow direction

The arrow on the stainless steel plate of the sensor indicates the direction in which the liquid flows inside the sensor. This helps to install the meter correctly in the pipe. The flow direction can be changed using the operating buttons and the menu. This prevents incorrect measurements.

Setting up the basic parameters

The parameters of the FlowGuard® FT410 are preset by SEIKOM Electronic according to your order. If no desired parameters have been ordered, the meter will h a v e the standard parameterization. The user can change the parameters u s i n g the buttons and the operating menu.

Safety rules for the user

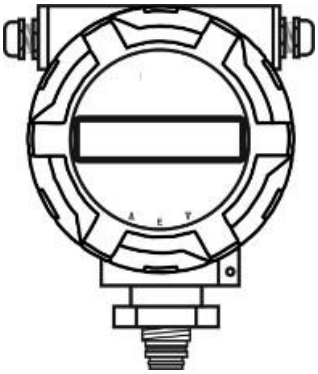
Any mechanical or electrical interference with the flow meter and the evaluation unit is not permitted. The medium to be measured may cause chemical burns or scalding.

6. Technical data

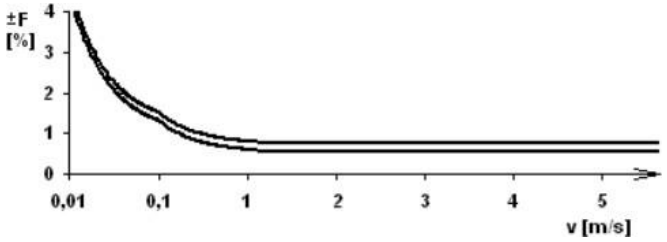
Evaluation electronics

Supply voltage:	230 V (+10;-20%) 50 60 Hz (standard) 24 V AC/DC with Reverse polarity protection (on order)
Power consumption:	4.6 VA
Display:	LCD 2 x 16 characters, backlight
Size:	DN10-400
Lining material:	Rubber (hard, soft, certified for drinking water): DN25 ... 400 (up to 80°C) PTFE: DN 15 ÷ DN 250 (up to 150°C)
Electrode material:	CrNi steel DIN 1.4571, Hastelloy C4, titanium, tantalum
Sensor material:	Flange: Stainless steel and mild steel with polyurethane coating Sandwich, thread, food processing: stainless steel
Process connection:	Sandwich, flange DIN (EN1092), screw thread (EN10226-1) Food (fittings DIN 11851, clamp)
Measuring range	(Qmin/Qmax) 0.2 ... 12 m/s (1/60); 0.12 ... 12 m/s (1/100); 0.06 ... 12 m/s (1/200)
Measuring frequencies:	12.5 measurements per second
(standard) Display response:	1.28 s
Current loop response:	1.28 s
Flow range:	1:60; 1:100 (0.1 ... 10 m/s); 1:200
Accuracy:	0.5% for 0.1 ... 10 m/s
Min. medium conductivity:	20 µS/cm
Flow measurement accuracy:	up to 0.5% (for 0.1 ... 10 m/s)
Repeat accuracy:	up to 0.2% (for 0.1 ... 10 m/s)
Additional electrodes:	Reference, earthing and detection for empty pipe (DN 15 ... DN 400)
Empty pipe detection:	DN 15 ... DN 400
Min. conductivity of medium:	20 µS/cm (for lower conductivity by agreement with manufacturer)
Units:	Flow rate - m^3/h; l/h; l/min; l/s; positive, negative Volume - m^3; l; positive, negative, sum in both directions
Control unit:	2 x external push-buttons (display)
	3 x buttons inside (display + parameter change)

Output:	Pulses up to 400 Hz; selectable constant current loop 4 ... 20 mA; selection range
Input:	Reset of the zero counters (only when ordered) Communication: RS485 interface; MODBUS, M-Bus protocol (control: external buttons ▲ and ▼) (internal buttons ▲, E , ▼)
Protection class:	min. IP 65
Cable glands	left (network) 1x cable max. Ø 13 mm right (outputs) 1 x cable max. Ø 13 mm (standard)
Ambient temperature:	5... 55°C
Air humidity:	max. 90%.
Weight:	1340 g
Dimensions:	144 x 151 x 125 mm (H x W x D), Ø head 104 mm
Material:	Cast aluminum, powder coating



Error limit under reference conditions (measuring range 1:1000)



Durch-messer	Max. Fehler des gemessenen Wertes			Kurve
DN [mm]	v >= 1 m/s	1 m/s > v >= 0.1 m/s	v < 0.1 m/s	
<= DN 10	0.8 % z M*	0.72 % + 0.8 mm/s	1.52 % + 0.35 mm/s	1
>= DN 15	0.5 % of M*	0.52 % + 0.8 mm/s	1.22 % + 0.35 mm/s	2

*M-von Messwert

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6.1 Factory configuration

The current loop is set so that the zero flow corresponds to 4 mA and the maximum flow 20 mA.

The address of the meter is set to 1 and the communication parameters are set to 2400 Bd, 8 db, 1 sb, parity EVEN (Mbus) or 9600 Bd, 8 db, 1 sb, without parity (Modbus).

The access password for changing parameters is 0000. The same password also applies if the device has been reset to the factory settings.

Pulses of the constants and current loops - Factory settings

Diameter DN	Impulsausgang		4 – 20mA (Qmin/Qmax 1/100)	
	Vout[imp/l]	Vout - Impulsbreite [ms]	Q[l/h] für 4mA	Q[l/h] für 20mA
6	auf Anfrage			
8	auf Anfrage			
10	10	4	0	3,400
15	10	4	0	7,600
20	10	4	0	14,200
25	10	4	0	21,000
32	1	4	0	34,000
40	1	4	0	54,000
50	1	4	0	84,000
65	1	4	0	144,000
80	1	4	0	220,000
100	0.1	4	0	340,000
125	0.1	4	0	534,000
150	0.1	4	0	760,000
200	0.1	4	0	1,350,000
300	0.1	4	0	3,052,000
400	0.1	2.5	0	5,400,000

Diameter	Resolution V	Resolution Q
DN≤15	V [0.001 m3]	Q [0.001 m3/h]
50≥DN>15	V [0.01 m3]	Q [0.01 m3/h]
DN>50	V [0.1 m3]	Q [0.1 m3/h]

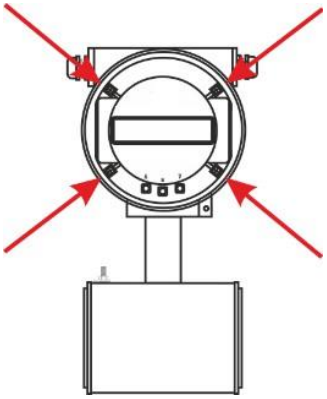
Flow ranges for the individual DN sizes:

Diameter [mm]	Qmin [m3/h] pro Qmin /Qmax			Qmax [m3/h]
	1/60 (0.2 m/s)	1/100 (0.12 m/s)	1/200 (0.06 m/s)	(12 m/s)
DN 6	auf Anfrage			
DN 8	auf Anfrage			
DN 10	0.06	0.034	—	3.4
DN 15	0.13	0.076	0.038	7.6
DN 20	0.24	0.142	0.071	14.2
DN 25	0.35	0.21	0.105	21
DN 32	0.6	0.34	0.17	34
DN 40	0.9	0.54	0.27	54
DN 50	1.4	0.84	0.42	84
DN 65	2.4	1.44	0.72	144
DN 80	3.6	2.2	1.1	220
DN 100	5.6	3.4	1.7	340
DN 125	8.9	5.34	2.67	534
DN 150	13	7.6	3.8	760
DN 200	23	13.5	6.75	1350
DN 250	35	21.1	—	2115
DN 300	51	30	—	3050
DN 350	70	41	—	4150
DN 400	90	54	—	5426

6.2 Setting and checking the FlowGuard® FT410

1. User modification

The flow meter allows the user to rotate the display depending on how it needs to be installed. To rotate the display, the cover must b e removed from the display head. The four fixing screws must then be unscrewed so that the electronic board can be rotated by 90° or 180°. Care must be taken to ensure that the cables are not twisted.



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The instructions for adjusting the position of the display:

1. Remove the top cover with glass viewing window
2. Loosen the four fastening screws
3. Remove the metal frame
4. Rotate the circuit board with display to the desired position (by ± 90° or 180°)
5. Fasten the metal frame in the desired position
6. Tighten the four fastening screws
7. Screw on the top cover with glass viewing window

6.3 Operation FlowGuard® FT410

The device is equipped with two external pushbuttons on the side of the electronics housing and three internal buttons on the lower part of the measuring circuit board.

