Technical presentation

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1. Flowmeter selection

1.1. Material selection

To select the proper flowmeter for your application you should know:

- Expected flow range – affects DN selection
- Size of pipes and pipe connections
- Expected maximum pressure – affects flange selection
- Expected maximum temperature – affects liner selection
- Measured medium – affects liner and electrodes selection

Electrode	Liner	Connection	Pressure
Stainless steel	Hard rubber	DIN	PN10
Hastelloy	Soft rubber	ANSI	PN16
Titanium	PTFE	JIS	PN25
Tantalum	E-CTFE	Wafer	PN40
Platinum		Hygienic	150PSI
		Tri-Clamp	300PSI

Expected maximum temperature – affects liner selection :

- 0 °C – 70 °C Hard rubber or Soft rubber
- 0 °C – 130 °C PTFE or E-CTFE plus remote connection

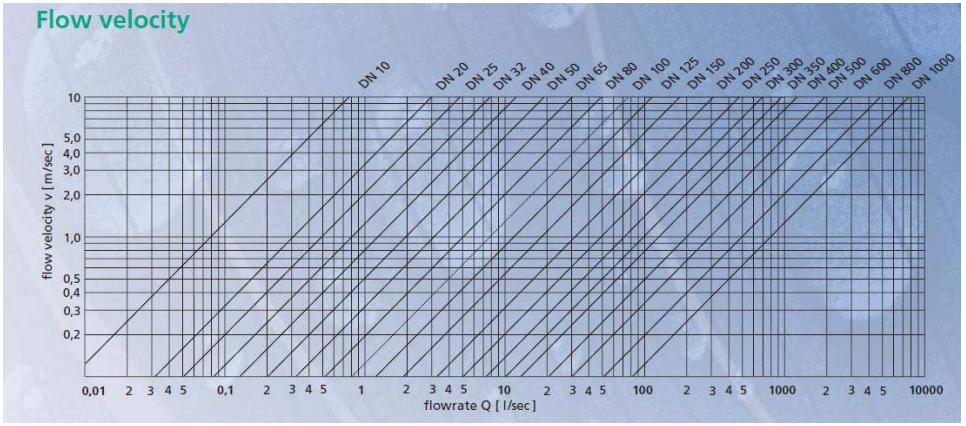
Measured medium – affects liner and electrode selection :

		Flowtube Liner			Electrode Material				
Process	Maximum	PTFE	ETFE	Hard	316 SST	Hastelloy	Tantalum	Platinum	Titanium
Liquid	concentr.	Teflon		Rubber		C-276		-10% Iridium	
Acetaldehyde	100%	A1	A2	N	B4	A4	B5	A5	A1
Acetamide	100%	A1	A1	N	B1				
Acetic Acid	50%	A1	A1	N	B3	A3	A1	A	A1

See material resistivity table for detailed information

1.2. Choosing size

Flow velocity



Flow rate

	Flow rates [l/s]						Flow rates [m³/h]					
DN	Q 1%	Q 5%	QN	QN 50%	QN 100%	Q MAX	QN 1%	QN 5%	QN	QN 50%	QN 100%	Q MAX
10	0,01	0,04	0,2	0,39	0,79	0,98	0,03	0,14	0,8	1,41	2,83	3,53
15	0,02	0,09	0,5	0,88	1,77	2,21	0,06	0,32	2	3,18	6,36	7,95
20	0,03	0,16	0,9	1,57	3,14	3,93	0,11	0,57	3,2	5,65	11,31	14,14
25	0,05	0,25	1,4	2,45	4,91	6,14	0,18	0,88	5	8,84	17,67	22,09
32	0,08	0,4	2,2	4,02	8,04	10,05	0,3	1,5	8	14,5	29	36,2
40	0,1	0,6	4	6,3	12,6	15,7	0,5	2,3	13	22,6	45,2	56,6
50	0,2	1	6	9,8	19,6	24,5	0,7	3,5	20	35,3	70,7	88,4
65	0,3	1,7	9	16,6	33,2	41,5	1,2	6	35	59,7	119,5	149,3
80	0,5	2,5	14	25,1	50,3	62,8	1,8	9	50	90,5	181	226,2
100	0,8	3,9	20	39,3	78,5	98,2	3	14	80	141	283	353
125	1	6	30	61	123	153	4	22	150	221	442	552
150	2	9	50	88	177	221	6	32	200	318	636	795
200	3	16	100	157	314	393	1	57	300	565	1131	1414
250	5	25	150	245	491	614	18	88	500	884	1767	2209
300	7	35	200	353	707	884	25	127	800	1272	2545	3181
350	10	48	300	481	962	1203	35	173	1000	1732	3464	4330
400	13	63	400	628	1257	1571	45	226	1300	2262	4524	5655
500	20	98	600	982	1963	2454	61	353	2000	3534	7069	8836
600	28	141	800	1414	2827	3534	102	509	3000	5089	10179	12723
700	38	192	1000	1924	3848	4811	139	693	4000	6927	13854	17318
800	50	251	1200	2513	5027	6283	181	905	5000	9048	18096	22620
900	64	318	1500	3181	6362	7952	229	1145	6000	11451	22902	28630
1000	79	393	2000	3927	7854	9817	283	1414	8000	14137	28274	35340

