MAG X2 User Guide

arkon flow systems

Arkon Flow Systems
Nováčkova 11, 614 00 Brno, Czech Republic
Tel. +420 543 214 822, Tel./Fax +420 543 215 249
Enquiries/ Orders/ General questions: office@arkon.co.uk
Marketing support/ Brochures: marketing@arkon.co.uk
Technical support: support@arkon.co.uk
www.arkon.co.uk

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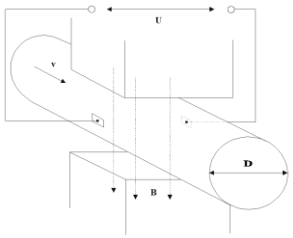
1. Introduction

1.1. Operating Principle

The measurement is based on the principle of Faraday‘s law on electromagnetic induction in which an electric voltage is induced in an electrically conductive body that moves in a magnetic field.



Liquid flows through a tube in the direction of the magnetic field. Liquid with a certain minimum electrical conductivity induces a voltage which is detected by two electrodes located in a 90 degree angle from the magnetic field and the flow direction.

1.2. Applications

 Water / waste water	 Chemical industry	 Food industry	 Power engineering	 Agriculture	 Effluent Industry

1.3. Safety Instructions

	Please read this manual carefully before using the product.
	Keep this manual for future reference. Arkon Flow Systems, s.r.o will not be liable for any damage caused by improper use of the product or its accessories.
	If the device is used any different way than is specified, the electric protection may be disrupted.
	The MAGX2 flow converter - flow-meter must not be mounted in explosive hazardous areas.

1.4. Unpacking the flowmeter

❶ While unpacking the flowmeter, conduct a visual check of the flowmeter upon receipt to make sure the product has not been damaged during transport.
❷ Check the completeness of the package. In case of any problem, contact the Arkon sales department without delay.

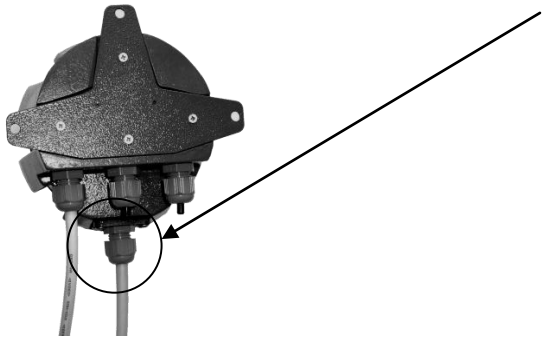
Flowmeter
Cables
CD ROM + Manual
Mounting kit

2. Installation

2.1. Remote or Compact

Any MAGX2 flowmeter can be delivered in two versions; Compact with IP67/IP68 or Remote. The compact version has the transmitter unit connected directly to the sensor body. This version does not require any further mounting or installation of the transmitter.

The remote version has a separated transmitter. It is connected to the sensor with a cable. The cable entry into the sensor is protected by a junction box, which can be potted to IP68 (page 11).
The cable entry on the transmitter side is through a M16x1.5 gland.

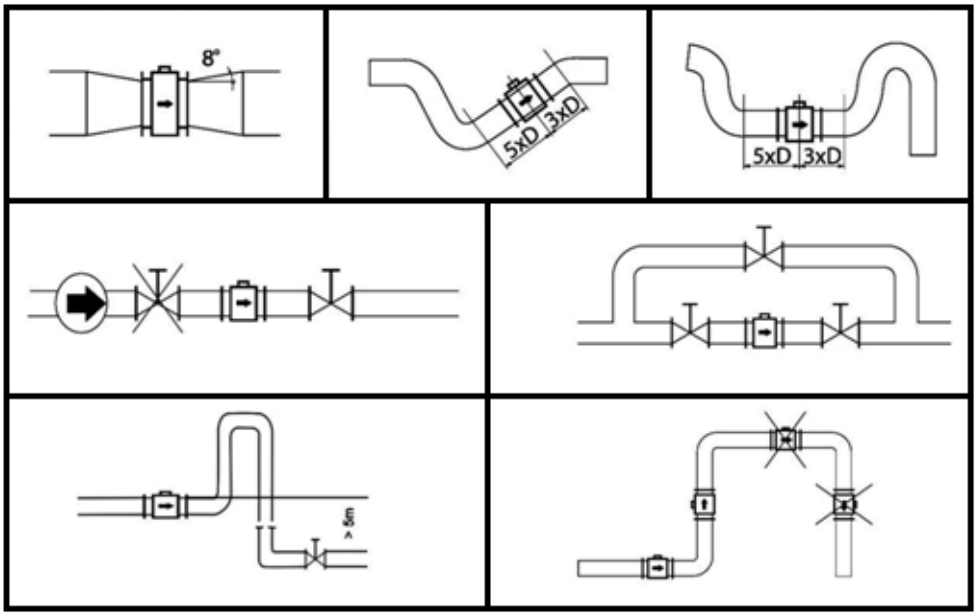


The cable type used for the connection between sensor and transmitter for remote versions: UNITRONIC® LiYCY (TP) 0035 830, 2x2x0.5
The MAGX2 is equipped with an electronic board located inside the sensor neck. This board sends a digital signal to the transmitter, unlike traditional flowmeters, which send an analogue signal. This allows the MAGX2 to carry its signal over much longer distances than conventional flowmeters; up to 500m is possible.

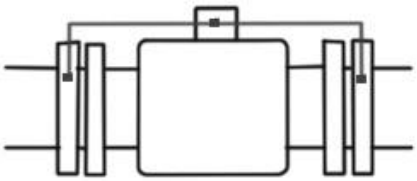
2.2. Sensor installation

Sensor dimensions can be found on page 54
Proper sensor installation is extremely important in order for your flowmeter to work correctly. Below, you will find minimum sensor installation requirements that need to be respected at all time. Sensor must not be installedneck facing down.

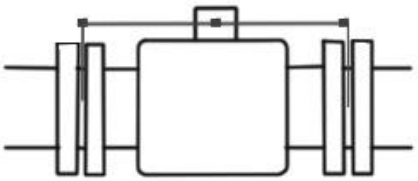
Sensor installation requirements:



All MAGX2 sensors are supplied with 2 built in earthing electrodes which is sufficient for all applications with metal pipes and tanks. However on applications where all pipes and tanks are manufactured from plastic, it is recommended that earthing rings are also installed to ensure the maximum resistance of the sensor to earth is <1 ohm.

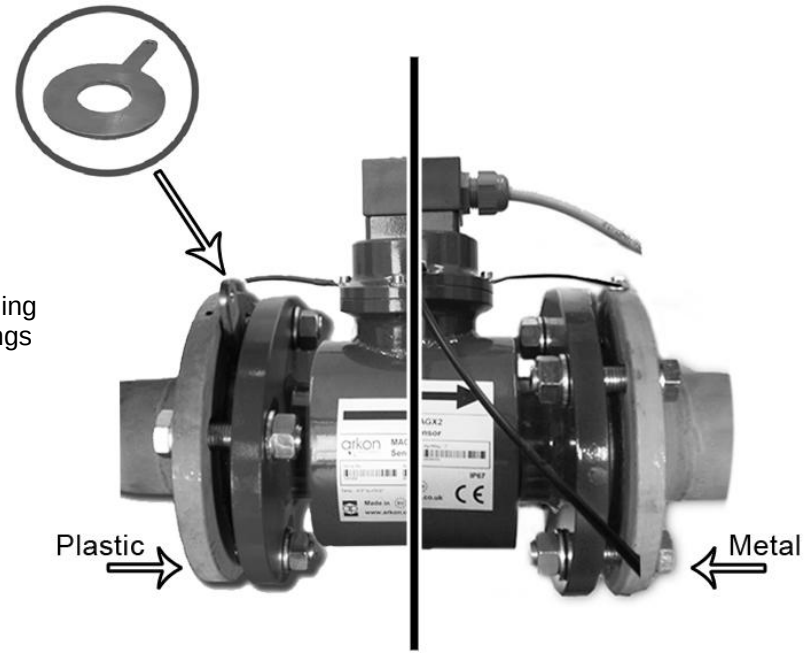


Conductive (metal) pipe



Non-conductive (plastic, lined) pipe

Sensor grounding with earthing rings



	To ensure correct meter operation make sure the earthing rings and sealings around are centered.

2.3. Dry liner

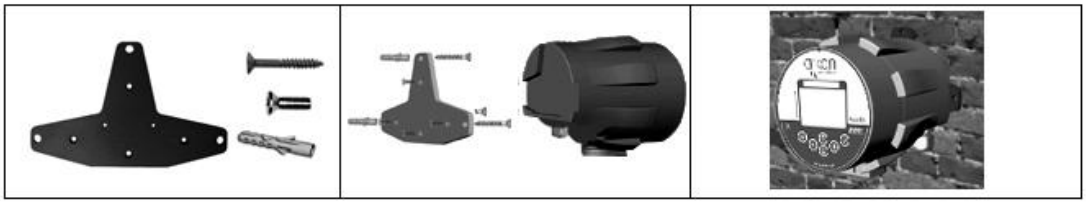
Flowmeters with a Hard Rubber liner can show incorrect readings during the first 2-3 days after installation. This is due to the fact that the time needed for transport and the time before installation is long enough for the liner to dry out, and thus it changes shape/size. This change, in effect, affects reading accuracy. Simply by keeping the meter wet, this problem solve itself within 2-3 days and no other action is required at all.

2.4. Installation of the transmitter

In case of a compact flowmeter version, the transmitter will need no further installation, and should be ready for use. In case of a remote version, the following 4 steps are necessary.

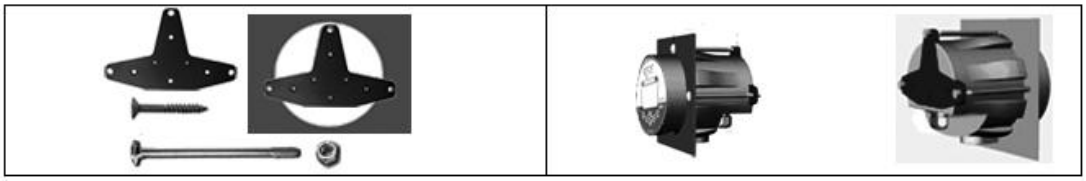
❶ Mount the transmitter to a wall, panel, or DIN-rail.

Wall mounting:

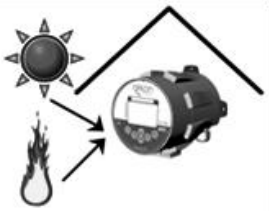


DIN-rail mounting:

Panel mounting:



The electronics have to be protected against direct sunlight and high temperatures!



The transmitter housing should be exposed to minimal mechanical strain only (max. 1kg)!

❷ Connect the transmitter to the signal cable from the sensor.

IP67 Transmitter
To do this, first open the transmitter housing by disconnecting the two parts of the transmitter housing with the metal “key” that is provided with the meter

IP68 Transmitter
To do this undo four M6x22 screws using allen key nr.5 that is part of the delivery.

After the meter is opened, pull the signal cable through the cable gland on the bottom of the transmitter housing (see page 5).Connect the connector at the end of the signal cable from the sensor to the transmitter circuit board.

	Electrical installation should only be done by a qualified person. Standard safety regulations for hazardous electrical installations have to be respected. The O-ring sealing shall be exchanged every 6 months of operation.

❸ Connect the transmitter to network power.

The customer is assumed to supply its own network power supply cable (90-250VAC, 24VDC or 12VDC, depending on the type of power supply ordered with the flowmeter). Before connecting to network power, the cable needs to be properly connected to the transmitter.
First pull the cable end through one of the cable glands (ideally the first on the left looking at the transmitter housing from the back-side) on the bottom of the transmitter.
Recommend 3x1mm round crosscut cable.
After connecting the power cable, close the housing and connect the cable to network power. This will make the flowmeter switch on.

	For electrical connection the appropriate temperature rated cables have to be used (Ta=70degC)

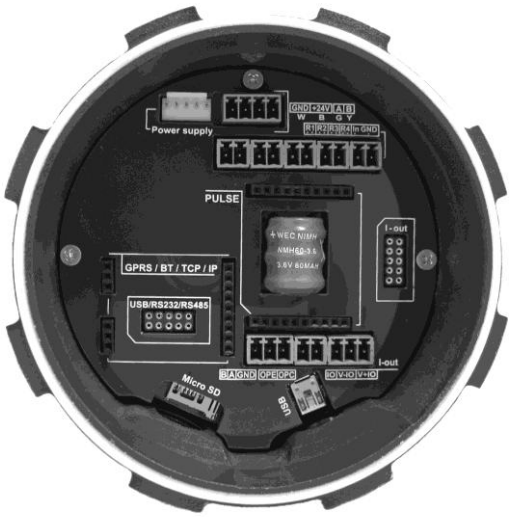
❹ Set up the transmitter for use.
You are now ready to start using your flowmeter or to customize its settings as per your requirements. For example;
- Set-up the measurement unit of flow-rate displayed, e.g. m3/hr.
- Set up of the unit for the volume displayed. For all volume counters this same unit will be used.

2.5. Module installation

❶- Always check if the module does not have a bent or broken pin, before placing it in the correct module slot of the MAGX2 motherboard.

❷ - Always make sure you place the module in the correct slot of the motherboard! The name that is written on the module itself has to match the name written next to the slot. **Placing the module in an incorrect slot can cause damage to the module and the motherboard, and has to be avoided by careful module installation!**

❸ **-** Check whether you are placing the module in the correct position. It does matter how you turn the module to fit the slot! The white line around the actual slot on the motherboard indicates the correct position of installation. The bevelled corner should be your point of orientation (note the picture below).



❹ - Now you can place the module in its slot:

Correct installation

Incorrect installations

The RS232 Module is placed in a different slot.

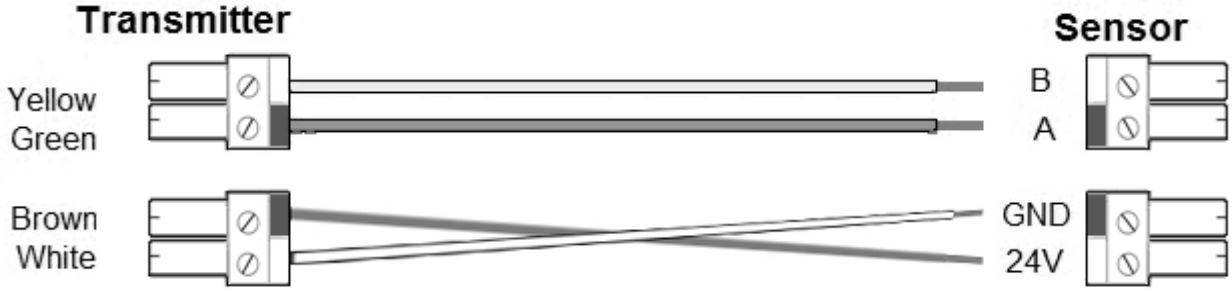
The RS232 Module is placed in the correct slot, but with the bevelled corner in the wrong direction.

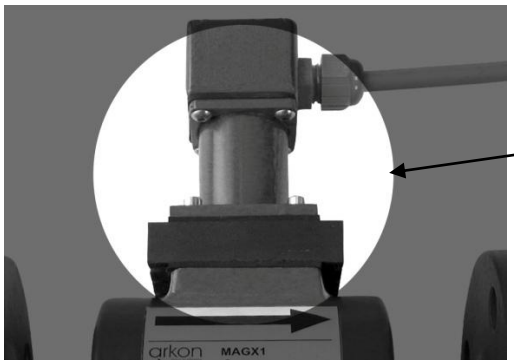
	Any connection or disconnection of any module has to be done with network power to the meter switched off.

2.6. Cables connections

The following diagrams show the connections of the cables between sensor and transmitter.

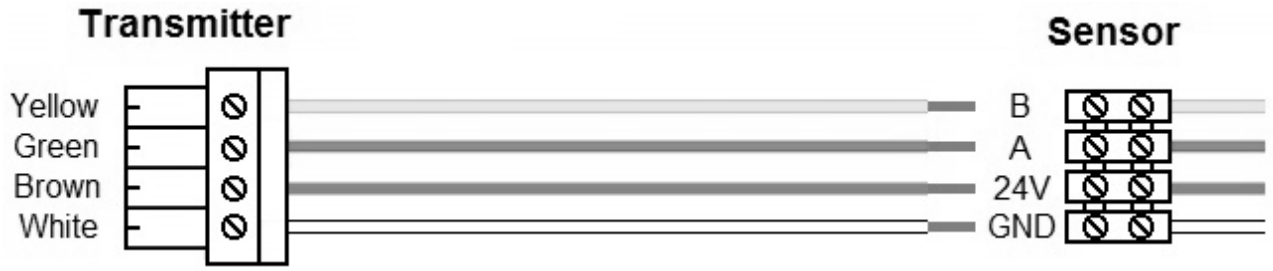
Sensor communication module version 7.1

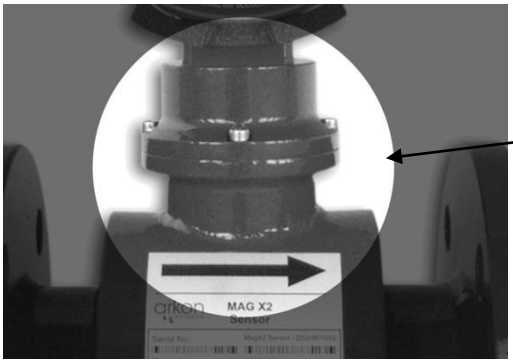




Use this cable connection only for “sensor to transmitter communication module - version 7.1”.

Sensor communication module version 8.0





Use this cable connection only for "sensor to transmitter communication module – version 8.0".

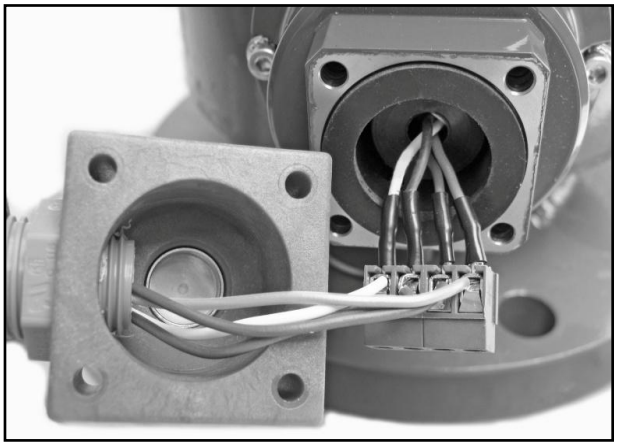
	"Please note that in different versions of the transmitter, 2 types of connections can be used. These are 1 x 4-pin connector instead of a 2 x 2-pin connector as shown in the picture."