External button functions:

▲	short press	Shift in the current menu upwards upwards, change of the market value upwards
▼	short press	Shift in the current menu down down, change of the market value downwards
▲	Long press (>3s)	Open the parameter menu
▼	long press (>3s)	Close the parameter menu

▲ Press simultaneously to reset the user counter rV (approx. 0.5 s)

▼ ▲ and ▼

▲ Press simultaneously to restart the counter (>8 s)

▼ ▲ and ▼

Inner button functions:

Before pressing the E button and entering the password:

▲	short press	Move up in the current menu, change the price value upwards
▼	short press	Shift downwards in the current menu, change the cursor value downwards
▲/ E	Long press (>3s)	Opening the parameter menu
▼	Long press (>3s)	Closing the parameter menu
▲ ▼	Press simultaneously ▲ and ▼	Reset the user counter rV (approx. 0.5s)
▲ ▼	Press simultaneously ▲ and ▼	End of value change without storage (>3s)
▲ ▼	Press simultaneously ▲ and ▼	Restart the counter (>8s)
E	short press	Confirmation (Enter) or change

The basic menu contains the following elements:

-	Date and time	
-	Current flow	Q
-	Bar chart	
-	Volume in a positive direction	+ V
-	Volume in negative direction	- V
-	Total volume (summary of both directions)	∑ V
-	User volume (resettable) only in positive direction	rV
-	Status	OK

The order may differ according to the meter setting. The user can change and customize the data displayed on the first two lines.

If the counter status changes or is not in the correct state, this is indicated by the display flashing.

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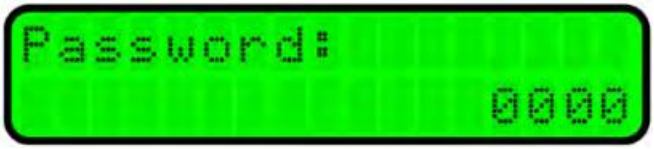
Special button functions

A long press on the two outer buttons activates a REBOOT (reinitialization of the flow meter).
A long triple press on the inner buttons triggers the service communication interface. After initialization, you will be prompted to enter a password. If the password is not entered, the service interface is only available for reading.
The settings menu can be exited by pressing and holding the lower button on the side of the display unit or by pressing and holding the right button under the front glass panel. You can also wait for Time Out to return the flow meter to its basic menu.

Password setting

FlowGuard® FT410 have two password levels, namely a user password and a production password.

The USER PASSWORD makes it possible to change user parameters that have no influence on the calibration of the meter. It is a user-defined password, whereby the default value for the password is 0000. The password is only required the first time it is entered and is invalid after returning to the basic display or within two minutes of inactivity when the meter automatically returns to the basic display.



The PRODUCTION PASSWORD is a generated, unique password that is linked to the respective meter and is not publicly accessible. The data can only be changed under the production password by a person authorized by SEIKOM Electronic.

These are the following data:

- Serial number
- K1-constant
- n1-constant
- Sensor - DN

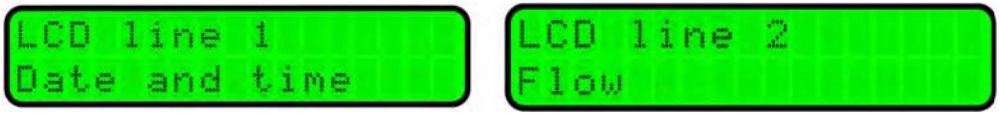
Basic menu

The basic display menu contains the following items:

1)	NAME	INDEX
2)	Date and time	-
3)	Flow rate	Q
4)	Flow bar graph	"
5)	Volume (+)	+V
6)	Volume (-)	-V
7)	Total volume	ΣV
8)	User volume	rV
9)	Status	-

The order may vary depending on the meter settings. You can select the data to be displayed on the first two lines (or change the order) to suit your requirements.

z. B.:



If the status of the meter i s in a status other than the normal and correct (OK) status, the display of the measurement failure alternates with the normal display. It is therefore not necessary to constantly check the status; in the event of a fault, it is automatically shown on the display unit.

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The outer and inner menu buttons ▲ and ▼ can be used to scroll through the basic menu, reset user volumes, change parameters or exit the menu.

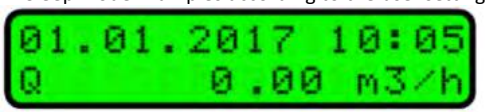
The parameter menu contains the following elements:

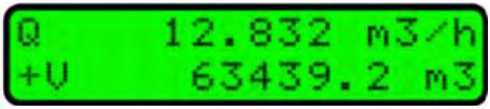
1. Date and time
2. Operating hours counter (operating time BST counter)
3. Failure of the power supply (power failure)
4. Pulse output or flow switch
5. Current output
6. Communication
7. Basic display
8. Attenuation
9. Lighting
10. Serial number
11. Calibration constants
12. Empty conduit testing
13. Firmware version
14. Insensitivity range - suppression of the measuring start point*
15. Zero calibration*
16. Flow simulation
17. Language
18. Resetting the counters* (Reset)
19. Nominal diameter (DN)
20. Flow direction*
21. Flow units [Q]
22. Share of flow units [Q] in percent (bar graph)
23. Volume units [V]*
24. User volume counter (resettable)
25. Change password
26. Factory setting (manufacturer's configuration)

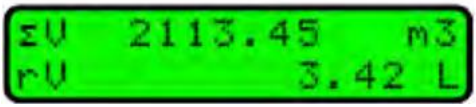
**** When the counter is used for recording, the parameters are marked with an asterisk* and cannot be changed. The meter is fitted with a seal (stamp) on the signal source to secure access to jumper J1. If the meter is not used for these purposes and is not subject to metrological approval, jumper J1 is fitted with a wire jumper that contains all settings, including the items from the parameter menu with an asterisk.***

The central button E is intended for editing the entries in the parameter menu. When the button is pressed, the operator is prompted to enter the password (the manufacturer's default password: 0000). The value can only be increased or decreased using the ▲ and ▼ buttons. The change can then be confirmed with the E button. If the changed parameter is not numerical, it can be changed using a "scroll bar". The password is valid as long as the setting is active. If the display is not used for more than 2.5 minutes, the password becomes invalid and the display automatically returns to the basic display.

Sleep mode Examples according to the user setting:



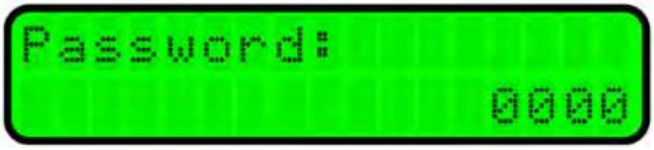




Note: The order of the advertisements can be adapted to the customer's requirements.

Instructions for setting up individual elements:

Before setting up, it is necessary to unscrew the protective cover on the front of the device to gain access to the buttons. When operating the parameter menu for the first time (long press on the ▲ button), an authorization password must be entered (the default password of SEIKOM Electronic: 0000). This is set separately for each of the four numbers from left to right using the ▲ or ▼ buttons. The password is confirmed with the E button. By double-clicking the ▼▲ buttons (press ▲ and ▼ simultaneously for approx. 0.5s), the previous position can be corrected if necessary. If an incorrect password has been entered, it cannot be changed and the initial configuration of the password must be repeated.



become.

Note: The password is valid as long as you are busy with the setting. If the display is not used for more than 2.5 minutes, the password becomes invalid and the display automatically switches to the basic display. The numerical values of the individual elements are set in a similar way.

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If you do not want to set a simple numerical number, but a list of possible values, the units are selected using the ▲ and ▼ buttons and confirmed individually with the E button. After a successful entry, you will be asked whether the changed password should be saved: Answer with Yes/No and confirm with the E button.

6.3.1. Date and time

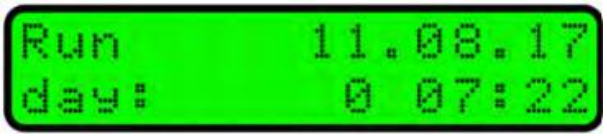
This position has the format DD/MM/YYYY SS/MM

The position is selected using the ▲ and ▼ buttons and can be selected using the E button. After entering the date and time, the setting is saved by pressing the E button.

The change must be confirmed.

6.3.2. Operating hours counter (BST counter)

This item monitors the operating time (switch-on) of the counter. The first line contains the date of the last reset and the second line the length of operation in days, hours and minutes.



The position can be reset by pressing the E button.

6.3.3. Failure of the power supply

This item monitors the time of the power failure at the meter. The first line contains the date of the last reset and the second line the duration of the outage. The position can be reset by pressing the E button.