Q1% - Minimun applicable flowrate (with guaranteed accuracy) / Q5%- recommended minimum flowrate (minimum flowrate with best accuracy)
QN recommended nominal flowrate (expected working flowrate) / Q50% recommended maximum flowrate (maximum flowrate for industrial use)
Q100% maximum applicable flowrate (maximum flowrate with guaranteed accuracy) / QMAX maximum applicable overload (Q125%) (flowmeter is still measuring)

To achieve the best performance choose DN by Q_N :

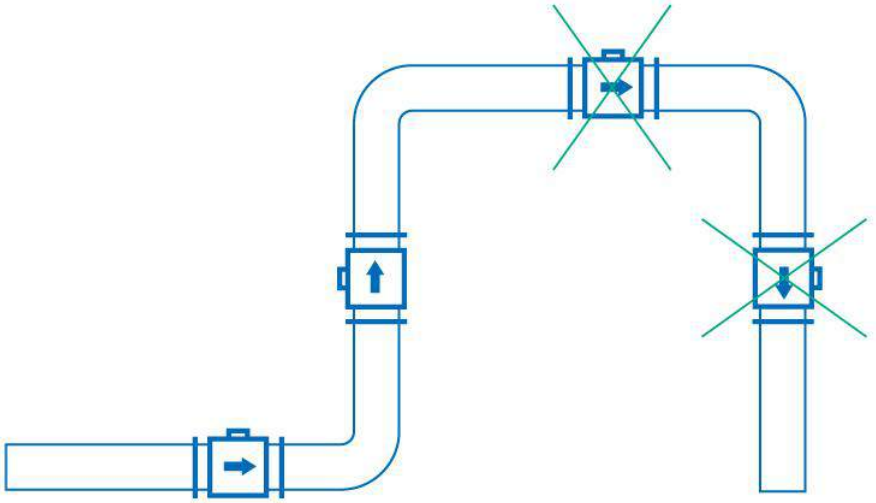
(10% of Q_N) < Q < Q_N

DN	Q_N [m^3/hr]	DN (not MAGB1)	Q_N [m^3/hr]
10	0,8	200	300
15	2,0	250	500
20	3,2	300	800
25	5,0	350	1000
32	8,0	400	1300
40	13,0	500	2000
50	20,0	600	3000
65	36,0	700	4000
80	50,0	800	5000
100	80	900	6000
125	150	1000	8000
150	200		

2. Installation of electromagnetic flowmeter

2.1. Installation into pipes
Possible ways of mounting

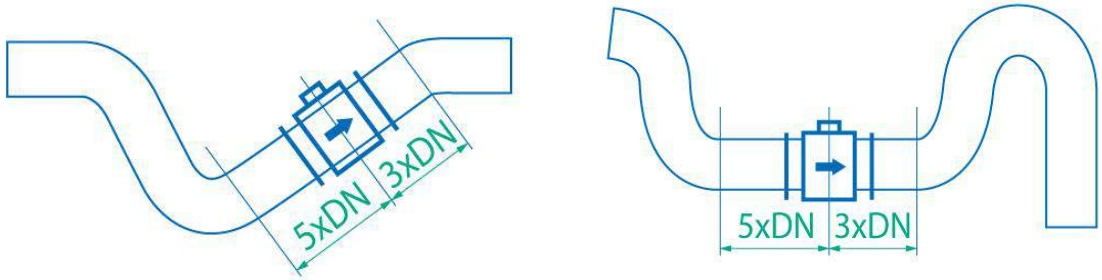
The sensor tube must always remain full of liquid