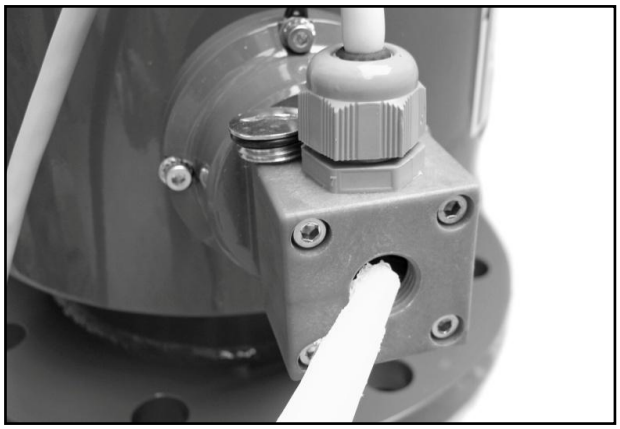
Important: In case of IP68 transmitter it is needed to use silicone gel to extra protect cable glands from inside of the meter. Pour neutral silicone gel into the cable gland from inner side and pull the cable 3mm out of the housing to make the cable gland extra protected for IP68.

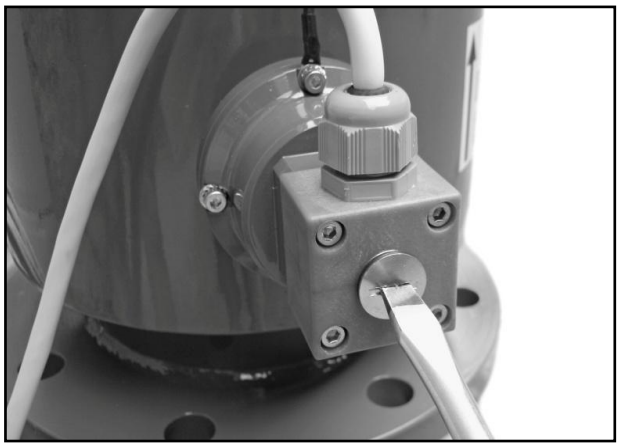
2.7. Potting the remote sensor terminal box for sensor communication module

For sensor communication module, to guarantee IP68 protection of the sensor, it is necessary to pot the sensor terminal box properly. The proper way to do this is described below:

❶	Plug the connectors into the sensor (white and green wire adjacent).
❷	Screw the small terminal box to the sensor neck (4 screws).
❸	Fill the terminal box completely with silicone, by squeezing it through the opening on top of the box.
❹	Close the small terminal box with the sealing screw.







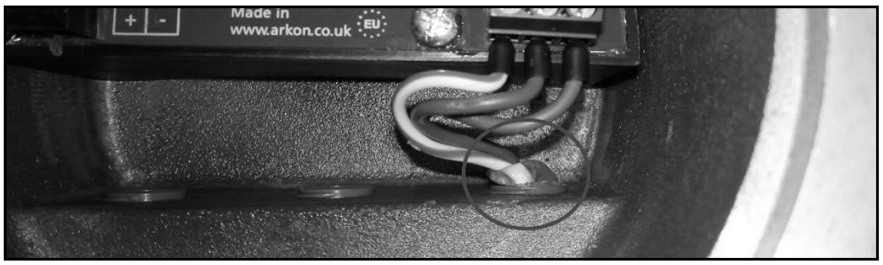
2.8. Fill up of a cable gland of MAGX2 IP68 housing

❶	Fit MAGX2 IP68 housing with standard round cross-cut cable. Example: Power Supply (see pic. 1).
❷	Apply sufficient amount of silicon gel to cable gland of opened round cross cut cable end inside housing of MAGX2 (see pic. 2).
❸	Slightly pull out the cable while turning the cable to achieve sufficient spread of silicon around the cable in the cable gland (see pic. 3 and pic. 4).
❹	Do an optical control – focus on full spread of silicone gel around the cable.

Pic. 1 round cross cut cable properly connected inside of MAGX2 IP68 housing

Pic. 2 Application of silicon binder on cable sheat of opened round cross cut cable end

Pic. 3 Manipulation with the cable to achieve sufficient fill up of a cable gland



Pic. 4 Do an optical control to verify sufficient fill up of the cable gland which satisfy IP68 standart

2.9. Ambient conditions

Ambient temperature: -20 – 60 ºC
Relative humidity: up to 100%, non-condensing

3. MAGX2 Transmitter Unit

Module Name:	Module Short Name:	Ordering Code:
MAGX2 Transmitter Unit	**Transmitter**	**MAGX2 T****** MAGX2 IP68 T******

The MAGX2 Transmitter unit is the main part of the flowmeter. It consists of the MAGX2 motherboard, a graphical display, touch-button controls and a transmitter housing.
Through the display and with help of the touch buttons, you can go through the various menus for data reading, configuration and setup of your flowmeter.

The following symbols are used in this manual and on the flowmeter display.

☑	ENTER		LEFT
☒	Esc		Selection menu
	Back		Key-lock
	DOWN		Electrode cleaning
	RIGHT	D	Demo mode
	UP		SD card present

IP67 version – Touch buttons
Touch-buttons are working on capacitance principle therefore any conductive material close to button's area will cause button press. Even water can do it so it is strongly recommended to use key-lock when any presence of water is expected. 30 seconds after turning the flowmeter on, touch-buttons autocalibration is started so function of the touch-buttons may be unstable.

IP68 version – Optometric buttons
Optometric buttons are working on a IR light reflection principle therefore any strong source of light will cause button press or buttons inactivity. In dusty areas or where direct sunlight shine directly on a keypad it is recommended to use key-lock, operate the buttons after cleaning the glass and shade from sunlight.

The MAGX2 transmitter has a key-lock possibility. You can lock touch-buttons by touching the Esc key first followed by the Enter key within one second. This will lock the flowmeter and there will be a lock symbol on display.

Touching the buttons will have no effect on flowmeters function. To unlock buttons touch the buttons same way as for locking.

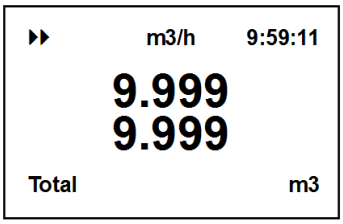
If flowmeter is in cleaning electrode there is a lightning symbol on display.

Upon starting the flowmeter, you will automatically see the main screen of the menu.

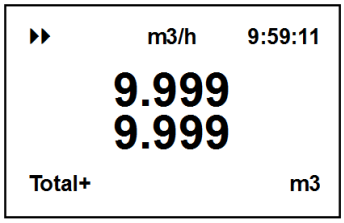
If transmitter is switched off from power supply longer than 3 months, output settings may be lost.

3.1. Main screen

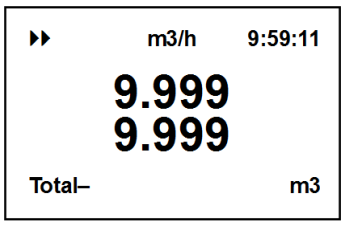
Total Volume
This is the total volume counter; the sum of all historical flows for a particular flowmeter. The user is not able to zero this counter without use of the service password. Direction of flow is ignored for this counter (negative flow is calculated the same way as positive flow).



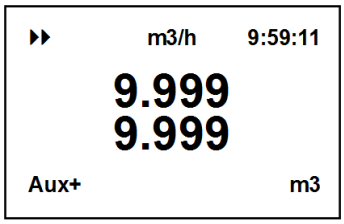
Positive Volume
This counter is only credited when the measured medium is flowing in the chosen positive direction. In case the flow is 0, or if it is flowing in the opposite (negative) direction, the number on the counter remains the same.



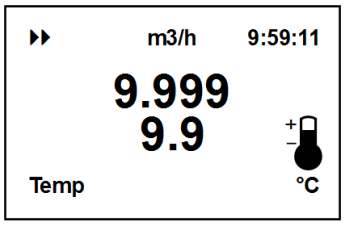
Negative Volume
This counter works the same way as the positive volume counter, yet in the opposite direction. In case the flow is 0, or flowing in the designated positive direction, the number on this counter will remain the same.



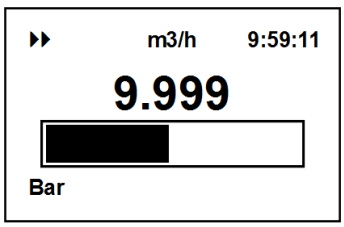
Auxiliary Volume
This is a 2nd total volume counter. It works the same as the Total Volume positive counter, yet with the only difference being that it can be reset to 0 at any time, with **User Settings** password.



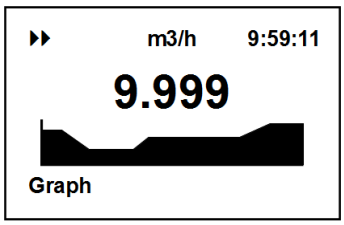
Temperature
This item is a temperature indication for the measured medium.



Bar Graph
Represents actual flowrate in a proportion to Qn (100%). The Qn – maximal flow value can be changed in **User Settings**.

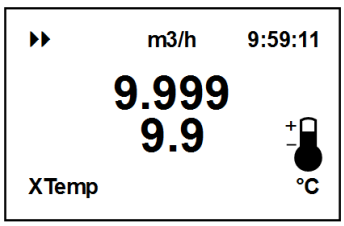


Time Graph
Shows last 2minutes of actual flow in time based graph (1 second step). Maximum of the graph is Qn value, can be changed in **User Settings**.

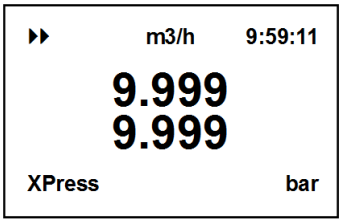


External Measurements - Temperature
This item is a temperature measured by the connected external temperature sensor.*

*External Measurement Temperature module must be used.

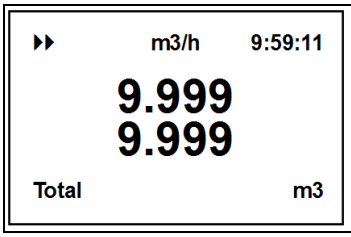


External Measurements - Pressure
This item is a pressure measured by the connected pressure sensor.*



*External Measurement Pressure module must be used.

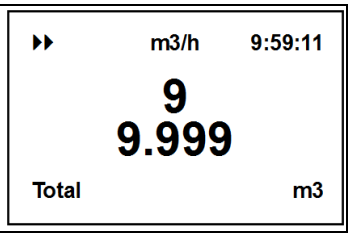
You can cycle through these 9 indication screens by pressing the **up** and **down buttons** on the transmitter.



It is possible to change the number of decimal digits of the actual flow displayed in the main screen:

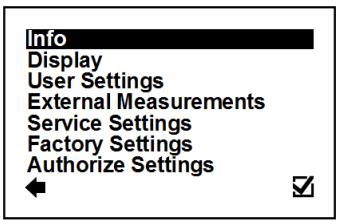
decimal numbers ➔

By using the ➲➲ buttons



If value of any Volume counter higher than 4 000 000 m3, then value of Volume show only in m3 unit. If value of any Volume counter higher than 999 999 999 m3, then this Volume will be reset to 0.

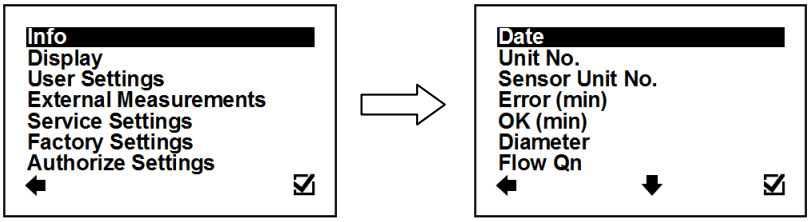
3.2. Flowmeter Menu

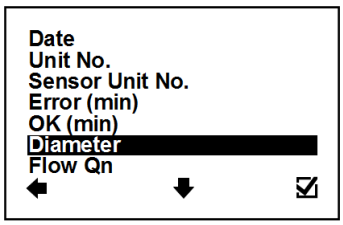


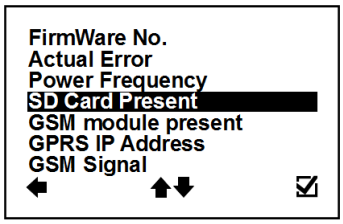
After pressing the enter button you get to into the root-menu. From here, you can chose any of the sub-menu's displayed in the picture on the right.

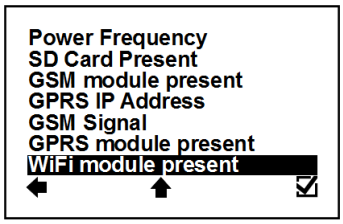
Navigate with 🡙🡘 and select your choice with ☑.

3.3. Info menu



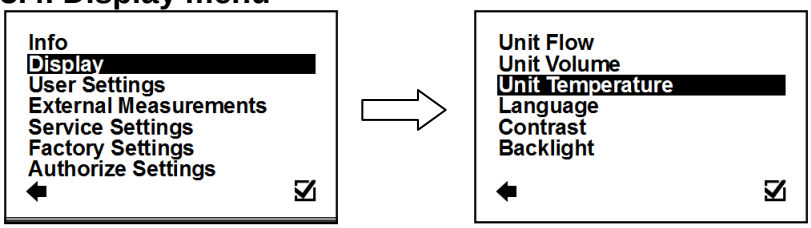






Date	This item shows the current date according to the transmitter's setup. It can be changed in the User Settings menu.
Unit No.	Displays the serial number of the motherboard. This number is allocated during production by the manufacturer.
Sensor Unit	Displays the serial number of the sensor. This number is allocated during production by the manufacturer. This item is working with sensor ver. 8 and newer.
Error (min)	The number of minutes the device was not measuring because of errors.
OK (min)	The number of minutes that the device measured correctly.
Diameter	This item shows the nominal sensor diameter that is currently configured for the given flowmeter.
Flow Qn	Here, the flowmeter displays the predicted nominal flow. Values can be changed under User Settings.
Firmware No.	This shows the current firmware version.
Actual Error	This shows all actual errors (see chapter 10).
Power frequency	Identifies the network power supply frequency.
SD card present	Shows if the SD card is inserted in the flowmeter.
GSM module present	Shows if the GPRS module is inserted in the flowmeter.
GPRS IP address	Displays IP address of GPRS module.
GSM Signal	Signal strength of the GSM SMS Module.
GPRS module present	Shows if the GPRS module is inserted in the flowmeter.
Wifi module present	Shows if the Wi-Fi module is inserted in the flowmeter.

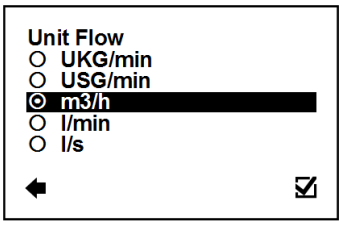
3.4. Display menu



3.4.1. Display > Unit Flow

Setup of the displayed measurement unit for current flow.

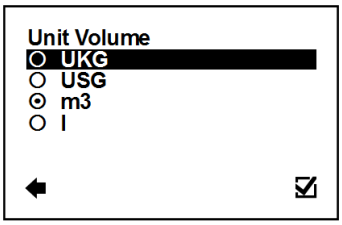
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
UKG / min	UK gallon per minute
USG / min	US gallon per minute
m3 / h	Cubic meters per hour
l / min	Litres per minute
l / s	Litres per second



3.4.2. Display > Unit Volume

Setup of the displayed measurement unit for total flow.

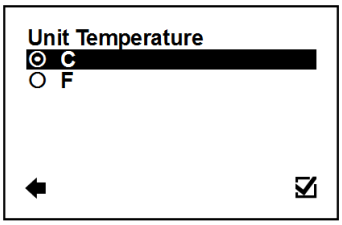
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
UKG	UK gallon
USG	US gallon
m3	Cubic meter
l	Litre



3.4.3. Display > Unit Temperature

Setup of the displayed measurement unit of temperature indication and external measurement of temperature.

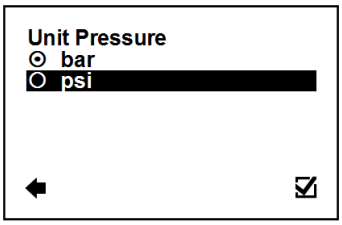
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
C	Degrees Celsius
F	Degrees Fahrenheit



3.4.4. Display > Unit Pressure

Setup of the displayed measurement unit of the external pressure measurement.

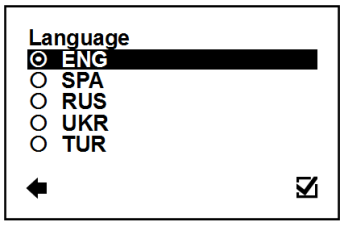
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
bar	Pressure in bar unit (1 bar = 100 kPa = 14,50 psi)
psi	Pressure in psi unit (1 psi = 6,89 kPa = 0,07 bar)



3.4.5. Display > Language

Setup of the language for flowmeter menu.