OUT1 and OUT2 output / flow switch

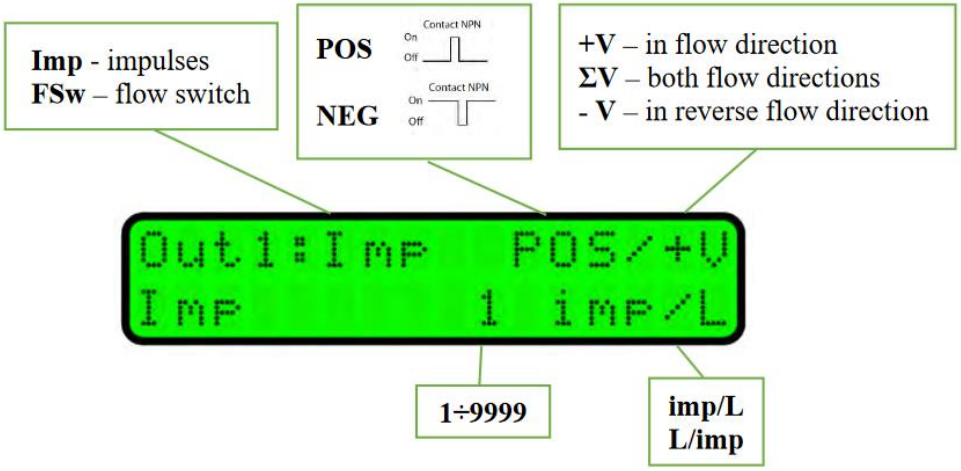
OUT1 can be configured as a pulse output or flow switch contact.

OUT2 can be set as a pulse output, flow switch or status contact.

1. OUT1 Pulse

output setting

When setting the pulse output parameters, it is possible to change the logic (polarity) of the electrical signal (on/off state), set the pulse output, which direction the flow meter should react to (flow rate runs in the positive direction, in the opposite direction and in both directions) as well as your own pulse constant, including its display (pulse / L or L / pulse) and pulse width. This output can be configured as a pulse output or as a flow switch.



The width of the pulse cannot be set as required. The specified pulse lengths can be selected using the ▲ and ▼ buttons.

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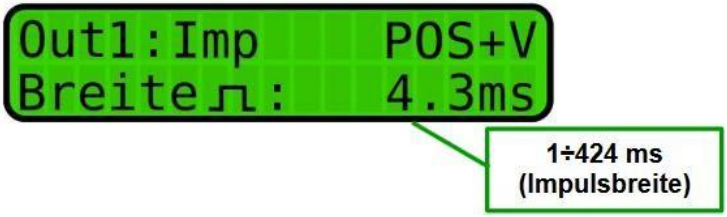
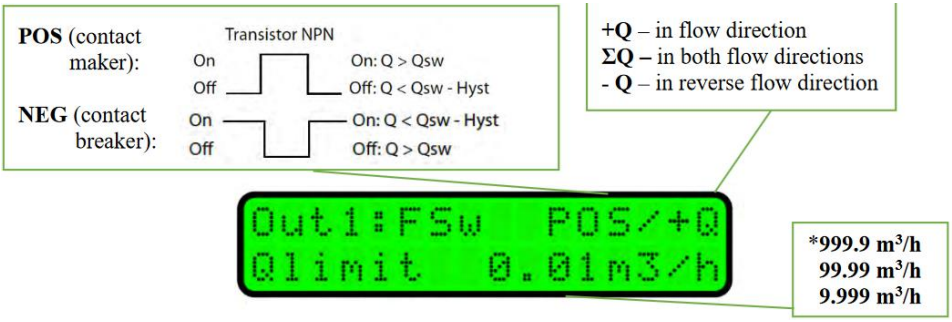


*Note

Period [ms] = pulse width [ms] + interpulse interval [ms] where gap ≥ width The pulse width is selected in steps by scrolling through predefined values using the ▲ or ▼ buttons.

Flow switch

The logic (polarity) of the electrical signal (positive/negative) can be changed for the flow switch (note that no pulse output is possible in this case). It is also possible to define the flow direction to which the flow switch should react (flow rate in the positive direction, in the negative direction or both directions) and the actual value of the switching point.
It is also possible to set the size of the hysteresis in % between the Qon and Qoff states.

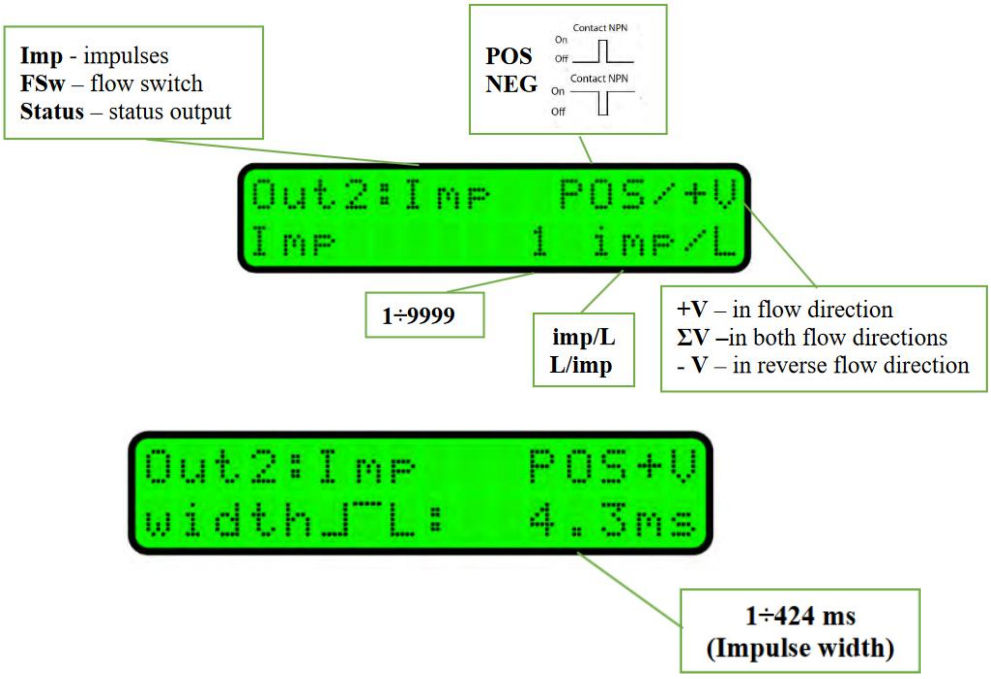


*Qlimit - the number of decimal places is specified by DN of the specified counter and cannot be changed.

2. OUT2 Pulse output

settings

To fully set the pulse output parameters, it is possible to change the logic (polarity) of the electrical signal (positive/negative), set the pulse output to which the volumetric counter should respond (volume runs in the positive direction, in the opposite direction and in both directions) and set your own pulse constant including its display (imp/L or L/imp).



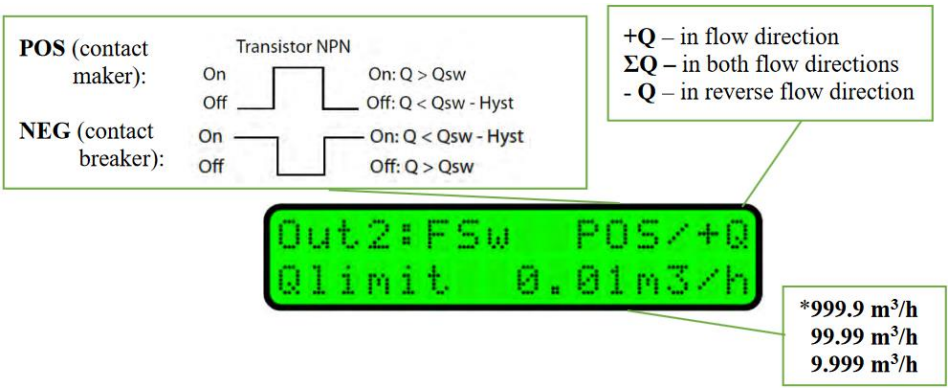
*Note
Period [ms] = pulse width [ms] + interpulse interval [ms] where gap ≥ width

The pulse width is set in steps by scrolling through predefined values using the ▲ or ▼ keys. selected.

Operation of the flow switch

In the "Flow switch" status output parameter setting, it is possible to change the logic (polarity) of the electrical signal (on/off status), set the output, which direction the output should react to (flow in positive direction, in opposite direction and in both directions) and your own switching point value.

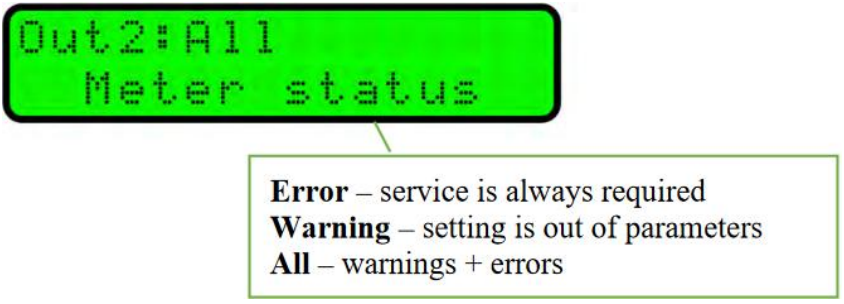
The status contact makes it possible to set the hysteresis between the Qon and Qoff states.