Horizontal (standard) mounting

The sensor tube must always remain full of liquid. The best way to achieve this is to locate the sensor in a low section of pipe, see the following picture.

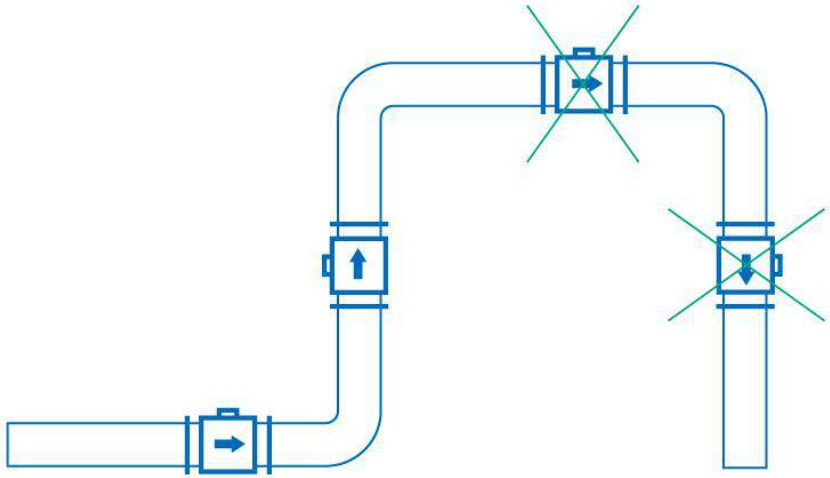
It is recommended to install the sensor in a section of straight pipe with at least 5 times the pipe diameter before sensor and 3 times after sensor.



Vertical mounting

When the sensor is mounted on a vertical section of pipe, the flow direction must be upwards.

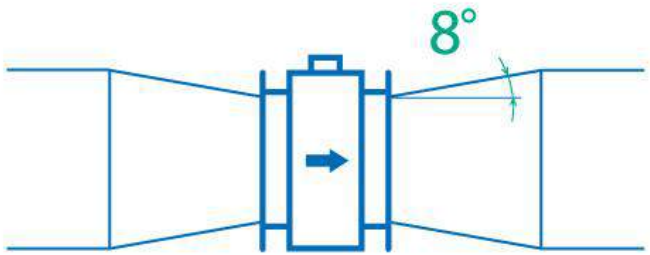
Downward direction is not an acceptable installation; air bubbles can collect in the sensor and the measurement could be unstable and inaccurate.



Pipe reducers

If the pipe diameter is not the same as the diameter of sensor, then pipe reducers can be used.

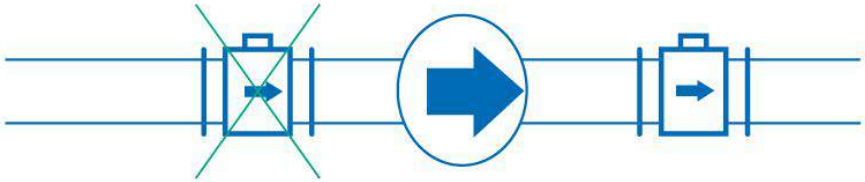
So as not to lose accuracy of the measurement, the slope of reducers should not exceed 8°.



Pumps

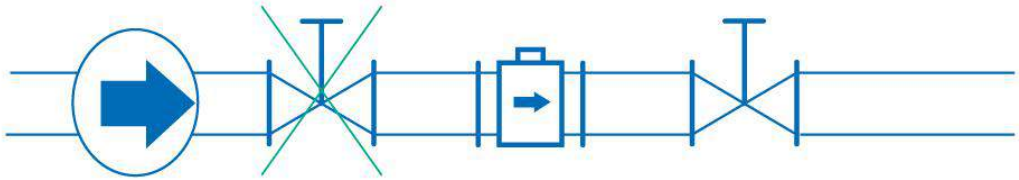
Do not install the sensor on the suction side of a pump or on a section of pipe where a vacuum is possible.