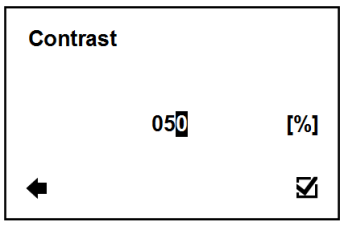
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
ENG	English
SPA	Spanish
RUS	Russian
UKR	Ukrainian
TUR	Turkish



3.4.6. Display > Contrast

Contrast of the display setup.
Possible range: 0 – 100 %

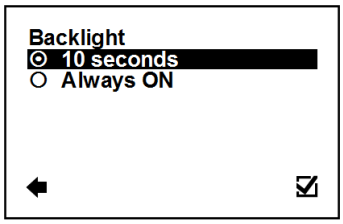
←	Back with no change
↔	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory



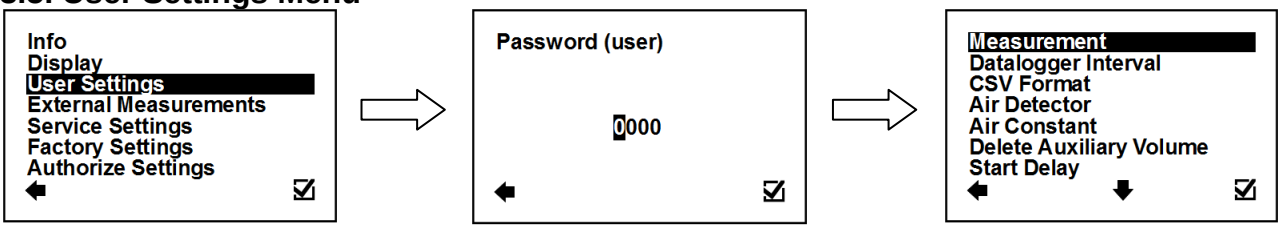
3.4.7. Display > Backlight

Setup of the backlight for flowmeter display.

←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
10 seconds	The backlight would turn off 10 seconds after the last button touch
Always ON	The backlight will be always on



3.5. User Settings Menu

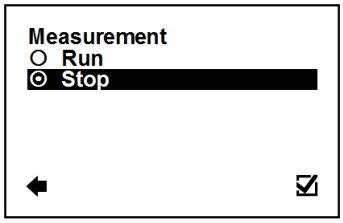


To enter this part of the menu, it is necessary to enter the **User** Password.
The default factory setting is **1111**. See page **26**. for user password settings.

3.5.1. User Settings > Measurement

This option allows selecting flow measurement to be on or off.

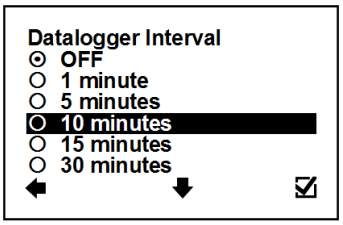
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
Run	The device is measuring, the totalizers are active
Stop	The display will show a value, yet the totalizers are off

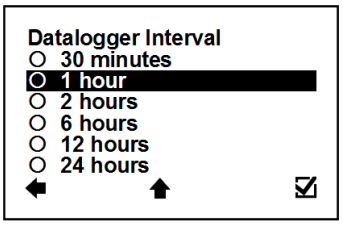


3.5.2. User Settings > Datalogger Interval

This option allows select how often will be totalizers saved on SD card.

←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
OFF	Totalizer is not used (SD card not necessary)
1 minute	The interval of saving totalizers; SD card needed
5 minutes	
10 minutes	
15 minutes	
30 minutes	
1 hour	
2 hours	
6 hours	
12 hours	
24 hours	



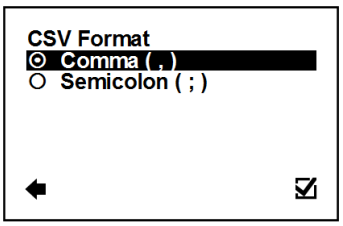


While there is an error “SD card not inserted” or “SD Open file” active and the user plugs in the SD card, error will disappear after next write to the datalogger. It is recommended to setup the datalogger interval again or restart the flowmeter after every SD card plug.
It is not recommended to use 1 minute statistic for a long term logging. 1 minute datalogging is mainly used for troubleshooting of the meter.

3.5.3. User Settings > CSV Format

This option allows selecting separator between each data in datalogger.

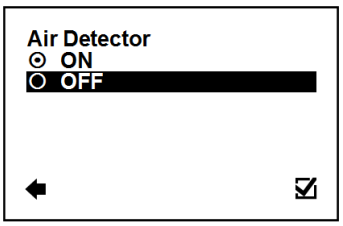
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
Comma (,)	Select comma
Semicolon (;)	Select semi-colon



3.5.4. User Settings > Air Detector

This option allows selecting empty pipe check (air detector) to be on or off.

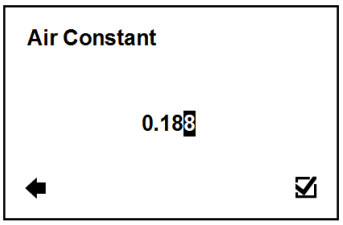
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
ON	The detector is active
OFF	The detector is switched off



3.5.5. User Settings > Air Constant

Constant value to determine the empty pipe detection limit.
Possible range: **0.000 – 0.999**

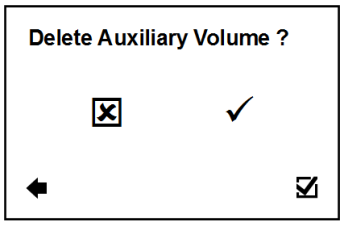
←	Back with no change
↔	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory



3.5.6. User Settings > Delete Auxiliary Volume

This function serves to zero the auxiliary flow totalizer.

←	Back with no change
↻↺	Item selection
☑	Confirmation of choice
☒	No change
☑	Zero the auxiliary totalizer

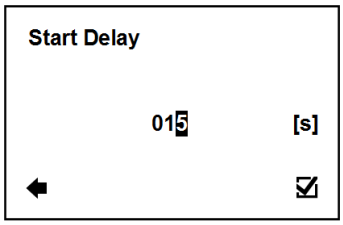


3.5.7. User Settings > Start Delay

Time delay for the flowmeter where it, after switching on, will not request measurement data from the sensor.

Possible range: **0 – 120 s**

←	Back with no change
↻↺	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory

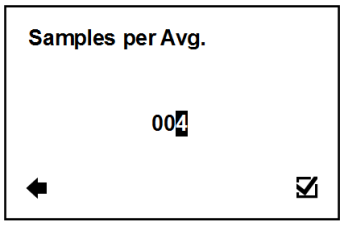


3.5.8. User Settings > Samples per Avg.

The number of samples that the flowmeter will use for calculation of its displayed average flow value/time unit.

Possible range: **0 – 120 samples/avg**

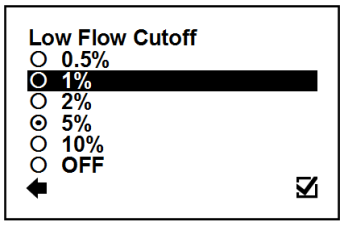
←	Back with no change
↻↺	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory



3.5.9. User Settings > Low Flow Cut-off

This function serves to set the minimum flow the flowmeter will react on.

←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory

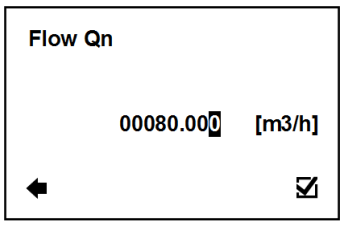


3.5.10. User Settings > Flow Qn

This function serves to setup the nominal flow-rate.

Possible range: **0 – 36000 m3/h**

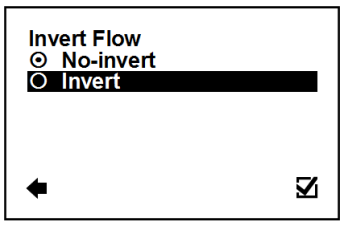
←	Back with no change
↻↺	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory



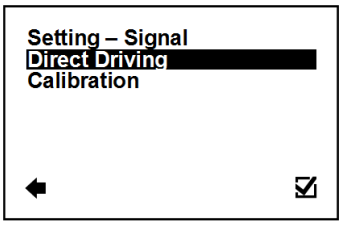
3.5.11. User Settings > Invert Flow

This function serves to change the definition of flow direction.

←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



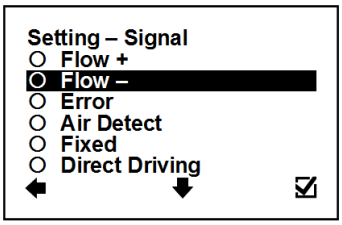
3.5.12. User Settings > Current Loop



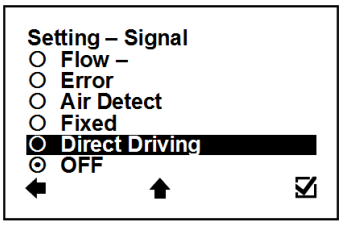
←	Back with no change
↑↓	Item selection
☑	Enter this part of the menu

User Settings > Current Loop > Settings Signal

This function serves to select which signal the output should be giving.

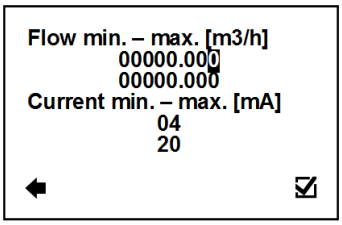


←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
Flow+	Output: **10 mA**, for any positive flow
Flow–	Output: **10 mA**, for any negative flow
Error	Output: **10 mA**, for any error identified by the device The signal can be cancelled by pressing any push button on the flowmeter.
Air Detect	Output: **10 mA**, during air detection (empty pipe)
Fixed	Output: fixed output of 10 mA
Direct Driving	Output: Direct Driving – setup is below
OFF	Output: fixed output of **4 mA**



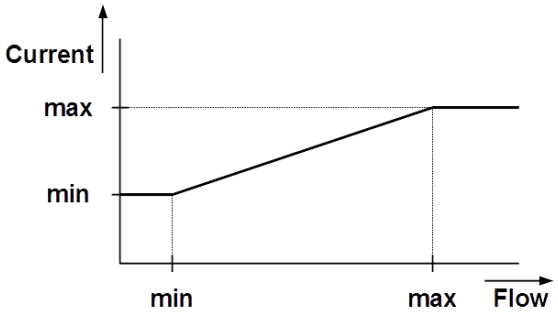
User Settings > Current Loop > Direct Driving

This function serves to set flow values in relation to current output.
Possible range: **0 – 36000 m3/h**; **4 – 20 mA**



←	Back with no change
↔	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory
Flow min. – max.	Setup of measurement flow-range (only positive values)
Current min. – max.	Setup of the current output range, corresponding to the actual flow-rate within the given range

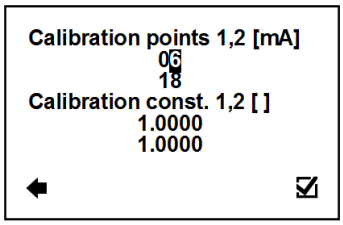
When changing an item for the current loop output, all settings for the voltage output are to be changed, to make sure there will be no signal conflict at the output port. The output that is not used has to be switched off (Settings – Signal – OFF).



User Settings > Current Loop > Calibration

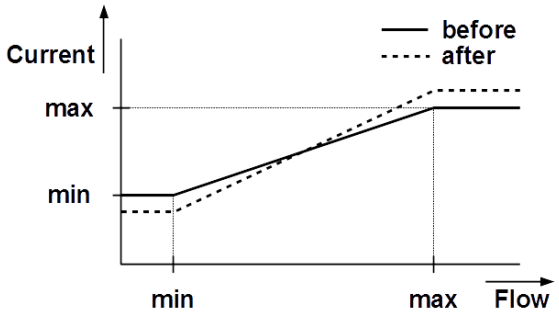
This function serves to modify current loop output signal.
Possible range: **4 – 20 mA**; **0.5000 – 1.5000**

←	Back with no change
↔	Selection of digit position
↕	Value setting
☑	Confirmation of setup and saving to memory
Calibration point 1,2	Setup of calibration point 1, 2. First point must be less than second point.
Calibration constant 1,2	Setup of calibration constant for first and for second calibration point.



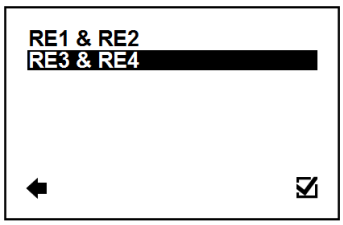
Formula for calibration constant calculation:
Expected value: 6 mA, Measured value: 6.1 mA
Calibration point one: 6 mA
Calibration constant one $= \frac{6}{6.1} = 0.9836$

Expected value: 18 mA, Measured value: 17.9 mA
Calibration point two: 18mA
Calibration constant two $= \frac{18}{17.9} = 1.0056$



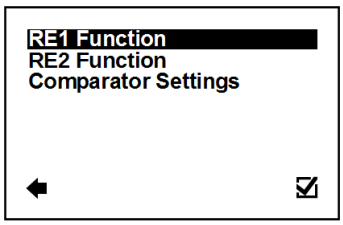
3.5.13. User Settings > Pulse Output

←	Back with no change
↕	Item selection
☑	Enter this part of the menu



User Settings > Pulse Output > RE1 & RE2

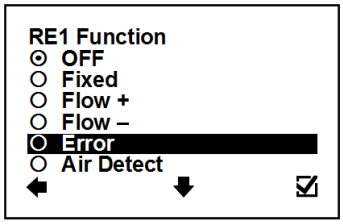
←	Back with no change
↕	Item selection
☑	Enter this part of the menu

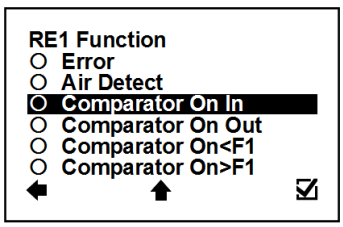


User Settings > Pulse Output > RE1 & RE2 > RE1 (RE2) function

This function serves to select which signal the output should be giving. The relays are independent to each other.

←	Back with no change
↕	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
OFF	Output: **OFF**, fixed status signal
Fixed	Output: **ON**, fixed status signal
Flow+	Output: **ON**, for any positive flow
Flow–	Output: **ON**, for any negative flow
Error	Output: **ON**, for any error identified by the device. The signal can be cancelled by pressing any push button on the flowmeter.
Air Detect	Output: **ON**, during air detection (empty pipe)
Comparator On In	Output: **ON**, if the actual flow-rate is within the given range (can be set under Comparator Flow)



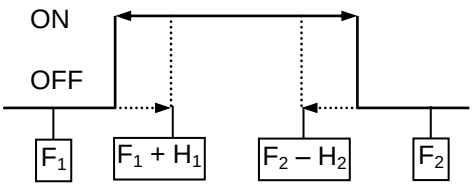


Comparator On Out Output: **ON**, if the actual flow-rate is outside the given range (can be set under Comparator Flow)

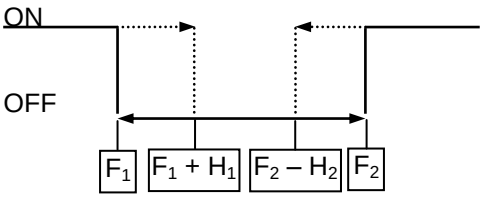
Comparator On<F1 Output: **ON**, if the actual flow flow-rate is smaller than the value set as “Flow1” (can be set under Comparator Flow)

Comparator On>F1 Output: **ON**, if the actual flow-rate is bigger than the value set as “Flow1” (can be set under Comparator Flow)

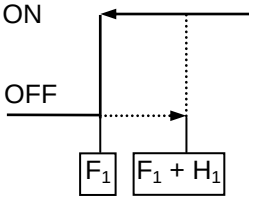
On In:



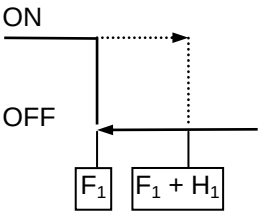
On Out:



On > F1:



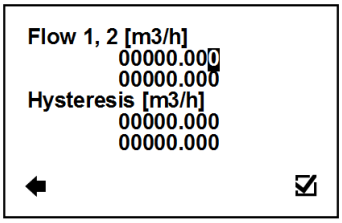
On < F1:



User Settings > Pulse Output > RE1 & RE2 > Comparator Settings

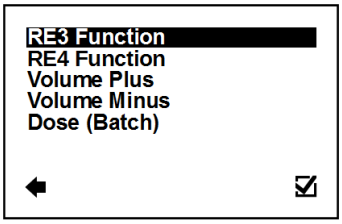
Possible range**: 0 – 36000 m3/h**; **0 – 36000 m3/h**

←	Back with no change
↔	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory
Flow 1, 2	This function serves to configure the flow-range for the Comparator Mode. Flow1 < Flow2
Hysteresis	Setup of hysteresis for the Comparator Mode



User Settings > Pulse Output > RE3 & RE4

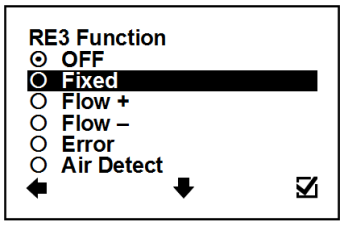
←	Back with no change
↑↓	Item selection
☑	Enter this part of the menu

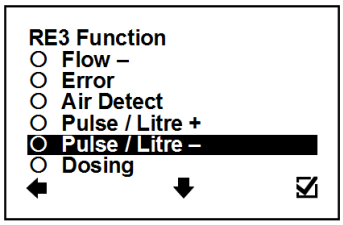


User Settings > Pulse Output > RE3 & RE4 > RE3 (RE4) function

This function serves to select which signal the output should be giving. The relays are independent to each other.

←	Back with no change
⇳	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
OFF	Output: **OFF**, fixed status signal
Fixed	Output: **ON**, fixed status signal
Flow+	Output: **ON**, for any positive flow
Flow–	Output: **ON**, for any negative flow
Error	Output: **ON**, for any error identified by the device. The signal can be cancelled by pressing any push button on the flowmeter
Air Detect	Output: **ON**, during air detection (empty pipe)
Pulse/litre+	The unit generate pulse 160 ms when the volume plus pass through the flowmeter
Pulse/litre–	The unit generate pulse 160 ms when the volume minus pass through the flowmeter
Dosing	This function serves to control dosing (batching)



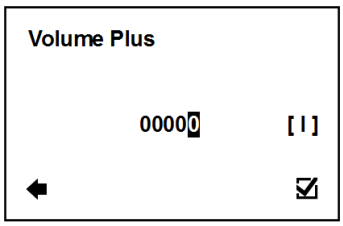


User Settings > Pulse Output > Volume Plus

This function serves to configure the positive flow volume after which a 160 ms output pulse is generated to correspondent Relay. In case of a power failure, the output will start counting volume from 0.