*Qlimit - the number of decimal places is specified by DN of the specified counter and cannot be changed.

3. Meter reading - error output

Output 2 opposite output 1 can also be set as the error status output of the meter. If no error status occurs in the meter, the status output is switched on.

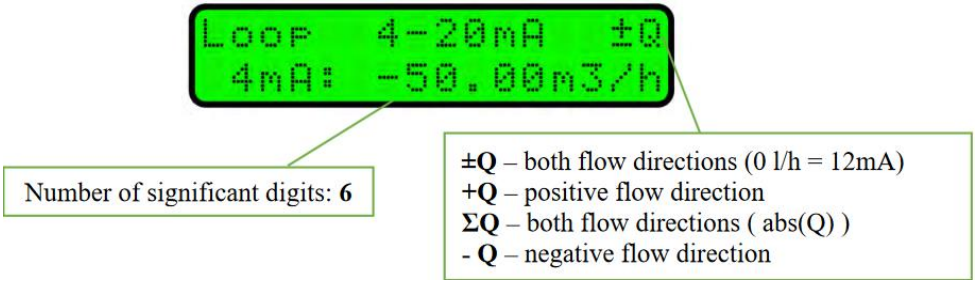


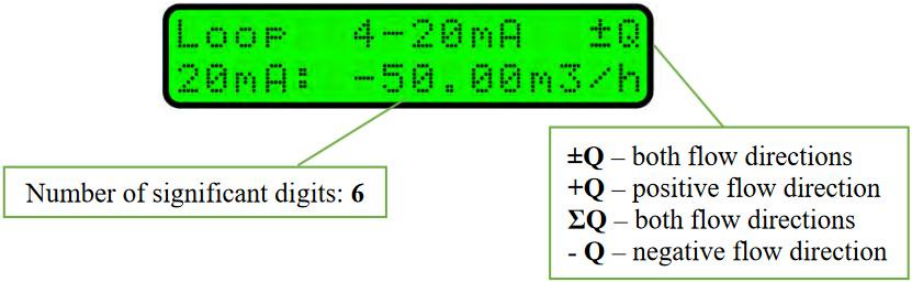
6.3.4. Current output

There are two parameters for setting the current output that can be used to define the limits of the current loop for the desired flow and the type of connection to the flow direction.

If "+Q" is set, the current output of the current loop corresponds linearly to the set range, but only in a positive flow direction. If "-Q" is set, the output signal is linearly dependent only on the flow in the negative direction. If ∑Q is set, the output value of the current loop is independent of the flow direction, but only of its absolute value.

The setting is made by changing the value of the flow volume in m3/h for 4mA and 20mA.





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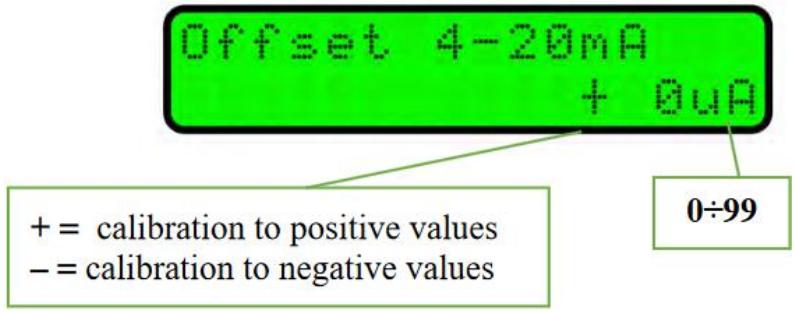
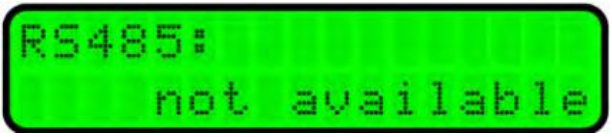
6.3.5. Offset

The analog output 4 ... 20 mA can also be adjusted with an offset.

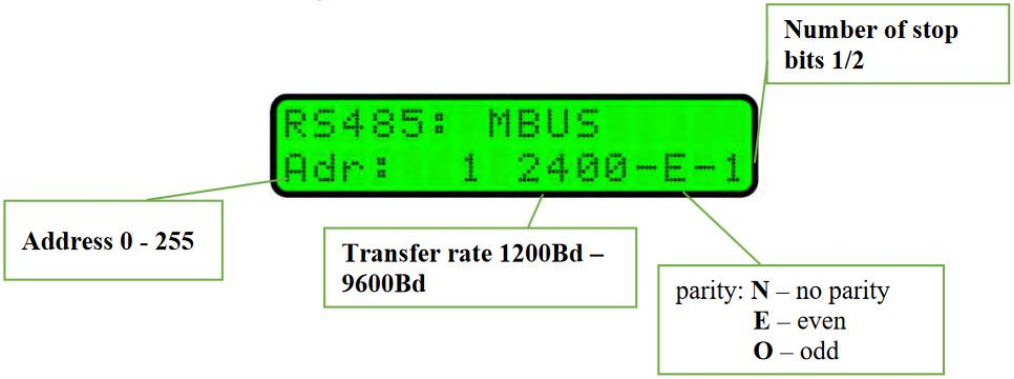


6.3.6. Communication (optional)

If the flow meter is ordered with an RS485 communication interface, these parameters can be set. A number between 0 and 255 can be selected for the address. The speed can be adjusted as standard. The communication type can be changed using the E button. After pressing the E button, the ▲ and ▼ buttons are pressed simultaneously for approx. 0.5 s. The required communication type can be selected with the ▲ and ▼ buttons and confirmed with the E button. If the protocol type is changed to MBus/MODBUS, the recommended speed for this type is automatically displayed.



If the communication interface has not been ordered, the parameters are not available.



6.3.7. Communication protocol MODBUS RTU

transmission service

The master station is the primary station that initiates all information transmissions. The satellite stations are secondary stations that only transmit information w h e n requested.

Transmission speed

The transmission speed can be 1200, 2400, 4800 or 9600 baud. The transmission is asynchronous RS485 with one start bit, 8 data bits and one stop bit. The standard transmission speed is 9600 baud.

After changing the transmission rate, the FlowGuard® FT410 must be restarted to apply the change. You can do this in two ways:

1. Disconnect the FlowGuard® FT410 from the power supply (pull the fuse briefly)

2. Press and hold the ▲ and ▼ keys together for approx. 8 seconds using the key combination. The following message appears on the FlowGuard® FT410 display: "Restarting the system....."

Addresses

Addresses 1 to 255 are reserved for the 255 secondary stations.

Inquiry/ answer

Public function code 03h - read holding registers

The master sends the public function code 03h (read holding register), start address, number of the register and the address of the secondary station.

Address range:

0x00	unsigned long Manufacturer number
0x02	unsigned long Volume ∑
0x04	unsigned long Volume +
0x06	unsigned long Volume -
0x08	unsigned long Volume User
0x0A	signed long Flow rate
	0x0CError Code*

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*Error Code:	Hi Byte = 0	
	Lo Byte = Error Code:	
	bit 0	Add volume overflow (inappropriate increase)
	bit 1	Frame error
	bit 2	Empty conduit
	bit 3	Input/ output overflow
	bit 4	reserved
	bit 5	reserved
	bit 6	reserved
	bit 7	reserved

Request:

Address	1 byte
Function code (03h)	1 byte
Start address	2 byte
Number of the register	2 byte
CRC32	2 byte

Answer:

Address	1 byte
Function code (03h)	1 byte
Number of bytes	1 byte 2xN*
	Register valueN* x 2 bytes
CRC32	2 byte

**N=Number of registers*

Error:

Address	1 byte
Error code (83h)	1 byte
Exception code	1 byte
CRC32	2 byte

Example

Read volume register 02h-09h: Request:

Address	01h
Function code	03h
Start address Hi	00h
Start address Lo	02h (volume ∑)
Number of registers Hi	00h
Number of registers Lo	08h
CRC32 Hi	E5h
CRC32 Lo	CCh

Answer:

address	01h
Function code	03h
Number of bytes	10h
Number of registers Hi	xxh (volume ∑)
	xxh
	xxh
Number of registers Lo	xxh
Number of registers Hi	xxh (volume +)
	xxh
	xxh
Number of registers Lo	xxh
Number of registers Hi	xxh (volume -)
	xxh
	xxh
Number of registers Lo	xxh
Number of registers Hi	xxh (volume user) xxh
	xxh
Number of registers Lo	xxh
CRC32 Hi	xxh
CRC32 Lo	xxh

Resolution units of the registers are provided by the resolution of the LCD display.