Possible range: **0 – 99999 l**

←	Back with no change
⇄	Selection of digit position
⇳	Value setting
☑	Confirmation of setup and saving to memory

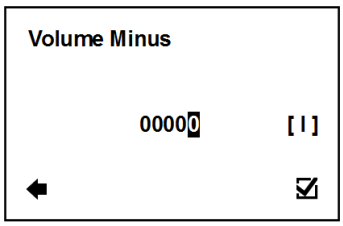


User Settings > Pulse Output > Volume Minus

This function serves to configure the negative flow volume after which a 160 ms output pulse is generated to correspondent Relay. In case of a power failure, the output will start counting volume from 0.

Possible range: **0 – 99999 l**

←	Back with no change
⇄	Selection of digit position
⇳	Value setting
☑	Confirmation of setup and saving to memory

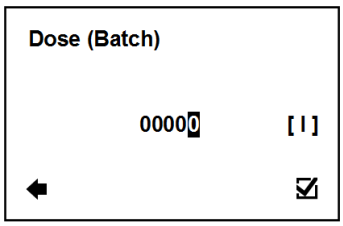


User Settings > Pulse Output > Dose (Batch)

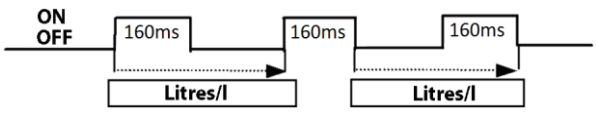
This function serves to control dosing (batching). A dose is activated through a pulse input on Pulse input. At the same time with the relay (RE3 and/or RE4) open. After reaching the required volume, relay (RE3 and/or RE4) is closed.

Possible range: **0 – 99999 l**

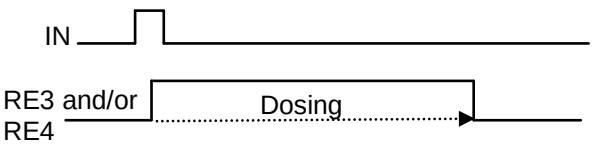
←	Back with no change
⇄	Selection of digit position
⇳	Value setting
☑	Confirmation of setup and saving to memory



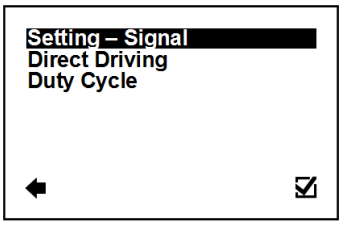
Litres/1 (Q+)/(Q–):



Dosing:



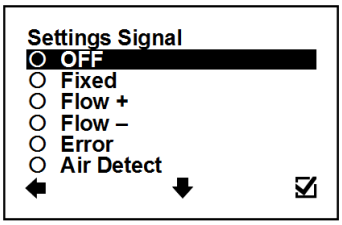
3.5.14. User Settings > Frequency output

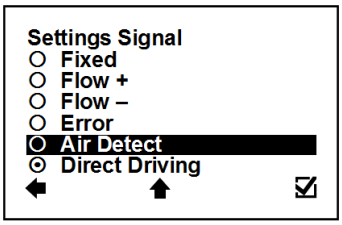


←	Back with no change
↑↓	Item selection
☑	Enter this part of the menu

User Settings > Frequency output > Settings Signal

This function serves to select which signal the output should be giving.

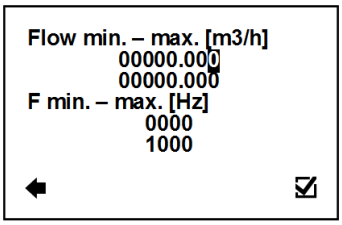




←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
OFF	Output: **OFF**
Fixed	Output: **100Hz** fixed output
Flow+	Output: **100Hz**, for any positive flow
Flow–	Output: **100Hz**, for any negative flow
Error	Output: **100Hz**, for any error identified by the device
Air Detect	Output: **100Hz**, during air detection (empty pipe)
Direct Driving	Frequency output changing according to actual flow

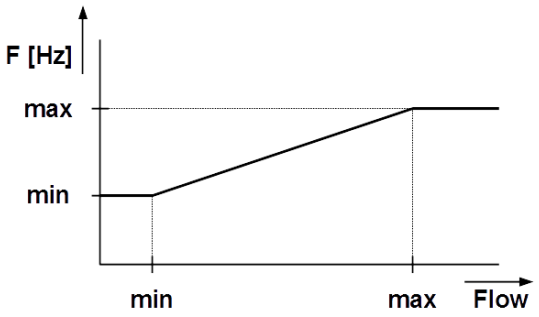
User Settings > Frequency output > Direct Driving

This function serves to set flow values in relation to frequency output.
Possible range: **0 – 36000 m3/h**; **0 – 1000 Hz**



←	Back with no change
↔	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory
Flow min. – max.	Setup of the active flow-range for the Frequency output module
F min. – max.	Configuration of the Frequency output range, corresponding to the actual flow-rate within the given range.

Minimal frequency 2 Hz
Maximal frequency 1000 Hz

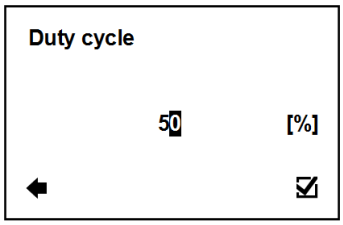


User Settings > Frequency output > Duty Cycle

Function to set duty cycle of the Frequency output. Percentage of high level.

Possible range: **1 – 99 %**

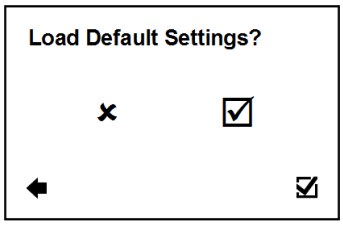
🡐	Back with no change
➲➲	Selection of digit position
⇳	Value setting
☑	Confirmation of setup and saving to memory



3.5.15. User Settings > Load Default Settings

This function will load default factory settings.

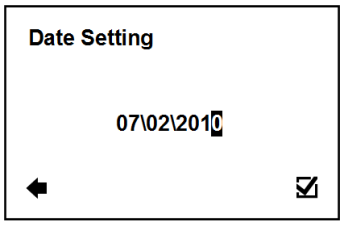
🡐	Back with no change
➲➲	Item selection
☑	Confirmation of choice
☒	No change
☑	Loads default settings



3.5.16. User Settings > Date Setting

Function to set date.

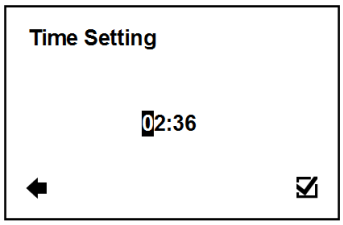
🡐	Back with no change
➲➲	Selection of digit position
⇳	Value setting
☑	Confirmation of setup and saving to memory
Date format	DD \ MM \ YYYY



3.5.17. User Settings > Time Setting

This function serves to set current time.

🡐	Back with no change
➲➲	Selection of digit position
⇳	Value setting
☑	Confirmation of setup and saving to memory
Time format	HH : MM

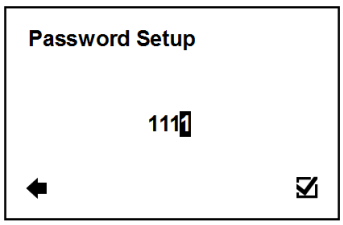


3.5.18. User Settings > Password Setup

This function serves to setup the flowmeter user password.

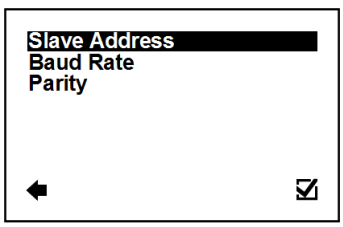
Possible range: **0000 – 9999**

🡐	Back with no change
➲➲	Selection of digit position
⇳	Value setting
☑	Confirmation of setup and saving to memory



3.5.19. User Settings > Modbus

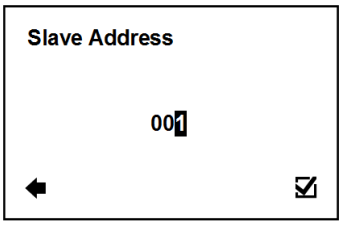
🡐	Back with no change
⇳	Item selection
☑	Enter this part of the menu



User Settings > Modbus > Slave Address

Modbus device address (Factory settings: 1).

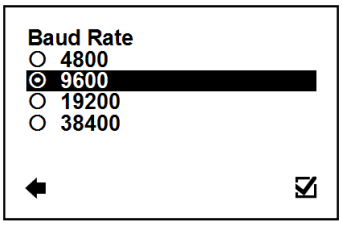
←	Back with no change
↔	Selection of digit position
↕	Value setting
☑	Confirmation of setup and saving to memory



User Settings > Modbus > Baud Rate

Setup communication speed (Factory settings: 9600).

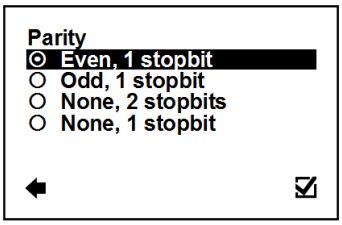
←	Back with no change
↕	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



User Settings > Modbus > Parity

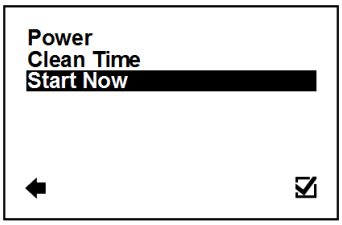
Setup communication parameters (Factory settings: Even, 1 stopbit).

←	Back with no change
↕	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



3.5.20. User Settings > Electrode Cleaning

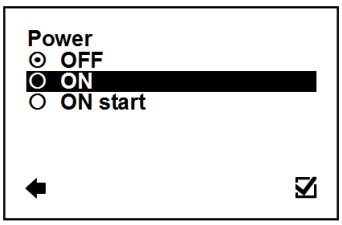
←	Back with no change
↕	Item selection
☑	Enter this part of the menu



User Settings > Electrode Cleaning > Power

Setup automatic electrodes cleaning.

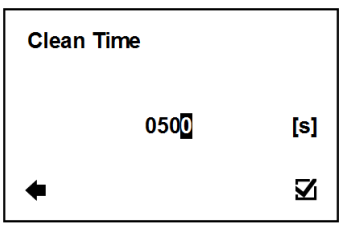
←	Back with no change
↕	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



User Settings > Electrode Cleaning > Clean Time

Setup clean time for automatic electrode cleaning
(Factory setting: 500 s).
Possible range: **1 – 9999 s**

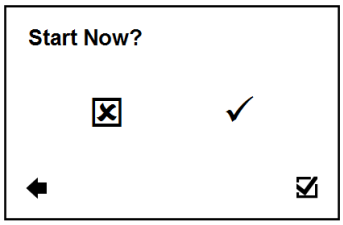
←	Back with no change
↔	Selection of digit position
↕	Value setting
☑	Confirmation of setup and saving to memory



User Settings > Electrode Cleaning > Start Now

This function serves to start electrode cleaning now.

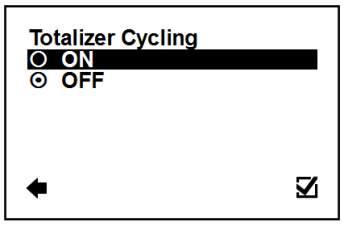
🡐	Back with no change
⮌⮎	Item selection
☑	Confirmation of choice
☒	No change
☑	Start electrode cleaning now



3.5.21. User Settings > Totalizer Cycling

Automatic totalizer cycling (time is set to 3 seconds).

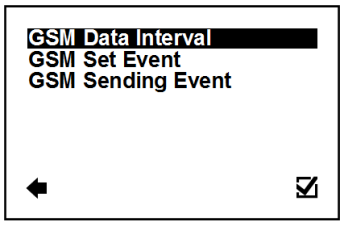
🡐	Back with no change
⮍⮏	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



3.5.22. User Settings > GSM Settings

Set all options for GSM.

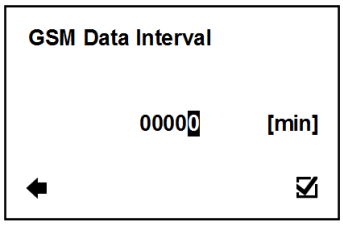
🡐	Back with no change
⮍⮏	Item selection
☑	Enter this part of the menu



User Settings > GSM Settings > GSM Data Interval

Set time interval for sending text message with actual data.

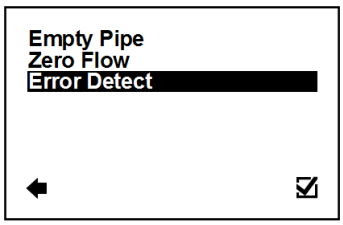
🡐	Back with no change
⮌⮎	Selection of digit position
⮍⮏	Value setting
☑	Confirmation of setup and saving to memory



User Settings > GSM Settings > GSM Set Event

Select event for sending text message.

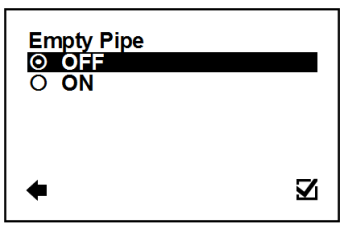
🡐	Back with no change
⮍⮏	Item selection
☑	Enter this part of the menu



User Settings > GSM Settings > GSM Set Event > Empty Pipe

Empty Pipe event sending.

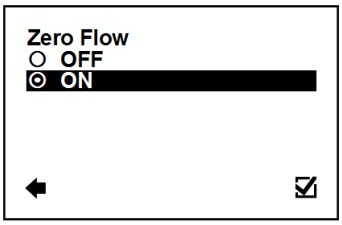
🡐	Back with no change
⮍⮏	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



User Settings > GSM Settings > GSM Set Event > Zero Flow

Zero Flow event sending.

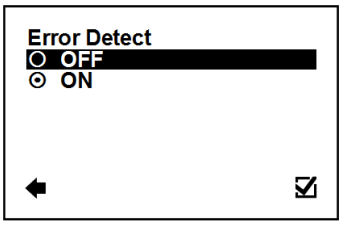
🡐	Back with no change
🡑🡓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



User Settings > GSM Settings > GSM Set Event > Error Detect

Error detect event sending.

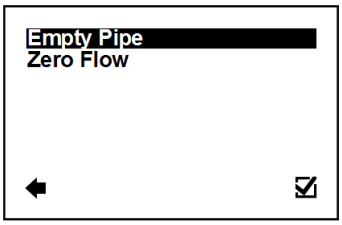
🡐	Back with no change
🡑🡓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



User Settings > GSM Settings > GSM Sending Event

Select sending options for each event.

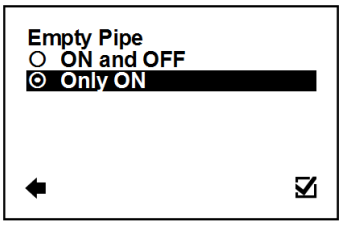
🡐	Back with no change
🡑🡓	Item selection
☑	Enter this part of the menu



User Settings > GSM Settings > GSM Sending Event > Empty Pipe

Select options sending for Empty Pipe event.

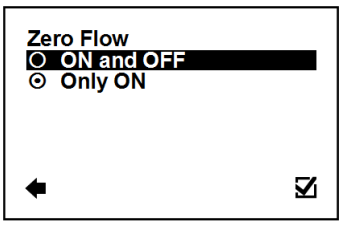
🡐	Back with no change
🡑🡓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



User Settings > GSM Settings > GSM Sending Event > Zero Flow

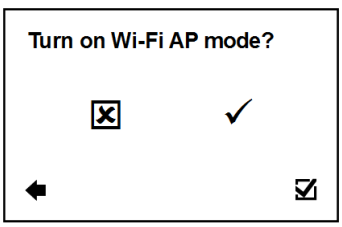
Select options sending for Zero Flow event.

🡐	Back with no change
🡑🡓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



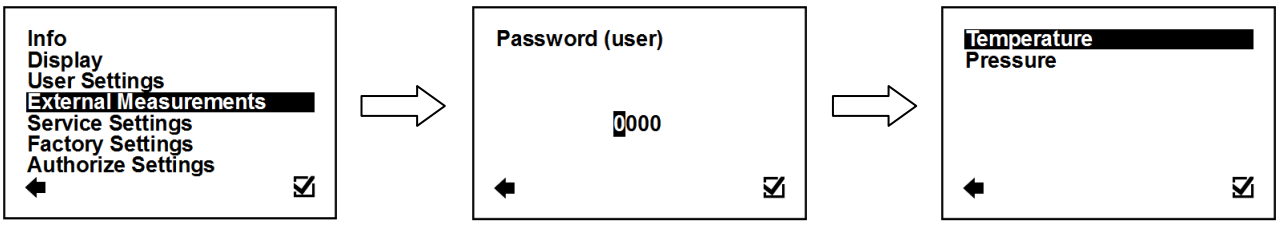
3.5.23. User Settings > Wi-Fi AP mode

🡐	Back with no change
⮌⮎	Item selection
☑	Confirmation of choice
☒	No change
☑	Turn on Wi-Fi AP mode



Allowing Wi-Fi module to AP mode - prepares the module to be set for operation from external PC or mobile device. For more information please refer to P31 MAGX2 Wi-Fi module installation procedure.

3.6. External Measurements Menu

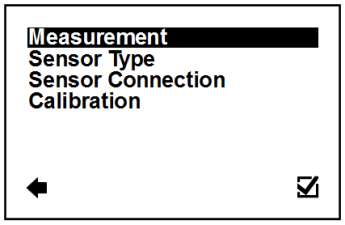


To enter this part of the menu, it is necessary to enter the **User** Password.

3.6.1. External Measurements > Temperature

Setup of the external measurement of temperature.

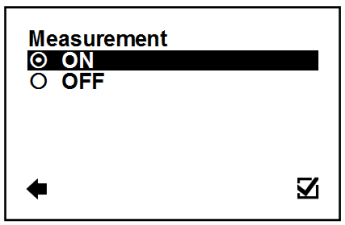
←	Back with no change
↑↓	Item selection
☑	Enter this part of the menu



External Measurements > Temperature > Measurement

Measurement of external temperature.

←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
ON	When set ON, the value of external temperature is shown amongst totalizers (XTemp)*

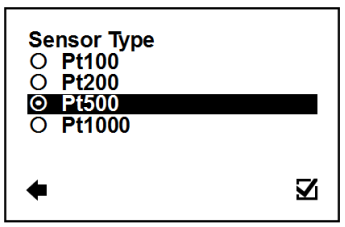


*It is not possible to use simultaneously External Temperature Module and Pulse module

External Measurements > Temperature > Sensor Type

Sensor type selection.