Example:

LCD	Register
53,4 m³	534
689,89 L	68989
5.6 m³/h	56

Illegal **data address**

The data addresses 1, 3, 5, 7, 9, 11 are not permitted addresses for the server or the slave. The addresses generate exception 0x02. Memory address spaces 0xFE00 to 0xFF are system registers that are blocked for users.

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Modbus register

Register¤	Contents¤	¤	Format¤	Note¤
40001¤	Serial·number¤	upper·register¤	INT¤	*1¤
40002¤	Serial·number¤	lower·register¤	INT¤	
40003¤	Total·flow·rate¤	upper·register¤	UINT¤	*2¤
40004¤	Total·flow·rate¤	lower·register¤	UINT¤	
40005¤	Total·+·flow·rate¤	upper·register¤	UINT¤	
40006¤	Total·+·flow·rate¤	lower·register¤	UINT¤	
40007¤	Total·-·flow·rate¤	upper·register¤	UINT¤	
40008¤	Total·-·flow·rate¤	lower·register¤	UINT¤	
40009¤	Total·user·flow·rate¤	upper·register¤	UINT¤	
40010¤	Total·user·flow·rate¤	lower·register¤	UINT¤	
40011¤	Current·flow·rate¤	upper·register¤	INT¤	
40012¤	Current·flow·rate¤	lower·register¤	UINT¤	
40013¤	Error·status¤	¤	INT¤	*3¤

***1 Calculate the serial number using the following formula:**

Serial number = (upper register * 65536) + lower register

***2 Calculate the totals using the following formula:**

Sum X = ((upper register *65536) + lower register) /100

***3 Contents of the status register:**

bit 0	Error during summation (incorrect increment) bit 1
	FRAME error
bit 2	Empty measuring tube
bit 3	Pulse output overflow
bit 4	ReserveCC
bit 5	Reserve
bit 6	Reserve
bit 7	Reserve

6.3.8. Communication protocol M-Bus

transmission service

The master station is the primary station that initiates all information transmissions. The satellite stations are secondary stations that only transmit information w h e n requested.

Initialization of slave (SND_NKE)

EN 1434-3 compatibility (redundant) Command. The secondary station responds ACK (E5h) if reception is correct.

Request:	10h	
	40h	Initialization slave
	A	Address
	CS	Checksum
	16h	Stop
Answer:	E5h	

Request/ response (REQ_UD2)

The master sends a short frame with the data request code 5Bh or 7Bh and the address of the secondary station.

Request:	10h	
	5Bh/7Bh	Data request Command code
	A	Address
	CS	Checksum
	16h	Stop

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Answer:

The measuring device responds with a frame consisting of the following
parameters: Identification number
Volume Σ Volume
User Volume +
Volume - Flow
Software Version
Error Code
Volume Σ, volume user, volume +, volume -

The volume is transmitted (32-bit integer coded) with the unit of the lowest digit/digit on the display.
The following options are available for the VIF value:

Transferred unit	VIF
1m³	16h
100L	15h
10L	14h
1L	13h
0,1L	12h
0,01L	11h
0,001L	10h

Flow rate

The flow rate is transmitted in 4 binary bytes (32-bit integer coded). The following options are available for the VIF value:

Transferred unit	VIF
1 m³/h	3Eh
100 L/h	3Dh
10 L/h	3Ch
1 L/h	3Bh
0,1 L/h	3Ah
0,01 L/h	39h
0,001 L/h	38h
1 L/min	44h
0,01 L/min	43h
0,001 L/min	41h
1 L/s	4Eh
0,1 L/s	4Dh
0,01 L/s	4Ch
0,001 L/s	4Bh

Software version

Format 8 bit integer

Alarms (8-bit integer)

Bit 0	Add volume overflow (inappropriate increase) Bit 1
	Frame error
Bit 2	Empty conduit
Bit 3	Input/ output overflow
Bit 4	reserved
Bit 5	reserved
Bit 6	reserved
Bit 7	reserved Total

length of the frame: 70 bytes

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Meter Answer Frame

0	68h	Start
	40h	(total length of the frame) - 6
	40h	(total length of the frame) - 6
	68h	Start
	08h	
5	xxh	Address
	72h	CI (mode 1)
	xxh	Identification number (LSB)
	xxh	"
	xxh	"
10	xxh " (MSB)	
	43h	Manufacturer identification
	4Dh	"
	xxh	Dimension code
	07h	Water meter
15	xxh Number of the access	
	xxh	Error code
	00h	Signature
	00h	"
	0Ch	DIF: 8digit BCD
20	78h VIF: Production number	
	xxh	SN (LSB)
	xxh	"
	xxh	"
	xxh	" (MSB)
25	04h	DIF: 4 bytes binary coded
	10h-16h	VIF: Volume Σ, depending on the decimal place
	xxh	Volume Σ (LSB)
	xxh	"
	xxh	"
30	xxh	" (MSB)
	84h	DIF: 4 bytes binary coded
	40h	DIFE/ UNIT 1
	10h-16h	VIF: Volume user, depending on the decimal place
	xxh	Volume user (LSB)
35	xxh	"
	xxh	"
	xxh	" (MSB)
	84h	DIF: 4 bytes binary coded
	80h	DIFE
40	40h	DIFE/ UNIT 2
	10h-	16h VIF: Volume +, depending on the decimal place
	xxh	Volume + (LSB)
	xxh	"
	xxh	"
45	xxh	" (MSB)
	84h	DIF: 4 bytes binary coded
	C0h	DIFE
	40h	DIFE/ UNIT3
	10h-16h	VIF: Volume -, depending on the decimal place

50	xxh	Volume - (LSB)
	xxh	"
	xxh	"
	xxh	" (MSB)
	04h	DIF: 4 bytes binary coded
55	38h-4Eh	VIF: Flow rate, depending on the decimal place
	xxh	Flow rate - (LBS)
	xxh	"
	xxh	"
	xxh	" (MSB)
60	01h	DIF: 1 byte binary coded
	FDh	VIF: Extension of the VIF code
	0Fh	VIFE: Software version
	xxh	Software version Value
	01h	DIF: 1 byte binary coded
65	FDh	VIF: Extension of the VIF code
	17h	VIFE: Alarm
	Xxh	Error code
	CS	Checksum
	16h	Stop

6.4 Basic display

The basic display of the device in idle status can be adapted to customer-specific requirements. This does not affect the order of the subsequent items. If the display is to be changed, this is done using the E button. Press the E button and select the parameter to be shown on the basic display. Press the E button again to confirm. The operator can choose between the following parameters, which can be shown both in the first line and in the second line of the display:

- Date and time
- User — VolumerV (resettable)
- Total volume — Total volume in both directions ∑V
- Volume (-) — DirectionFlow volume negative direction -V
- Volume (+) direction — Flow volume positive direction +V
- Bar graph flow rate — Bar graph flow rate
- Flow rate — Q

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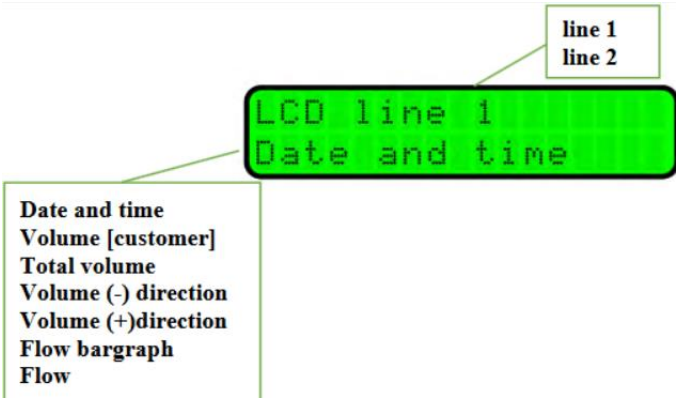
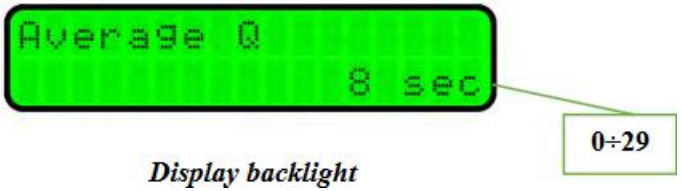


6.4.1. Attenuation

This parameter is used to set the time for averaging the flow rate values. The maximum time is 29 seconds.



Display backlight

6.4.2. Lighting

This parameter is used to select the time after which the display goes dark again if it is not used. The required setting is saved by pressing the ▲ and ▼ buttons (permanently, 40 s, 20 s, 10 s, off).