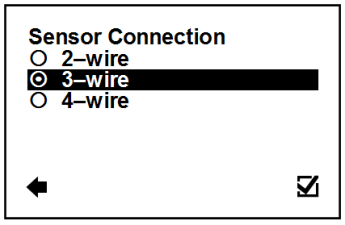
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



External Measurements > Temperature > Sensor Connection

Sensor connection selection.

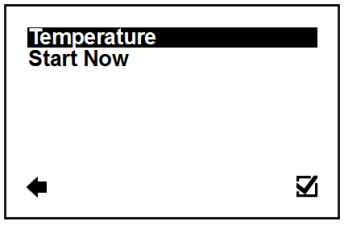
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory



External Measurements > Temperature > Calibration

Calibration of the external temperature sensor.

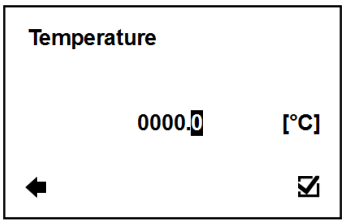
←	Back with no change
↑↓	Item selection
☑	Enter this part of the menu



External Measurements > Temperature > Calibration > Temperature

Calibration temperature at the time of calibration.*

🡐	Back with no change
⊃⊂	Selection of digit position
∩∪	Value setting
☑	Confirmation of setup and saving to memory

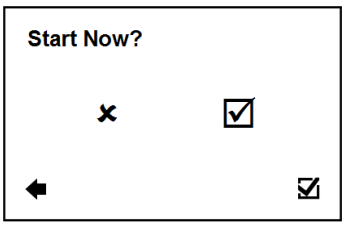


*Refference temperature of known temperature sensor at the time of calibration

External Measurements > Temperature > Calibration > Star Now

Start of the calibration.

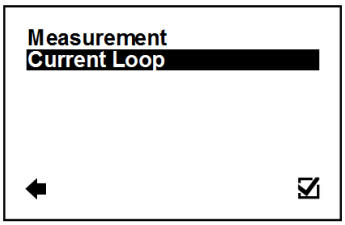
🡐	Back with no change
⊃⊂	Item selection
☑	Confirmation of setup and saving to memory
☒	Calibration temperature will not change
☑	New calibration temperature changed



3.6.2. External Measurements > Pressure

Setup of the external measurement of pressure.

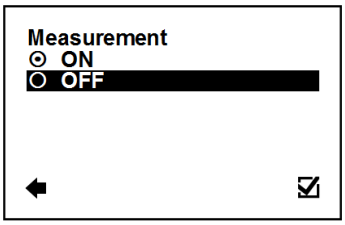
🡐	Back with no change
∩∪	Item selection
☑	Enter this part of the menu



External Measurements > Pressure > Measurement

Measurement of pressure.

🡐	Back with no change
∩∪	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
ON	When set ON, the value of pressure is shown amongst totalizers (XPress)*



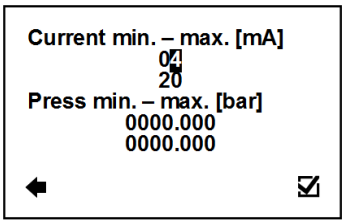
*It is not possible to use simultaneously Pressure Module a I-Out

External Measurements > Pressure > Current Loop

4-20mA external pressure sensor settings.*

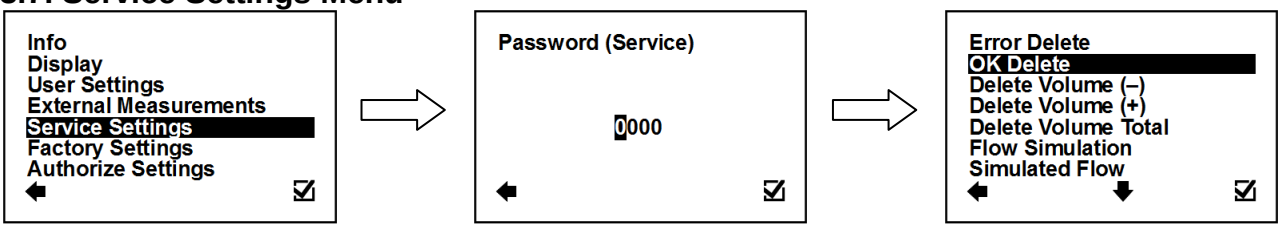
Possible range: **4 – 20mA**, **Pressure – according to sensor**

🡐	Back with no change
⊃⊂	Selection of digit position
∩∪	Value setting
☑	Confirmation of setup and saving to memory



*Any external pressure sensor working on passive 4-20mA. i.e. WIKA A-10 (P#1105VX3J)

3.7. Service Settings Menu

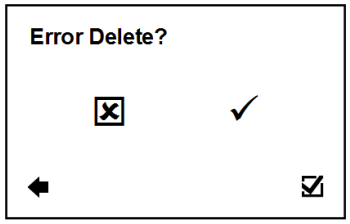


To enter this part of the menu, it is necessary to enter the **Service** Password.

3.7.1. Service Settings > Error Delete

This option serves to zero the totalizer for number of minutes the flowmeter signalised an error.

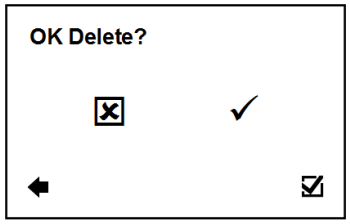
- ← Back with no change
- ↻ Item selection
- ☑ Confirmation of choice
- ☒ No change
- ☑ Resets error minute totalizer



3.7.2. Service Settings > OK Delete

This option serves to zero the totalizer for number of minutes of operation.

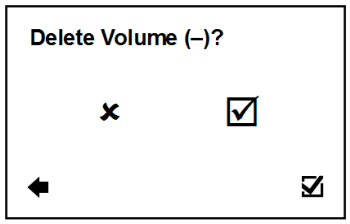
- ← Back with no change
- ↻ Item selection
- ☑ Confirmation of choice
- ☒ No change
- ☑ Resets operation minute totalizer



3.7.3. Service Settings > Delete Volume –

Option to zero the totalizer for negative flow.

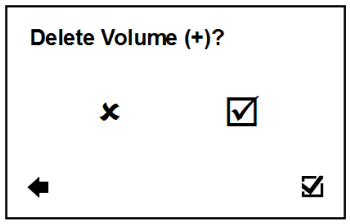
- ← Back with no change
- ↻ Item selection
- ☑ Confirmation of choice
- ☒ No change
- ☑ Resets negative volume totalizer



3.7.4. Service Settings > Delete Volume +

Option to zero the totalizer for positive flow.

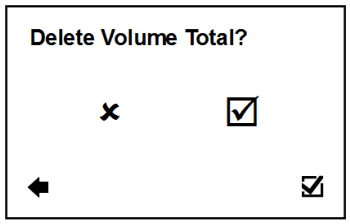
- ← Back with no change
- ↻ Item selection
- ☑ Confirmation of choice
- ☒ No change
- ☑ Resets positive volume totalizer



3.7.5. Service Settings > Delete Volume Total

Option to zero the totalizer for total flow.

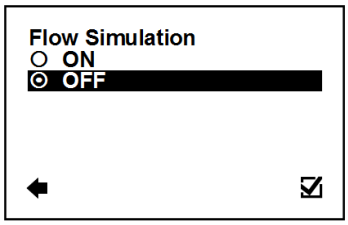
- ← Back with no change
- ↻ Item selection
- ☑ Confirmation of choice
- ☒ No change
- ☑ Resets total volume totalizer



3.7.6. Service Settings > Flow Simulation

Switching on/off the flow simulation mode.

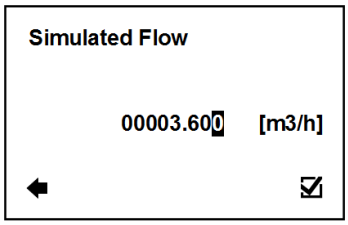
←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
ON	Flow Simulation status is ON
OFF	Flow Simulation status is OFF



3.7.7. Service Settings > Simulated Flow

Simulation flow in m3/hr (Factory setting: 3.6m3/h).
Possible range: **0 – 36000m3/h**

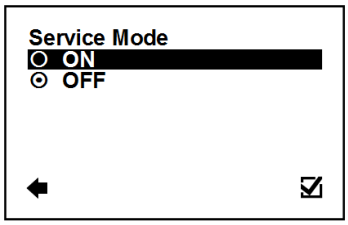
←	Back with no change
↔	Selection of digit position
↑↓	Value setting
☑	Confirmation of setup and saving to memory



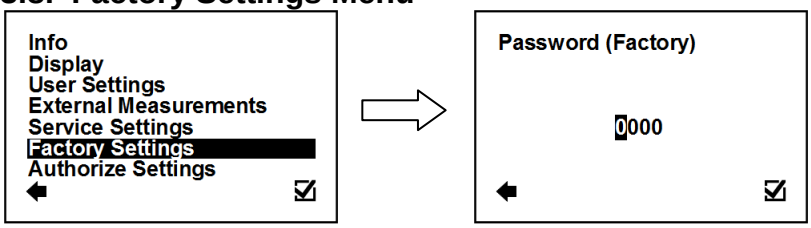
3.7.8. Service Settings > Service mode

Switching on/off the service mode for troubleshooting purposes.

←	Back with no change
↑↓	Item selection
⊙	Selection identification
☑	Confirmation of setup and saving to memory
ON	Service Mode is ON
OFF	Service Mode is OFF



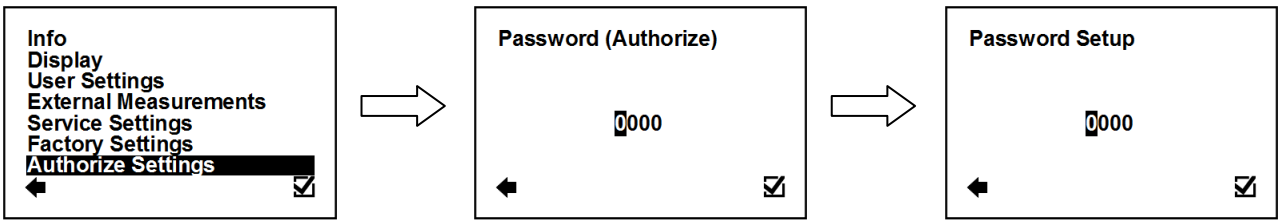
3.8. Factory Settings Menu



To enter this part of the menu, it is necessary to enter the **Factory** Password.

This function is only available to Arkon staff in the Arkon workshop.

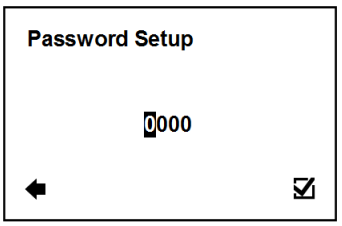
3.9. Authorize Menu



To enter this part of the menu, it is necessary to enter the **Authorize** Password.

This function is only available to Arkon staff in the Arkon workshop.

Authorize Settings > Password Setup



Here, it is possible to change a forgotten user password. It is necessary to call the Arkon sales office and provide the serial number. The authorisation number is provided based on this serial number.

←	Back with no change
↔	Selection of digit position
↕	Value setting
☑	Confirmation of setup and saving to memory
Password	Enter value between 0000 and 9999

4. Modules

4.1. Power Supply Module

Module Name:	Symbol:	Ordering Code:
Power Supply Module		***230***** ***24***** ***12*****

APPLICATIONS:

Industrial Power Supplies 90-250 V AC, 24 V DC or 12 V DC Distributed Power Systems.

This module is necessary for the complete flowmeter.

PIN LOCATION

Electrical Specifications

Input Voltages ±5% /	AC 90 - 250V / max. 15 VA
possible current	DC 24 V / max. 600mA
consumption	DC 12 V / max. 1050mA
Output Voltages	**3.3V / 2A**
	23.6V/300mA
Frequency Outputs	50-60Hz
Temp. Range	-20 – 70 °C
Dimensions:	R = 50mm
	H(230V) = 58mm
	H(12,24V) = 58mm
Weight	300g

	The device does not have a network power switch. For any electrical work or housing open it is necessary to disconnect the device from the network power, and this has to be done via a switch. The mains protective earth wire has to be connected to the PE terminal (power supply class 1). A switch or circuit breaker (B6) has to be in the building installation if mains supply 90 – 250 V AC from building installation is connected to the power supply module. It must be in close proximity to the equipment and within easy reach of the operator, and it shall be marked as the disconnecting device for the flowmeter.

90-250 V AC / 15VA Recommended power supply cable minimum 3xØ1mm^2	24 V DC / 600mA Recommended power supply cable minimum 2xØ0.5mm^2	12 V DC / 1050mA Recommended power supply cable minimum 2xØ0.5mm^2
All used wires have to be round crosscut cables.		

	Any connection or disconnection of any module has to be done with the network power to the meter switched off. The flowmeter is CAT II – CAT III device.

4.2. Datalogger

Module Name:	Symbol:	Ordering Code:
Micro SD card		

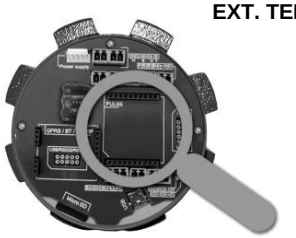
BASIC CIRCUIT CONNECTIONS:
 Size: 11mm x 15mm x 1.0mm Durability: 10,000 insertion/removal cycles Weight: 0.4g Minimal Capacity: 32 MB
The data are stored in *.csv format. To read the datalogger simply plug the SD card to your computer and open the file using any table processor.
The logging interval is possible to set from 1 minute to 1 day Each record consist of: Date and time, FW number, Measurement(Run/Stop), Total, Total+, Total-, Aux, Error Min, OK min, Error Code, Temperature, External Temperature (if present), External Pressure (if present)
While there is an error “SD card not inserted” or “SD Open file” active and the user plugs-in the SD card, error will disappear after next write to the datalogger. It is recommended to setup the datalogger interval again or restart the flowmeter after every SD card plug-in.

4.3. Module positioning

Individual module installation is straightforward thanks to a plug-and-play system. Yet, some caution is required when selecting the correct installation slot according to the picture below.

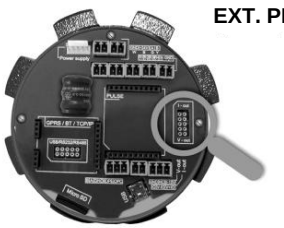
GPRS
BLUETOOTH
TCP/IP
GSM-SMS

PULSE
EXT. TEMPERATURE



RS232
RS485
USB

CURRENT-LOOP
EXT. PRESSURE



4.4. USB Module

Module Name:	Symbol:	Ordering Code:
MAGX2 USB Module	USB	******USB

APPLICATIONS:
Any System Requiring, USB Communications, Peripheral - PC and Terminal. USB 1.1 and USB 2.0 compatible

BASIC CIRCUIT CONNECTIONS:

Requirement: Microsoft Windows XP or newer version of operating system

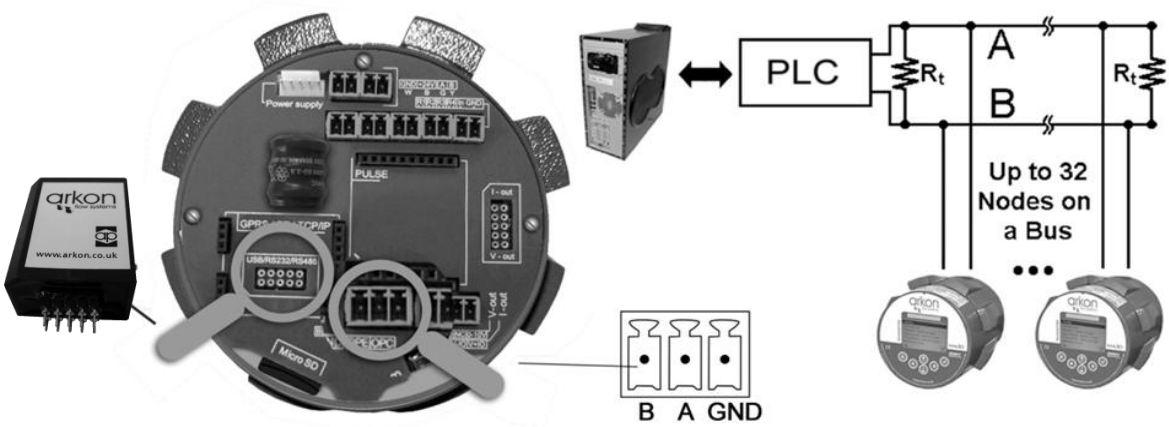
	Drivers are included in MAGX2 SW.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off. PELV device.

4.5. RS485 Module

Module Name:	Symbol:	Ordering Code:
MAGX2 RS485 Module	**RS 485**	******485**

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Peripheral - PC and Terminal.	
Electrical Specifications	
VCC to Ground	3.3 VDC
Baud rate	Max. 115200 baud/s

BASIC CIRCUIT CONNECTIONS:



Multi-Node Network with End Termination Using module RS485

Terminator R_t with resistance 100Ω should be connect to the end of line RS-485.