Serial number

6.4.3. Serial number

A serial number is assigned by SEIKOM Electronic and cannot be changed by the user.

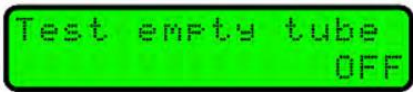
6.4.4. Calibration constants

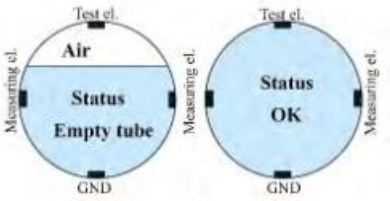
Calibration constants are set by SEIKOM Electronic and cannot be changed by the user.

Changes can only be made by an authorized person with a production password.

6.4.5. Empty conduit testing

This position can be used to switch the empty pipe check on and off. If the flow meter has been ordered without the empty pipe test, the empty pipe test cannot be switched on





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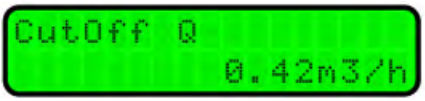
6.4.6. Firmware version

The firmware version is assigned by SEIKOM Electronic and cannot be changed by the user.

6.4.7. Insensitivity range - *suppression of the measuring start point*

The start of the measurement is recorded during production and cannot be changed by the user. Changes can only be made by an authorized person using the production password.



6.4.8. Zero calibration

The date under the heading " Zero calibration" indicates the time of the last calibration.
Flow rate recalibration.

To start the zero calibration, press the **E** button. The flow meter automatically analyzes the data. If "Yes" is selected by confirming with the **E** button, a new value is defined for the zero calibration and the date is updated (if "No" is selected, the values are not changed)

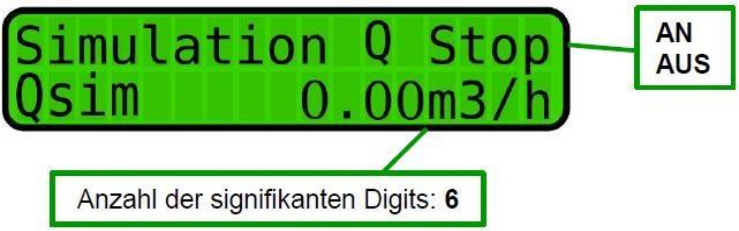
Note: Before zero calibration, the valves should be closed to ensure the actual zero calibration.

6.4.9. Flow simulation

The flow simulation is used to easily set and check the system without actually installing the device and without the flowing medium. The display shows the simulated flow rate as well as the current and pulse output. The simulated data is not recorded in the volume register.

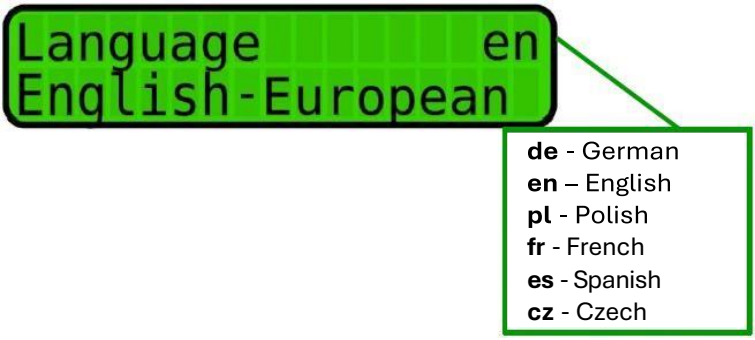
Warning! If the counter is running in the flow simulation mode, the basic display is not shown automatically after 2.5 minutes (normal case). After ending the simulation mode, press the ▼long key to exit the parameter menu.

To start or end the simulation, press the **E** button.



6.4.10. Language

The language can be changed by pressing the **E** button and selecting the required language.



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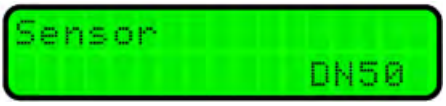
6.4.11. Resetting *the counters*

This parameter can be used to reset all or only selected counters. To perform the reset, press the **E button** and select the counter to be reset (ΣV, -V, +V or all). After resetting, the date of the last reset is displayed as well as information on which meter has been reset (ΣV, -V, +V or all).

6.4.12. Nominal diameter *(DN)*

This parameter is configured by SEIKOM Electronic and cannot be changed.

The DN change can only be carried out by an authorized person with a production password.



6.4.13. Flow direction

This parameter determines the direction of flow of the medium in the sensor. The positive direction is the direction indicated by the arrow on the flow meter. If the medium flows in the opposite direction to that indicated by the arrow, this is the negative direction.

The setting can be changed using the **E** button.

6.4.14. Flow units *[Q]*

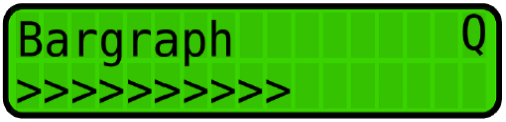
The flow units are changed using the **E** button.

The required number of decimal places is set by clicking on the ▲ and ▼ buttons and confirmed with the **E** button.

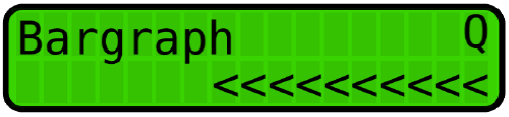
6.4.15. *Share of* flow units *[Q] in percent (bar graph)*

This parameter is used to set the bar graph. To set the bar graph, press the **E** button. You can select the flow to which the bar graph should react (+ Q, - Q, ΣQ) and the maximum flow at the maximum bar graph display on the display. The bar graph is made up of a total of 16 segments " or ", depending on the flow direction (only when selecting - Q or ΣQ).

Bar graph example (the medium flows in the positive direction)



Bar graph example (the medium flows in the negative direction)



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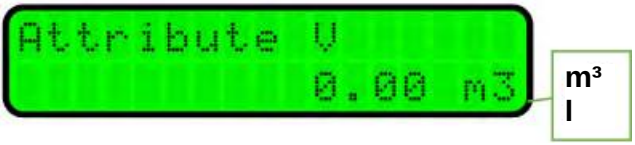
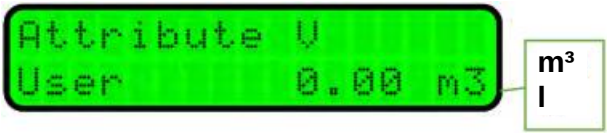
6.4.16. Volume units *[V]*

The volume units (+V, -V and ΣV) are changed using the **E** button. The number of decimal places of the volume counter can be selected from "none" to 3. The units are also selected here (l, m³). If these parameters are changed, previously measured values will also be adjusted. It is therefore advisable to reset the meters after changing the volume units.



6.4.17. User volume counter *with the option of resetting*

The user volume counter (rV) can be reset by pressing the ▲ and ▼ buttons simultaneously. The number of decimal places can be selected from "none" to 3. The units are also selected here (l, m³). If these parameters are changed, previously measured values will also be adjusted. It is therefore advisable to reset the meters after changing the volume units.



6.4.18. *Change* password

The default password of SEIKOM Electronic is **0000**, but the user can change it by pressing the **E** key. The password must consist of 4 digits.

Factory setting (SEIKOM Electronic factory setting)

This function resets the configuration of the measuring device to the factory settings. All user settings are deleted. If jumper J1 is set, the volume counters are also reset.

This function can be activated without a user password!

To change the factory setting, press the **E** button and click on the ▲ and ▲ buttons.
or ▼ **ANO (Yes)** is selected and confirmed again with the **E** button.

After confirmation, the flow meter is reset to the factory setting and the password is **0000** again.

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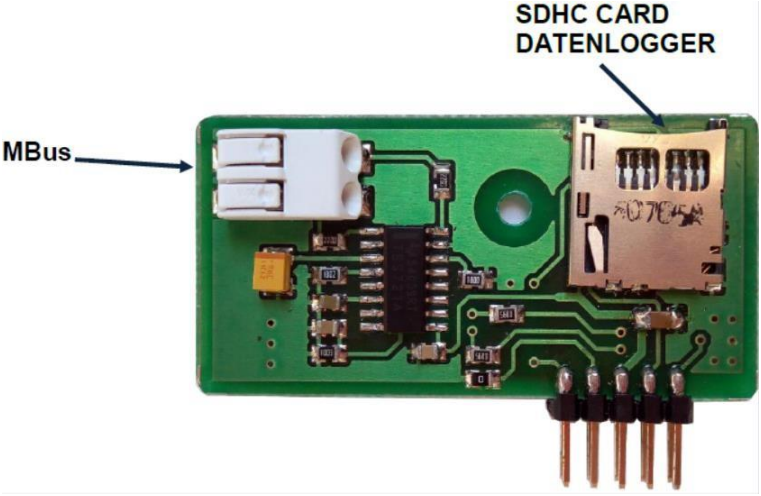
Extension module

The FlowGuard® FT410 can be equipped with an extension module for expansion with the following function:

1) DATA LOGGER
2) MBus
3) DATENLOGGER + MBus

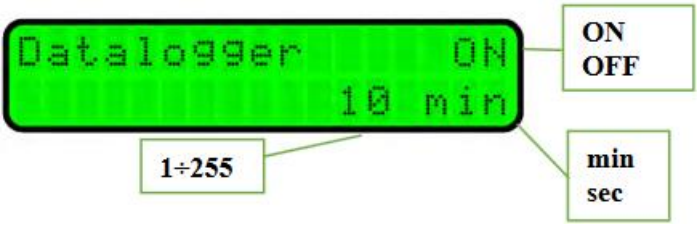


The extension module is inserted into the slot in the power supply unit of the meter and fastened with an M3 screw.