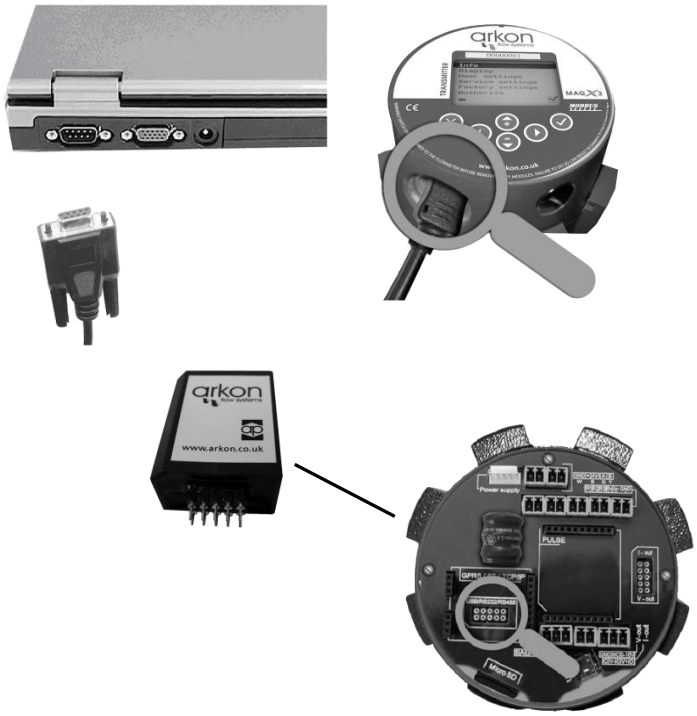
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

4.6. RS232 Module

Module Name:	Symbol:	Ordering Code:
MAGX2 RS232 Module	**RS 232**	******232**

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Peripheral - PC and Terminal.	
Electrical Specifications	
VCC to Ground	3.3 VDC
Baud rate	Max. 115200 baud/s

BASIC CIRCUIT CONNECTIONS:



A special cable Cannon9 – mini USB is included.

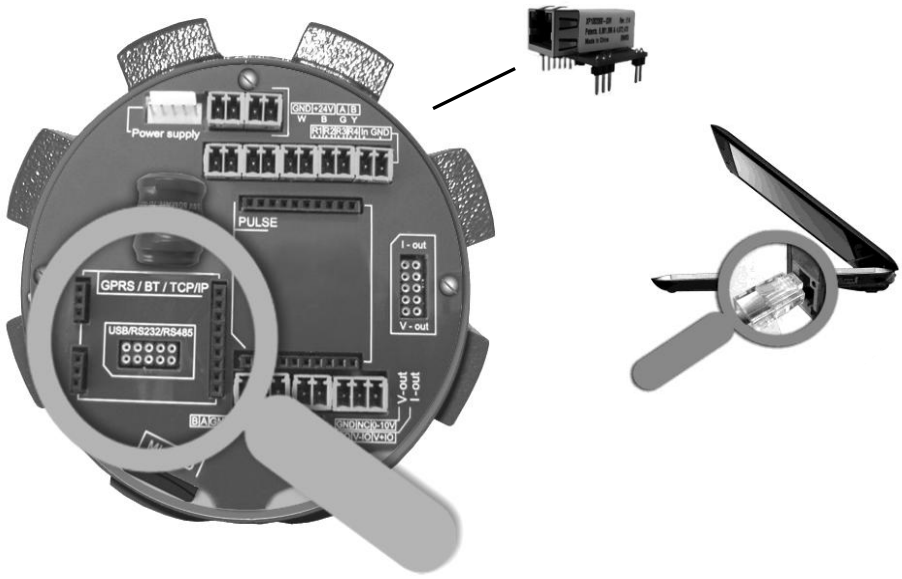
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

4.7. TCP/IP Module

Module Name:	Symbol:	Ordering Code:
MAGX2 TCP/IP Module	**TCP/IP**	******TCP**

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Peripheral - PC and Terminal.	
Electrical Specifications	
VCC to Ground	3.14V to 3.46V
Power Supply Current	120 – 267mA
Ethernet	10/100Mbit
Temp. Range	-20 – 70 °C

BASIC CIRCUIT CONNECTIONS:	**Using the TCP/IP Module**



See TCP/IP installation manual.

Warning!: There is a condition that must be fulfilled for the TCP/IP module to be able to operate correctly: line speed of the communication protocol Modbus **must** be set up on **19200Bd, Parity none, 1 stop bit.** If there is a different setting the communication will not work. You can find the setting in the following MAGX2 flow meter menu: "Menu / User settings / Modbus / Baud rate" and "Menu / User settings / Modbus / Parity".

	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

4.8. BLUETOOTH Module

Module Name:	Symbol:	Ordering Code:
MAGX2 BLUETOOTH Module	**Bluetooth**	******BTO**

APPLICATIONS:	
Wireless control of and communication between transmitter and PC or PLC systems Any System Requiring BlueTooth Communications	
Electrical Specifications	
VCC to Ground	3.3 VDC
Power Supply Current	120 mA
Baud Rate	Max. 460.8 Kbaud/s
Carrier Frequency	2.402 – 2.480 GHz
Range	100m (class 1)
Temp. Range	–20 – 70 °C

BASIC CIRCUIT CONNECTIONS:	**Using the TCP/IP Module**

See Bluetooth installation manual.

Warning!: There is a condition that must be fulfilled for the Bluetooth module to be able to operate correctly: line speed of the communication protocol Modbus **must** be set up on **19200Bd, Parity none, 1 stop bit.** If there is a different setting the communication will not work. You can find the setting in the following MAGX2 flow meter menu: "Menu / User settings / Modbus / Baud rate" and "Menu / User settings / Modbus / Parity".

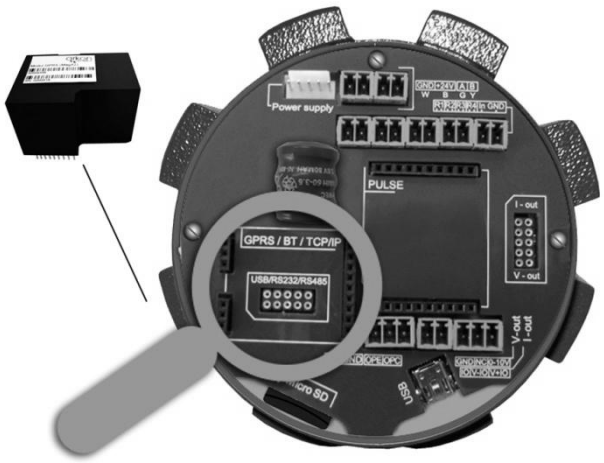
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

4.9. GSM-SMS Module

Module Name:	Symbol:	Ordering Code:
MAGX2 GSM-SMS Module	**GSM-SMS**	******SMS**

APPLICATIONS:	
Wireless monitoring of the flowmeter (Flow, Datalogger, Event, Error)	
Electrical Specifications	
VCC to Ground	3.3 VDC
Power Supply Current	RMS 400mA, MAX 1500mA
Operating Systems	GSM 850 / GSM 900 DCS 1800 / PCS 1900
SIM Card	3.0 / 1.8 V
Temp. Range	–20 – 70 °C

BASIC CIRCUIT CONNECTIONS:	**Using the GSM-SMS Module**



For more information about installation and specification see document:
P_29_MAGX2_GSM_SMS_Module in the CD.

Note: To avoid unauthorized access to the data, the customer is responsible for keeping flowmeter serial number and SIM card number secret.

Warning!: There is a condition that must be fulfilled for the GSM-SMS module to be able to operate correctly: **line speed** of the communication protocol Modbus **must** be set up on **19200Bd, Parity none, 1 stop bit**. If there is a different setting the communication will not work. You can find the setting in the following MAGX2 flow meter menu: "Menu / User settings / Modbus / Baud rate" and "Menu / User settings / Modbus / Parity".
For more information about GSM-SMS Module see MAGX2 GSM-SMS Module Specification.

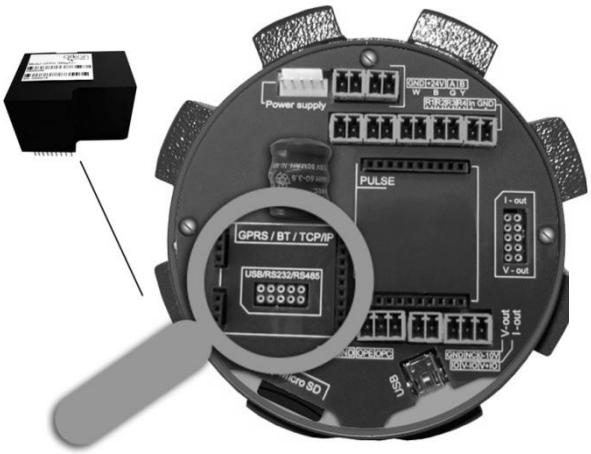
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

4.10. GPRS Module

Module Name:	Symbol:	Ordering Code:
MAGX2 GPRS Module	**GPRS**	********GPR**

APPLICATIONS:	
Wireless control of and communication between transmitter and PC or PLC systems Any System Requiring GPRS Communications	
Electrical Specifications	
VCC to Ground	3.3 VDC
Power Supply Current	RMS 400mA, MAX 1500mA
Baud Rate	19200 baud/s
Operating Systems	GSM 850 / GSM 900 DCS 1800 / PCS 1900
Multi-slot class	10 (4 Rx / 2 Tx / 5 Sum)
SIM Card	3.0 / 1.8 V
Temp. Range	–20 – 75 °C

BASIC CIRCUIT CONNECTIONS:	**Using the GPRS Module**



See GPRS Module Installation manual.

Warning!: There is a condition that must be fulfilled for the GPRS module to be able to operate correctly: **line speed** of the communication protocol Modbus **must** be set up on **19200Bd, Parity none, 1 stop bit**. If there is a different setting the communication will not work. You can find the setting in the following MAGX2 flow meter menu: "Menu / User settings / Modbus / Baud rate" and "Menu / User settings / Modbus / Parity".

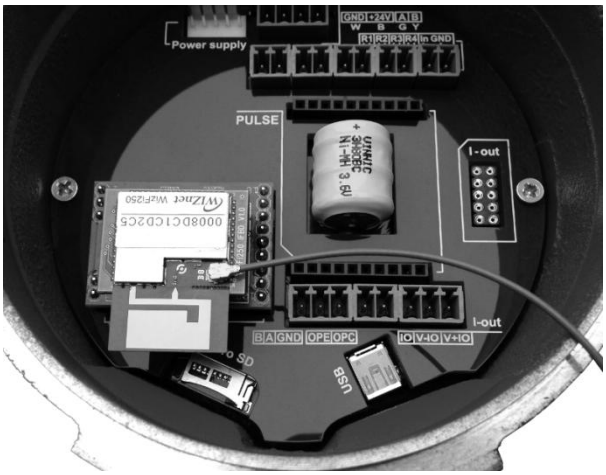
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

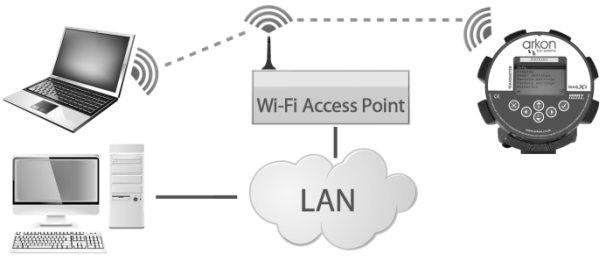
4.11. Wi-Fi Module

Module Name:	Symbol:	Ordering Code:
MAGX2 WiFi Module	Wi–Fi	******WIFI

APPLICATIONS:	
Wireless communication for short and medium distances.	
Electrical Specifications	
VCC to Ground	3.3 VDC
Power Supply Current	up to 430 mA
Baud Rate	4800 - 38400 baud/s
Carrier Frequency	2,400 – 2,484 GHz
Range	up to 200 m
Temp. Range	-20 – 70 °C

BASIC CIRCUIT CONNECTIONS:	**Using the Wi-Fi Module**





See Wi-Fi module installation procedure (P31).

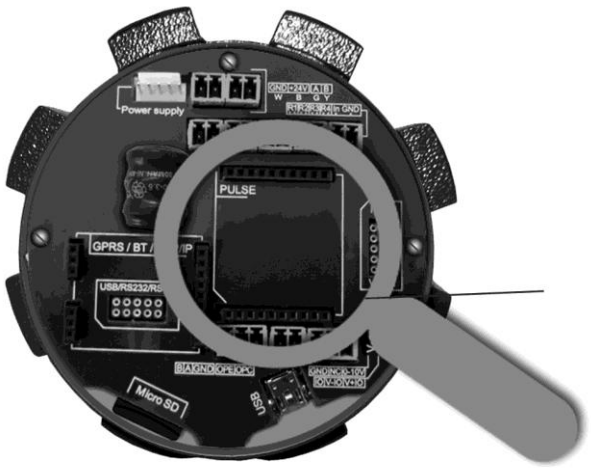
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

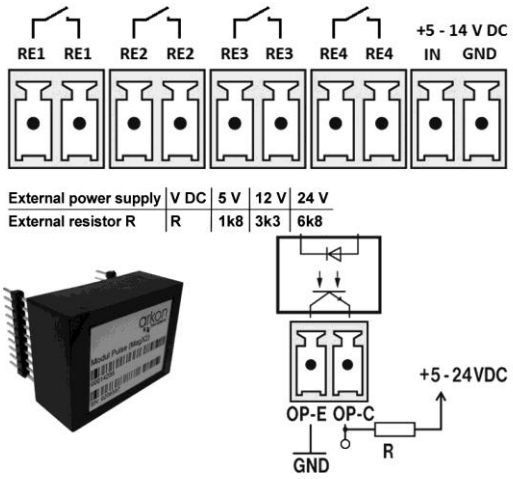
4.12. Pulse Output Module

Module Name:	Symbol:	Ordering Code:
MAGX2 Pulse Output Module	**PULSE**	*******P****

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Test Systems, Smart Transmitter	
Electrical Specifications	
VCC to Ground	3.3 VDC
Output mode	Frequency, Pulse
Max Relay Voltage	110VDC/0.5A
Output Frequency	2-1000 Hz
Batching Voltage Input Rate	+5 - 14VDC
Temp. Range	-20 – 70 °C

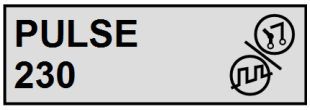
BASIC CIRCUIT CONNECTIONS:	**Using the Pulse Output Module**





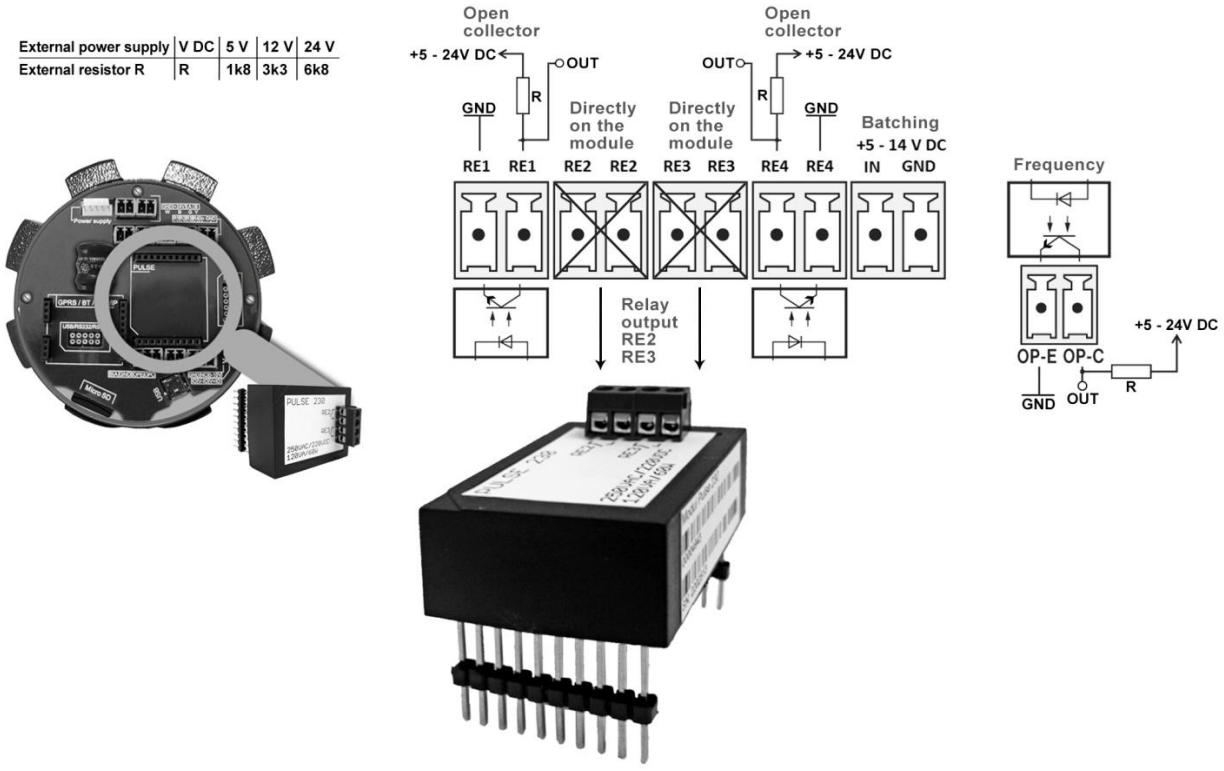
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

4.13. Pulse 230 Module

Module Name:	Symbol:	Ordering Code:
MAGX2 Pulse 230 Module		*******P2***

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Test Systems, Smart Transmitter	
Electrical Specifications	
VCC to Ground	3.3 VDC
Output mode	Frequency, Pulse - relay and open collector
Max Relay Voltage (RE2,RE3)	250VAC/220VDC at 120VA/60W
Output Frequency	2-1000Hz
Batching Voltage Input Range	+5-14V DC
Temp. Range	-20 to +70C

BASIC CIRCUIT CONNECTIONS:	**Using the Pulse 230 Output Module**



	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

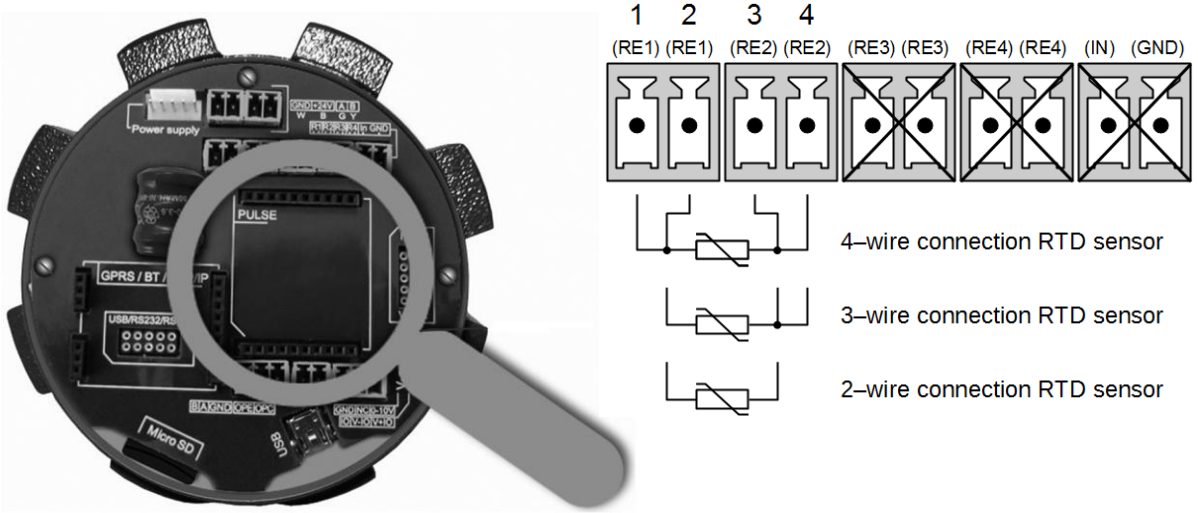
4.14. External Temperature Module

Module Name:	Symbol:	Ordering Code:
MAGX2 External Temperature Module	**External Temperature**	*****ET****

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Test Systems, Smart Transmitter	
Electrical Specifications	
VCC to Ground	3.3 VDC
RTD Sensor Type	Pt100, Pt200, Pt500, Pt1000
Tolerance RTD Sensors	Class A, Class B
RTD Sensor connection	2-wire, 3-wire, 4-wire
Measurement Range	-30 – 180 °C (or according to the manufacturer's specifications of the sensor)
Temp. Range	-20 – 70 °C

BASIC CIRCUIT CONNECTIONS:

The actual physical connection have to be selected in menu: External measurements – Temperature – Sensor Type



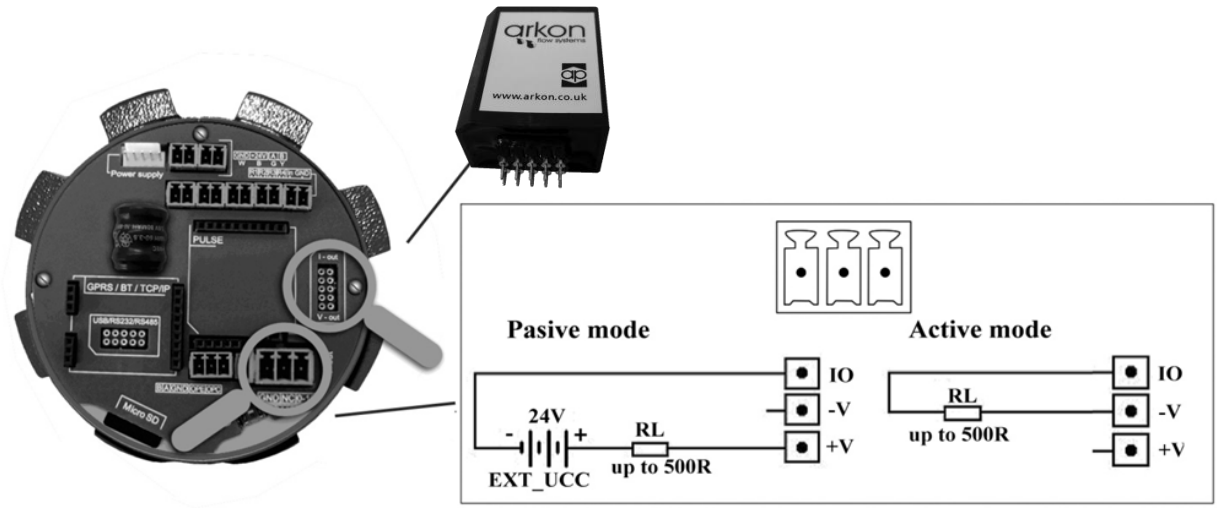
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

4.15. Current Loop Output Module

Module Name:	Symbol:	Ordering Code:
MAGX2 4-20mA Current Loop Output Module	**Current Loop** 	******C****

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Test Systems, Smart Transmitter	
Electrical Specifications:	
VCC to Ground	3.3 VDC
Type	12-bit DAC
Maximum resolution	3.9 µA
Current out	4 – 20 mA
Output mode	Active or Passive
Temp. Range	-20 – 70 °C

BASIC CIRCUIT CONNECTIONS:	**Using the Current Loop Module**



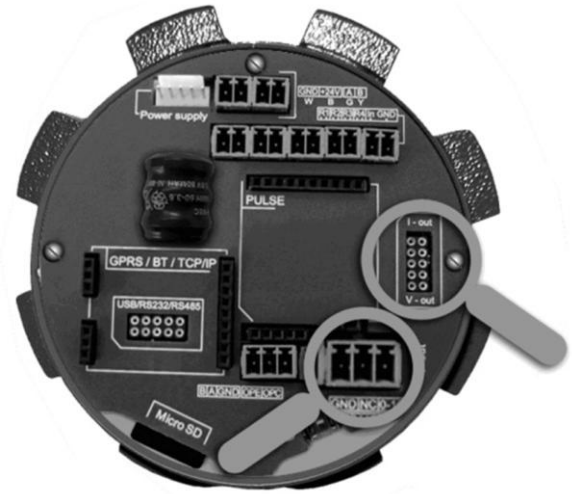
	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

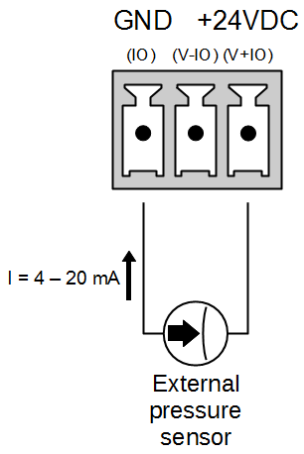
4.16. External Pressure Module

Module Name:	Symbol:	Ordering Code:
MAGX2 External Pressure Module	**External Pressure**	******EP****

APPLICATIONS:	
Industrial Automation, Industrial Process Control, Test Systems, Smart Transmitter	
Electrical Specifications:	
VCC to Ground	3.3 VDC
Output type Pressure Sensor	passive 4 – 20 mA (ext. power supply from Pressure Module)
Measurement Range	according to the manufacturer's specifications the sensor
Measurement Unit	bar, psi
Temp. Range	-20 – 70 °C

BASIC CIRCUIT CONNECTIONS:





	Warning electrostatic sensitive device.
	Any connection or disconnection of any module has to be done with the network power to the meter switched off.

5. OIML R49 certification

MAGX2 have been type tested and internationally proven and endorsed to the highest accuracy class 2 for cold and hot potable water meters – OIML R49-1 (Organisation Internationale de Métrologie Légale). For full details, OIML R49 is available to download from www.oiml.org. Its requirements are in line with other international standards, such as EN14154 and ISO4064. MAGX2 flowmeter has been evaluated by type approval at the Czech Metrology Institute to OIML R49 and passed the very highest accuracy designations for sizes DN25 to DN300 (1 to 12 in. NB).
The OIML R49-1 certificate of conformity is available on our website (www.arkon.co.uk).

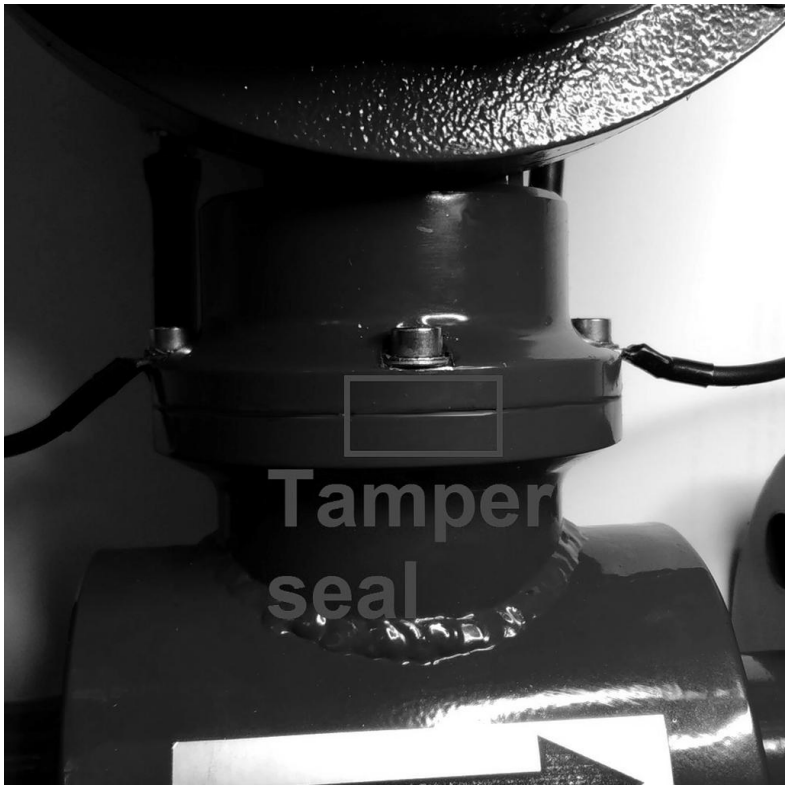
Climatic class: **B**
Electromagnetic class: **E2**
Pressure class: **MAP10**
Temperature class: **T50**
Pressure loss: **ΔP 10**
Installation condition: **U5D3**, any installation position
Accuracy class: **2**
Flow direction: **positive**
Q3/Q1 ratio is described in following table:

DN	R	Flow Rate [m3/hr]				R	Flow Rate [m3/hr]				R	Flow Rate [m3/hr]			
		Q1	**Q2**	**Q3**	**Q4**		**Q1**	**Q2**	**Q3**	**Q4**		**Q1**	**Q2**	**Q3**	**Q4**
25	**50**	0,32	0,51	16,00	20,00	**100**	0,16	0,26	16,00	20,00	**160**	0,10	0,16	16,00	20,00
32	**50**	0,50	0,80	25,00	31,25	**100**	0,25	0,40	25,00	31,25	**160**	0,16	0,25	25,00	31,25
40	**50**	0,80	1,28	40,00	50,00	**100**	0,40	0,64	40,00	50,00	**160**	0,25	0,40	40,00	50,00
50	**50**	1,26	2,02	63,00	78,75	**100**	0,63	1,01	63,00	78,75	**160**	0,39	0,63	63,00	78,75
65	**50**	2,00	3,20	100,00	125,00	**100**	1,00	1,60	100,00	125,00	**160**	0,63	1,00	100,00	125,00
80	**50**	3,20	5,12	160,00	200,00	**100**	1,60	2,56	160,00	200,00	**160**	1,00	1,60	160,00	200,00
100	**50**	4,00	6,40	200,00	250,00	**100**	2,00	3,20	200,00	250,00	**160**	1,25	2,00	200,00	250,00
125	**50**	8,00	12,80	400,00	500,00	**100**	4,00	6,40	400,00	500,00	**160**	2,50	4,00	400,00	500,00
150	**50**	12,60	20,16	630,00	787,50	**100**	6,30	10,08	630,00	787,50	**160**	3,94	6,30	630,00	787,50
200	**50**	16,00	25,60	800,00	1000,00	**100**	8,00	12,80	800,00	1000,00	**160**	5,00	8,00	800,00	1000,00
250	**50**	20,00	32,00	1000,00	1250,00	**100**	10,00	16,00	1000,00	1250,00	**160**	6,25	10,00	1000,00	1250,00
300	**50**	32,00	51,20	1600,00	2000,00	**100**	16,00	25,60	1600,00	2000,00	**160**	10,00	16,00	1600,00	2000,00

DN	R	Flow Rate [m3/hr]				R	Flow Rate [m3/hr]				R	Flow Rate [m3/hr]			
		Q1	**Q2**	**Q3**	**Q4**		**Q1**	**Q2**	**Q3**	**Q4**		**Q1**	**Q2**	**Q3**	**Q4**
25	**200**	0,08	0,13	16,00	20,00	**250**	0,06	0,10	16,00	20,00	**400**	0,04	0,06	16,00	20,00
32	**200**	0,13	0,20	25,00	31,25	**250**	0,10	0,16	25,00	31,25	**400**	0,06	0,10	25,00	31,25
40	**200**	0,20	0,32	40,00	50,00	**250**	0,16	0,26	40,00	50,00	**400**	0,10	0,16	40,00	50,00
50	**200**	0,32	0,50	63,00	78,75	**250**	0,25	0,40	63,00	78,75	**400**	0,16	0,25	63,00	78,75
65	**200**	0,50	0,80	100,00	125,00	**250**	0,40	0,64	100,00	125,00	**400**	0,25	0,40	100,00	125,00
80	**200**	0,80	1,28	160,00	200,00	**250**	0,64	1,02	160,00	200,00	**400**	0,40	0,64	160,00	200,00
100	**200**	1,00	1,60	200,00	250,00	**250**	0,80	1,28	200,00	250,00	**400**	0,50	0,80	200,00	250,00
125	**200**	2,00	3,20	400,00	500,00	**250**	1,60	2,56	400,00	500,00	**400**	1,00	1,60	400,00	500,00
150	**200**	3,15	5,04	630,00	787,50	**250**	2,52	4,03	630,00	787,50	**400**	1,58	2,52	630,00	787,50
200	**200**	4,00	6,40	800,00	1000,00	**250**	3,20	5,12	800,00	1000,00	**400**	2,00	3,20	800,00	1000,00
250	**200**	5,00	8,00	1000,00	1250,00	**250**	4,00	6,40	1000,00	1250,00	**400**	2,50	4,00	1000,00	1250,00
300	**200**	8,00	12,80	1600,00	2000,00	**250**	6,40	10,24	1600,00	2000,00	**400**	4,00	6,40	1600,00	2000,00

Test report number: 6015-PT-P3021-16
OIML Certificate No.:R49/2013-CZ-16.04

Please use the sealing label that is part of the package and add it to the sensor communication module part after installation to the end user.



6. Maintenance

MAGX2 flowmeter does not require any special maintenance. Dependent on the media being measured it is recommended that approximately once a year, to remove the sensor from the pipe and clean the liner. Method of cleaning consists of removing mechanical dirt and any non-conductive coating (like oil film) from the liner. A very dirty liner could cause inaccuracy of the measurement. Check mechanical state of the liner.

6.1. Self –cleaning electrodes

If mechanical cleaning is not possible, MAGX2 has electrolytic method to clean electrodes.

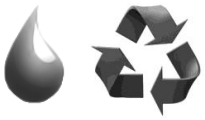
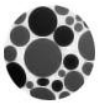
An electrolytic method is advantageous for its simplicity, however it can only be applied for the contamination that can be removed by electrolysis. (Low contamination and deposit).

24VAC voltage is applied directly to sensor electrodes to clean them. The time that that voltage is applied is selectable for user from 1 to 9999 seconds. For more info please go to section 3.5 User settings.

7. Liner and electrode selection

Liner and electrode material selection are an important issue when choosing your flowmeter. The tables below serve to give you an idea of general material compatibility. If you are not sure about suitability of liner/electrode material for a particular medium, please contact the Arkon sales department for further assistance, and the site where the flowmeter is to be used for what materials are acceptable for the process media. Arkon can only recommend materials, we cannot guarantee them.
Please note that Arkon offer also WRAS approved MAGX2 for DN25,DN50 and DN80 and WRAS approved material for sizes up to DN600. For more info contact our sales department.

Liner Selection:

Hard Rubber	Drinking water and wastewater		0 - 70°C
Soft Rubber	Water with abrasive particles		0 - 70°C
PTFE	Chemicals, food industries and drinking water		0 - 130°C
Hygienic rubber	Potable water; WRAS approved		cold water

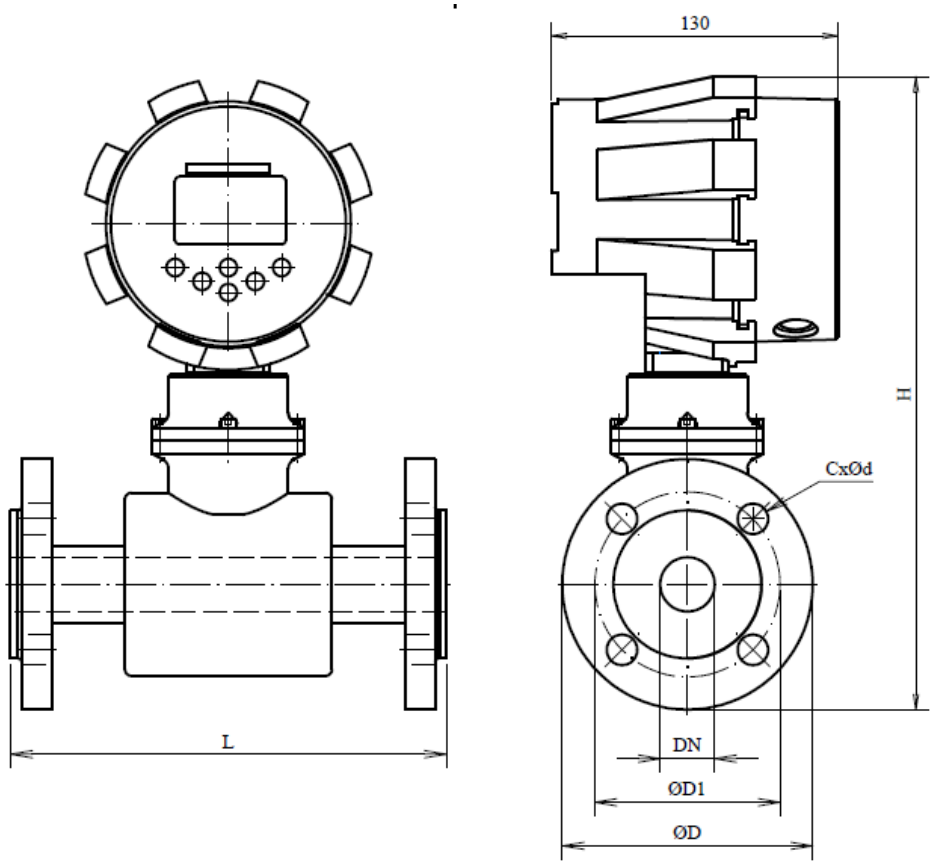
Electrode selection:

Stainless Steel	General purpose, sewage, water	
Hastelloy	Seawater, Chemicals	
Titanium	Aggressive chemicals	
Platinum	Aggressive chemicals	