1. **Data logger**

Switch off the power supply, insert the expansion card into the free slot and secure it with an M3 screw.

Insert the prepared microSDHC card into the module after switching it on. After insertion, the DATALOGGER is automatically created in the SET menu of the measuring device.



If the measuring device does not switch to the DATALOGGER menu after insertion, find this point in the SET menu. You can now set the activation/deactivation of logging and the logging interval. Available units for the logging interval are minutes or seconds.

If the map is accepted and a log file exists at the same time, the end of the file is searched and the data is added to the end of this file. While the end of the file is being searched, the number of searched and occupied clusters is displayed in the bottom left corner. The number of clusters in a search file is limited to 4096 (2MB). If the log file is longer, a new one is created, incremented by 1.

The name of the log file is LOG00.TXT-LOG99.TXT.

If the data has been written correctly, WRITE is displayed for a moment in the bottom left-hand corner.

If the microSDHC card is not accepted after logging is activated, an error message is displayed:

E:1 - GO_IDLE_STATE
E:2 - SEND_IF_COND
E:3 - ACMD41
E:4 - READ OCR
E:5 - no SDHC card

Requirements for the microSDHC card:
1) The card must be of the SDHC type (cards with a capacity of 4 GB or more)
2) The file format must be FAT32
3) The cluster size must be 512B*

*Note

Cards larger than 2 GB cannot normally be formatted in 512B clusters, so the card must be split into two partitions, with one active partition always smaller than 2 GB, formatted on FAT32 with 512B clusters.

The formatted card can be purchased as an accessory for the expansion module.

2. **MBus**

Switch off the power supply, insert the expansion card into the free slot and secure it with an M3 screw.

After switching off, connect the MBus communication cable to the terminals of the extension module.

Communication parameters:
2400Bd
paEven
8 data bits
1 stop bit
Address: The last two digits of the serial number

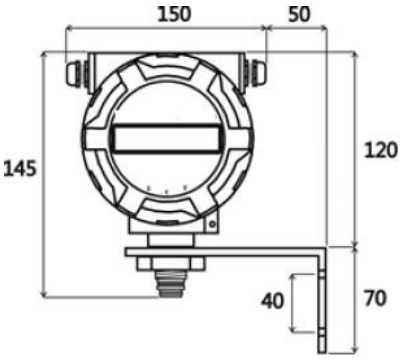
Diagnosis:

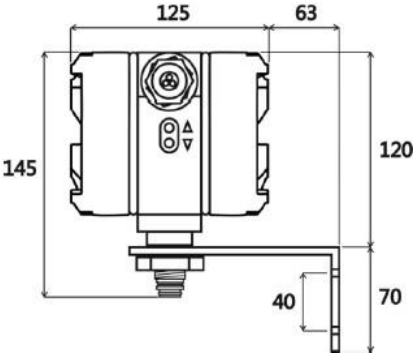
Reception and transmission can be configured in the SET menu, Communication line settings 1 - RS485, can be diagnosed.
Rx - receive on line 1 (RS4858, MBus/Modbus) Tx - transmit on line 1 (RS485, MBus/Modbus) R1 - receive on line 2 (MBus expansion module)
T1 - Transfer to line 2 (MBus extension module)

7. Application notes

Installation of the sensor with a separate evaluation unit:

First of all, it should be determined which type of mounting is to be used, whether the mounting is to be mounted behind the electronics or under the electronics. The mounting corner is attached to the wall using screws. The evaluation unit is mounted on the mounting and wired. The cables should be suspended so that no condensation runs into the housing.





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7.1 Disassembly and assembly of printed circuit boards

Mains board with terminals

Warnung

Risk of electric shock!

Before removing the electronics, make sure that the appliance is switched off and disconnected from the power supply.

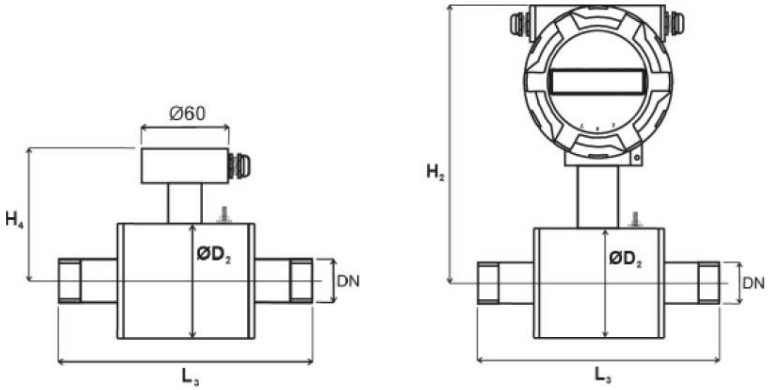
1. Unscrew the cover of the appliance
2. Remove the cables from the plug-in terminals if necessary. Remove if nec
3. First remove the first two fixing screws of the protective cover, then the four screws of the mains board.
4. Easily remove the mesh plate and disconnect the flat cable.
5. Remove the mesh plate and replace it with an intact one.
6. Reconnect the flat cable and insert the circuit board back into the housing.
7. Tighten the circuit board again with the fastening screws.
8. Close the lid again.

Replacing the display unit

1. Unscrew the cover of the appliance with the glass window.
2. Remove the four fastening screws
3. Remove the metal plate
4. Easily remove the mesh plate and disconnect the flat cable.
5. Carefully disconnect the sensor cables from the connections.
6. Connect the cables to the new circuit board
7. Connect the cables of the buttons and the flat cable
8. Turn the mains board in the desired direction (± 90° or 180°).
9. Fix the metal plate with screws
10. Tighten the circuit board again with the fastening screws.
11. Close the lid again.

7.2 Basic dimensions of the sensor

Screw thread



Diameter [mm]	Screw thread	D_2 outside ø	L_3 Sensor length	H_4 Sensor height	Weight (kg)	H_2 Compact sensor height	Compact sensor weight (kg)
10	⅜“	70	193	90	4	177	5
15	½“	70	196	90	4	177	5
20	¾“	80	206	95	4	182	5
25	1“	90	206	100	5	187	6
32	1¼“	100	233	105	5	192	6
40	1½“	116	256	113	6	200	7
50	2“	136	261	123	6	210	7

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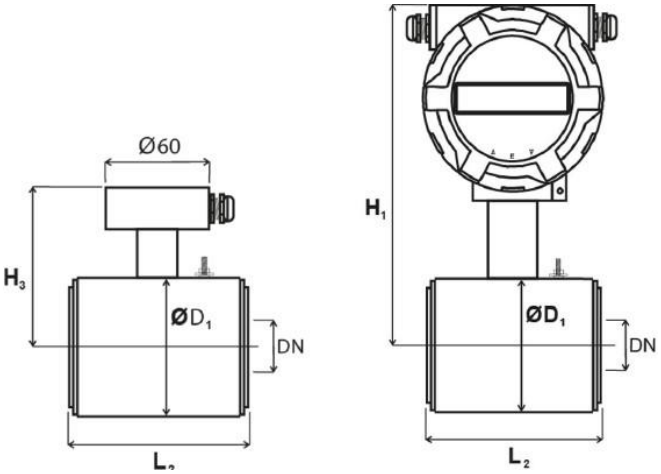
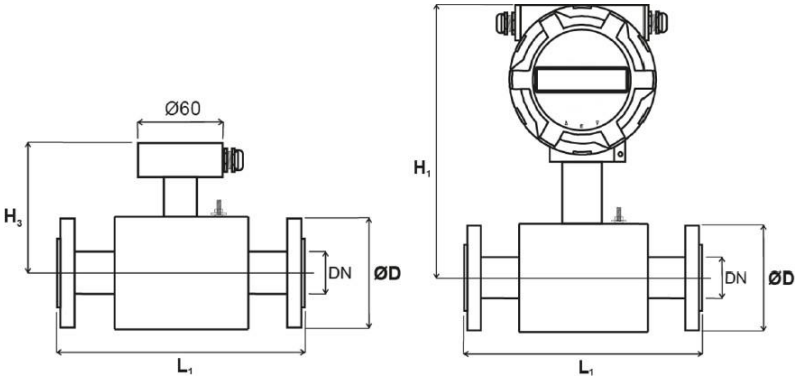
Sandwich



Diameter nominal [mm]	D_1 Outside diameter of sensor	L_2 Building length of sensor	H_3 Building height of sensor	Weight of detached flow sensor (kg)	H_1 Building height of comp. meter	Compact flow meter weight (kg)
10*,15	51	90	110	2	195	3
20	61	90	120	2	205	3
25	71	90	130	3	215	4
32	82	90	140	3	226	4
40	92	110	150	4	236	5
50	107	110	165	4	251	5
65	127	130	185	5	271	6
80	142	130	200	6	286	7
100	168	200	226	7	312	8
125	194	200	253	9	338	10
150	224	200	283	11	368	12
200	284	200	340	14	427	15

Flange



Diameter nominal [mm]	D Outside diameter of flanges	L_1 Building length of sensor	H_3 Building height of sensor	Weight of detached flow sensor (kg)	H_1 Building height of comp. meter	Compact flow meter weight (kg)
10*,15		200	86	4	173	5
20		200	86	4	173	5
25		200	91	5	178	6
32		200	96	6	183	7
40		200	101	7	188	8
50		200	109	9	196	10
65	The outside	200	119	11	206	12
80	diameter	200	126	12	213	13
100	corresponds to	250	139	19	226	20
125	the required	250	152	26	239	27
150	pressure class and	300	167	37	254	38
200	standards.	350	197	44	284	45
250		450	240	65	327	66
300		500	265	78	352	79
350		550	295	88	382	89
400		600	325	106	412	107

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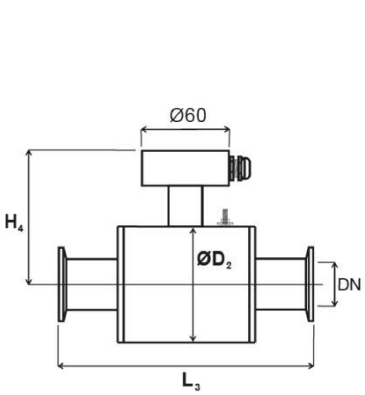
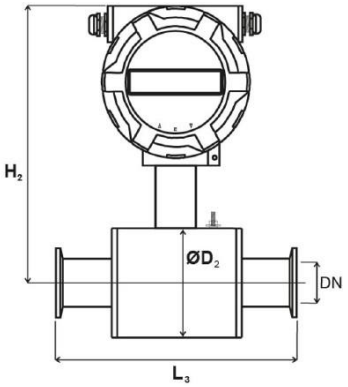
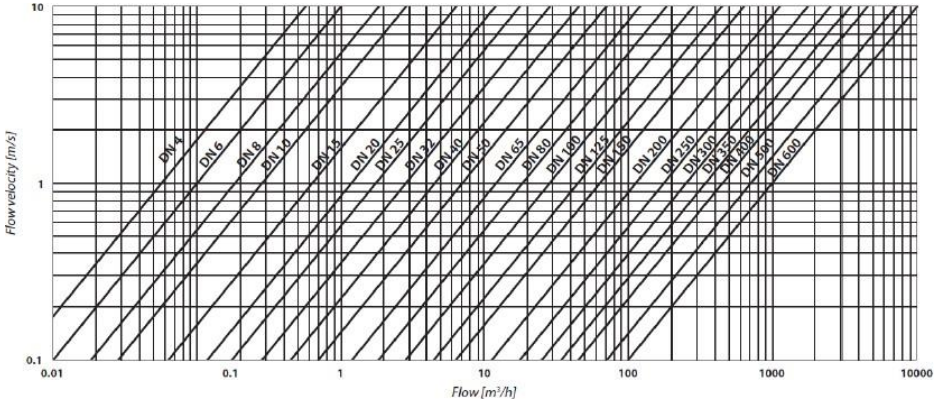
Food industry





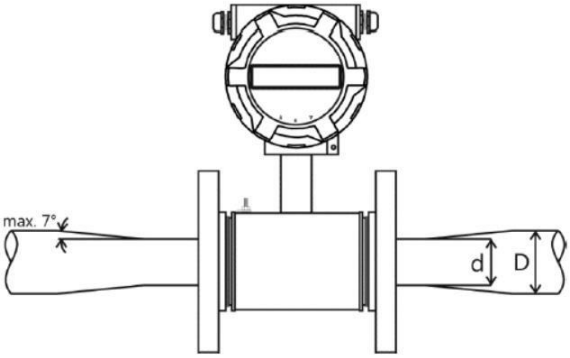
Diameter nominal [mm]	Food grade connection CLAMP/Screwed fitting	D_2 Outside diameter of sensor	L_3 Building length of CLAMP	L_3 Building length of food grade screwed fitting	H_4 Building height of sensor	Weight of detached flow sensor (kg)	H_2 Building height of comp. meter	Compact flow meter weight (kg)
10	DN 10	70	180	173	90	4	177	5
15	DN 15	70	175	165	90	4	177	5
20	DN 20	80	175	170	95	4	182	5
25	DN 25	90	175	180	100	5	187	6
32	DN 32	100	175	192	105	5	192	6
40	DN 40	116	203	215	113	6	200	7
50	DN 50	136	211	228	123	7	210	8
65	DN 65	151	upon	upon	131	7	218	8
80	DN 80	177	agreement	agreement	144	8	231	9

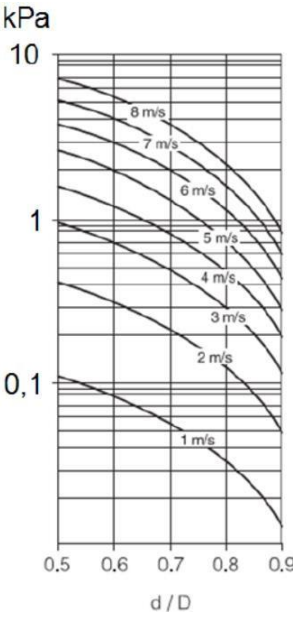
7.3 Nomogram for quick selection of the measuring point



7.4 Reduction of the pipe diameter

If the diameter of the pipe is larger than the diameter of the sensor.





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7.5 Interference during measurement

If errors occur during the measurement, this may be due to the following causes:

- High solids content
- Inhomogeneity of the liquid
- Interruption of mixing
- Continuous chemical reactions of the liquid
- Use of diaphragm and piston pumps
- Poor earthing

8. Disassembly, return, cleaning and disposal

8.1 Dismantling

Residual media in dismantled devices can endanger people, the environment and equipment. Sufficient precautionary measures must be taken.

There is a risk of burns. Allow the sensor to cool down sufficiently before removing it. When removing the sensor, there is a risk of dangerously hot media escaping.

8.2 Return shipment

Use the original packaging or similar to return the device.

Antistatic foil, insulating material, labeling as a sensitive measuring device, etc. can be used to protect against damage.

8.3 Cleaning

Disconnect the electrical connection before cleaning the sensor. Clean the device with a damp cloth.
Do not bring the electrical connection into contact with moisture.
Rinse or clean a dismantled device before returning it to protect people and the environment from hazards caused by adhering residues of measuring media
Residues of measuring media in dismantled devices can endanger people, the environment and equipment. Take adequate precautionary measures.

8.4 Waste disposal

Dispose of appliance components and packaging materials in an environmentally friendly manner in accordance with the country-specific waste treatment and disposal regulations.

9. EU DECLARATION OF CONFORMITY

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Telefon: +49 (0) 2058 916 90 00
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EU-Declaration of Conformity

The EU declaration of conformity applies to the following unit:

FlowGuard® FT410

This declaration of conformity is issued under the sole responsibility of the manufacturer.
We confirm the conformity to the essential requirements of the European directives:

2014/30/EU (EMV-Richtlinie)
2014/35/EU (Niederspannungsrichtlinie)
2011/65/EU (Beschränkung gefährlicher Stoffe)
2015/863/EU (Ergänzung RoHS 3)

The following standards were applied:

DIN EN IEC 63000: 2019-05
DIN EN IEC 61000-6-2: 2019-11
DIN EN 61000-6-3: 2021-03

Mettmann, 28th March 2023

Philipp Hein
Managing Director

Notes

Growing network of local distributors available online
www.seikom-electronic.com

Our product portfolio

Flow rate	Temperature	Print
Air quality and CO_2	Zener barriers	Universal Transmitter

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