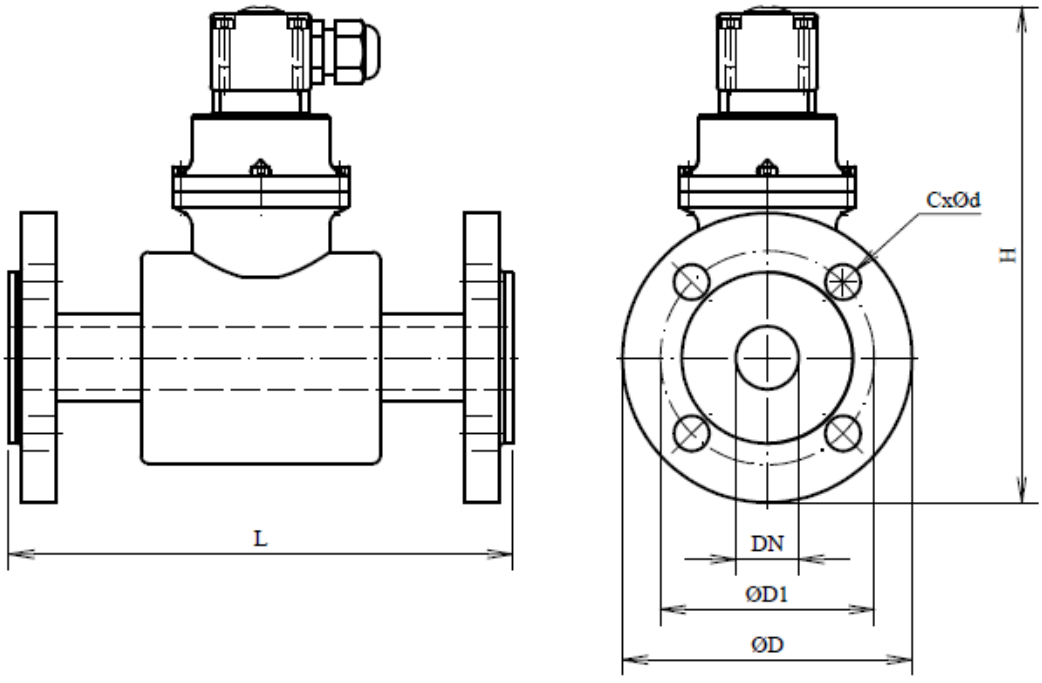
8. Flowmeter Dimensions

8.1. IP67 Transmitter

Compact version



Remote version



DN	ØD	ØD1	CxØd	H_compact	H_remote	L
10	90	60	4x14	258	168	200
15	95	65	4x14	263	173	200
20	105	75	4x14	270	181	200
25	115	85	4x14	276	186	200
32	140	100	4x18	294	205	200
40	150	110	4x18	303	213	200
50	165	125	4x18	317	227	200
65	185	145	8x18	337	247	200
80	200	160	8x18	355	266	200
100	220	180	8x18	375	286	250
125	250	210	8x18	401	312	250
150	285	240	8x22	440	351	300
200	340	295	12x22	511	421	350
250	405	355	12x26	581	491	400
300	460	410	12x26	630	540	500
350	520	470	16x26	698	608	500
400	580	525	16x30	751	661	600
450	640	585	20x30	794	704	600
500	715	650	20x33	863	773	600
600	840	770	20x36	980	890	600

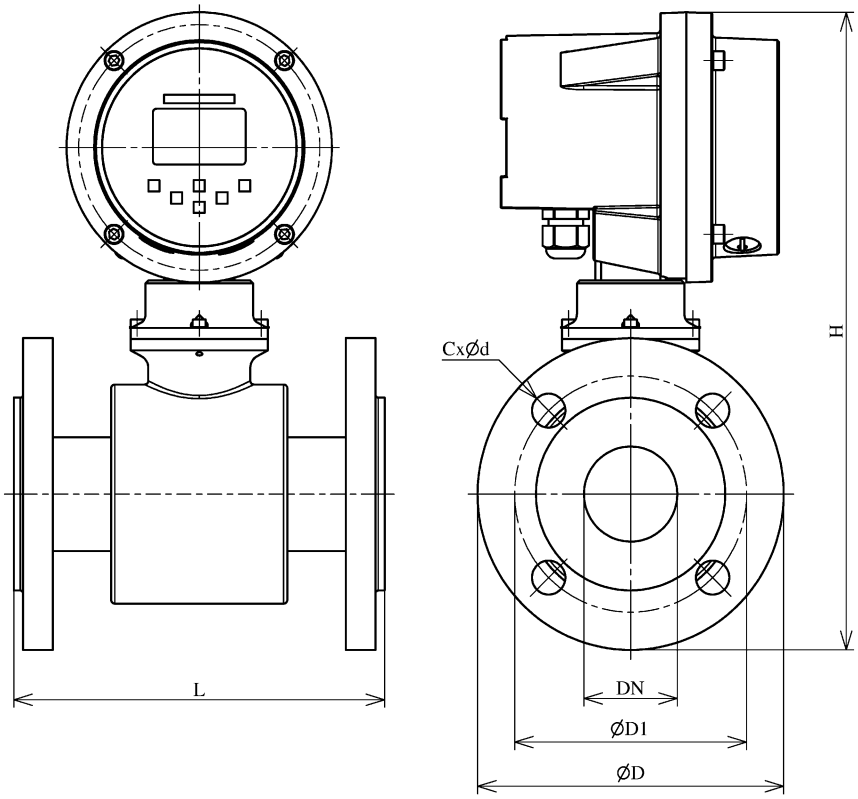
DN	ØD	ØD1	CxØd	H_compact	H_remote	L
1/2"	88,9	60,5	4x16	263	173	200
3/4"	98,6	69,9	4x20	276	187	200
1"	108	79,2	4x20	280	191	200
1.1/4"	117,3	88,9	4x20	291	201	200
1.1/2"	127	98,6	4x23	306	216	200
2"	152,4	120,7	8x20	317	227	200
2.1/2"	177,8	139,7	4x20	333	244	200
3"	190,5	152,4	4x20	351	261	200
4"	228,6	190,5	8x20	380	290	250
5"	254	215,9	8x23	403	314	250
6"	279,4	241,3	8x23	437	348	300
8"	342,9	298,5	8x23	512	422	350
10"	406,4	362	12x26	581	491	400
12"	482,6	431,8	12x26	642	552	500
14"	533,4	476,3	12x29	706	616	500
16"	596,9	539,8	16x29	758	668	600
18"	635	577,9	16x32	792	702	600
20"	698,5	635	20x32	855	765	600
24"	812,8	749,3	20x35	968	878	600

Tolerance of built-in length:
DN 10 – DN 150 → L ± 5 mm
DN 200 – DN 1000 → L ± 10 mm

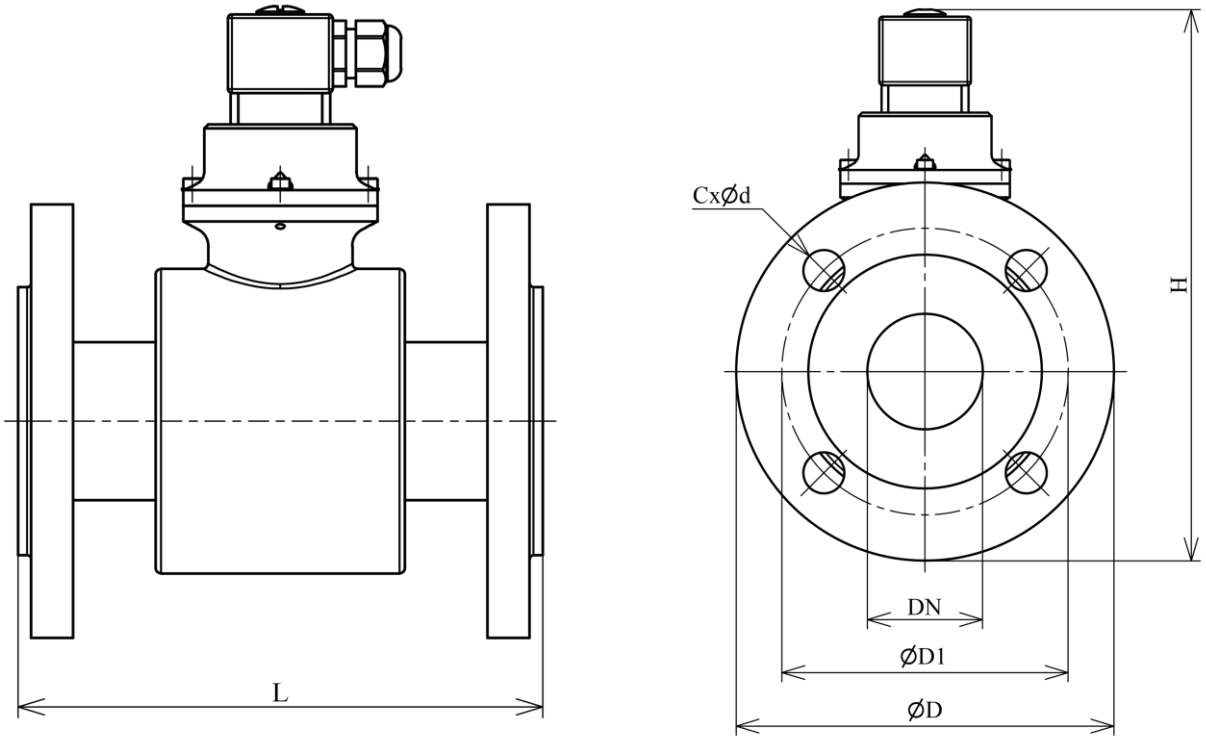
Standard pressure:
DN 10 – DN 50 → PN 40 / 150 lbs.
DN 65 – DN 150 → PN 16 / 150 lbs

8.2. IP68 Transmitter

Compact version



Remote version



DN	ØD	ØD1	CxØd	H_compact	H_remote	L
10	90	60	4x14	275	180	200
15	95	65	4x14	280	185	200
20	105	75	4x14	288	193	200
25	115	85	4x14	293	198	200
32	140	100	4x18	312	217	200
40	150	110	4x18	320	225	200
50	165	125	4x18	334	239	200
65	185	145	8x18	354	259	200
80	200	160	8x18	373	278	200
100	220	180	8x18	393	298	250
125	250	210	8x18	419	324	250
150	285	240	8x22	458	363	300
200	340	295	12x22	514	419	350
250	405	355	12x26	584	489	400
300	460	410	12x26	633	538	500
350	520	470	16x26	701	606	500
400	580	525	16x30	754	659	600
450	640	585	20x30	797	702	600
500	715	650	20x33	865	770	600
600	840	770	20x36	982	887	600

DN	ØD	ØD1	CxØd	H_compact	H_remote	L
1/2"	88,9	60,5	4x16	277	182	200
3/4"	98,6	69,9	4x20	284	189	200
1"	108	79,2	4x20	290	195	200
1.1/4"	117,3	88,9	4x20	300	205	200
1.1/2"	127	98,6	4x23	309	214	200
2"	152,4	120,7	8x20	328	233	200
2.1/2"	177,8	139,7	4x20	350	255	200
3"	190,5	152,4	4x20	368	273	200
4"	228,6	190,5	8x20	397	302	250
5"	254	215,9	8x23	421	326	250
6"	279,4	241,3	8x23	455	360	300
8"	342,9	298,5	8x23	515	420	350
10"	406,4	362	12x26	584	489	400
12"	482,6	431,8	12x26	644	549	500
14"	533,4	476,3	12x29	708	613	500
16"	596,9	539,8	16x29	762	667	600
18"	635	577,9	16x32	795	700	600
20"	698,5	635	20x32	856	761	600
24"	812,8	749,3	20x35	968	873	600

Tolerance of built-in length:
DN 10 – DN 150 → L ± 5 mm
DN 200 – DN 1000 → L ± 10 mm

Standard pressure:
DN 10 – DN 50 → PN 40 / 150 lbs.
DN 65 – DN 150 → PN 16 / 150 lbs

9. How to order your MAGX2

Model	Ordering code							Description
MAGX2 **MAGX2 IP68**	1	2	3	4	5	6	7	Standard calibration
MAGX2 OIML **MAGX2 IP68 OIML**								Enhanced calibration in accordance with OIML R49, edition 2013, class 2
	T							**MAGX2 main board, display, 6 buttons control unit**
								Power supply module
		230						Power supply module 90-250VAC - *Version 4.*
		24						Power supply module 24VDC - *Version 4.*
		12						Power supply module 12VDC - *Version 4.*
			CM					**Sensor to transmitter communication module - *Version 8***
								Remote mounting kit
				N				None
				W				WALL mounting kit (including 6m cable)
				P				PANEL mounting kit (including 6m cable)
				D				DIN-Rail mounting kit (including 6m cable)
								Output 1
					N			None
					C			4-20mA current output signal module
					EP			External pressure sensor**
								Output 2
						N		None
						P		Pulse output module
						P2		Pulse 230 output module
						ET		External temperature sensor**
								Communication
							N	None
							232	RS232 communication module, including 1,8m cable
							USB	USB communication module, including 1,8m cable
							BTO	Bluetooth communication module
							GPR	GPRS*
							485	RS485 communication module, distance up to 1km
							TCP	TCP/IP communication module, amplifiers might be necessary
							SMS	GSM-SMS
							WIFI	Wi-Fi

* Please note it is not possible to change MAGX2 transmitter settings using GPRS module. Other communication module will be required

** Input

Example

MAGX2 IP68	T	230	CM	N	C	N	USB

Example OIML, IP68 unit

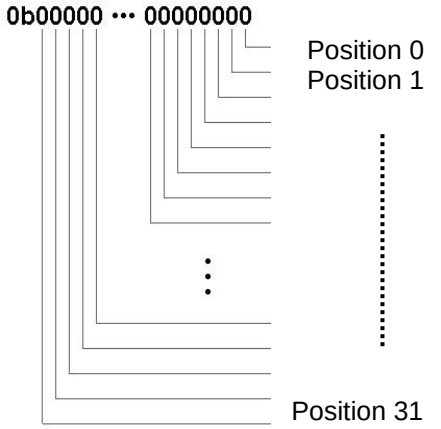
MAGX2 IP68 OIML	T	230	CM	N	C	N	USB

Model	Ordering code					Description
Sensor	1	2	3	4	5	
						Connection
	D					DIN
	A					ANSI
	DS					DIN Flange St. St.
	DSS					DIN St. St. body
	AS					ANSI Flange St. St.
	ASS					ANSI St. St. body
	S					DIN 11851
	SSS					DIN 11851 St. St. body
	J					JIS
	E					Table E
	TD					Table D
	T					Tri-clamp
	W					Wafer
						Size
		10 / 3/8 200 / 8				10mm / 3/8" 200 mm / 8"
		15 / 1/2 250 / 10				15mm / 1/2" 250 mm / 10"
		20 / 3/4 300 / 12				20mm / 3/4" 300 mm / 12"
		25 / 1 350 / 14				25mm / 1" 350 mm / 14"
		32 / 1.1/4 400 / 16				32mm / 1.1/4" 400 mm / 16"
		40 / 1.1/2 450 / 18				40mm / 1.1/2" 450 mm / 18"
		50 / 2 500 / 20				50mm /2" 500 mm / 20"
		65 / 2.1/2 600 / 24				65mm / 2.1/2" 600 mm / 24"
		80 / 3 700 / 28				80mm / 3" 700 mm / 28"
		100 / 4 800 / 32				100 mm/ 4" 800 mm / 32"
		125 / 5 900 / 36				125 mm/ 5" 900 mm / 36"
		150 / 6 1000 / 40				150 mm / 6" 1000 mm / 40"
						Liner
			HR			HARD RUBBER
			PT			PTFE
			SR			SOFT RUBBER
			NR			HYGIENIC RUBBER
			CT			E-CTFE
						Pressure
				150		150 psi
				300		300 psi
				10		PN10
				16		PN16
				25		PN25
				40		PN40
						Electrodes
					SS	Stainless Steel
					HA	Hastelloy C
					TI	Titanium
					PL	Platinum

Example

Sensor	D	100	HR	16	SS

10. MAGX2 Error Code Table



MAGX2 can detect and show a number of errors in one error code value.

Error position	Error Description
0	Empty Pipe (Air Detect)
1	Overloaded
2	Excitation
3	Sensor not responding
4	SD open file
5	SD card not inserted
6	Write flash
7	ADC
8	GSM SMS Module Timeout
9	GSM SMS Module Low Signal
10	GSM SMS Module SIM card error
11	GSM SMS Module send SMS error
12	GSM SMS Module error
13	Very low or high temperature of the sensor
14	GPRS COMUNNICATION
15	GPRS CHECK
16	GPRS TIMEOUT
17	GPRS RESET
18	GPRS ECHO
19	GPRS SIM PIN
20	GPRS SIGNAL
21	GPRS CALL
22	GPRS IP
23	GPRS ONLINE
24	OVERLOAD 2
25-31	RESERVED (non-use)

Errors on the display are indicated in hex format. This number must be converted to binary format! The MAGX2 software version 2.0.0.13 and newer decode and show error in Real time measurement tab.

The error code has been converted to binary format, each position is related to a different error (see the table above). Number 1 indicates error and number 0 indicates no error.

Example:

Error shown on display:	Error position:	Read errors:
083 HEX	100011 BIN	SD card not inserted / Overloaded / Empty pipe

11. Appendix

11.1. CE requirements

The MAGX2 Electromagnetic flowmeter is manufactured conform CE requirements.

CE

11.2. Warranty

The warranty conditions are covered by Arkon Flow Systems, s.r.o. Terms & Conditions of Sale and by Arkon Flow Systems, s.r.o Return Regulations and Warranty Conditions. The Arkon Flow Systems, s.r.o Terms & Conditions of Sale and the Arkon Flow Systems, s.r.o Return Regulations and Warranty Conditions are an integral part of the Resellers contract and of any Order Confirmation. Please see your Resellers contract or www.arkon.co.uk; Support section. The Warranty sheet is part of the Packing note of any new goods sent. For the claim or return procedure, please consult our web site www.arkon.co.uk or call the Arkon Flow Systems, s.r.o sales office.

11.3. Contact

Technical support: support@arkon.co.uk
Skype: support.arkon

Sales office: office@arkon.co.uk

Office hours:
8:30 – 18:00 (GMT+1)

Direct technical support:
8:00 – 17:00 (GMT+1)