Depends always on all piping system.



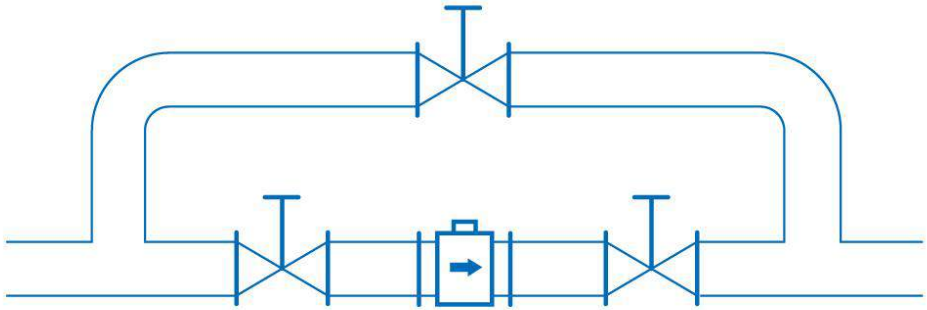
Valves

Suitable location of a shutoff valve is downstream of a sensor.
Depends always on all piping system.



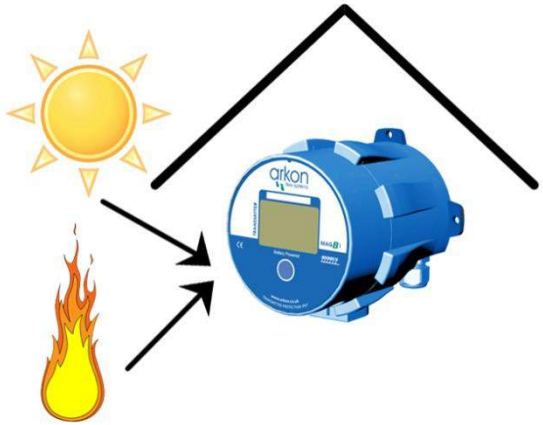
Removal during maintenance

If the application requires removal of the sensor for periodic maintenance, it is recommended to install a bypass section as the following drawing.



2.2.Overheating

Where ambient temperatures above 30 ºC are possible such as in a hot climate the electromagnetic unit should be protected against direct sunlight to avoid overheating. If necessary a sunshade has to be mounted over the electronic unit or a remote version with a separate electronic unit should be used.



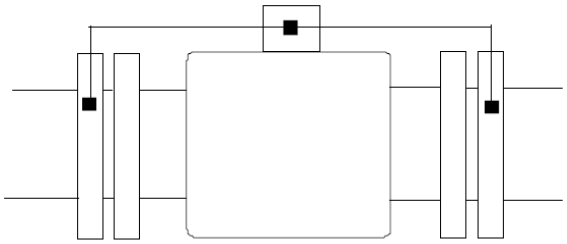
2.3.Vibration

Where strong vibrations are possible, both the input and output pipes must be mechanically fixed or a remote version with a separate electronic unit should be used.

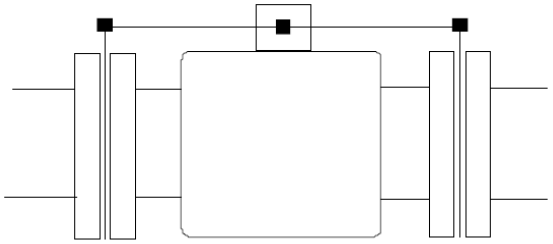
2.4.Earthing

MAGX2 and MAGB1 sensor have to be properly earthed using the grounding screw on the flowmeter neck.

If you are connecting to metal pipe work, it is not necessary to earth with earthing rings (picture on the left)
If you are connecting to plastic pipes, it is absolutely necessary to earth the flowmeter properly. You will need to earth through earthing rings. (picture on the right)



Steel Pipe



Plastic Pipe

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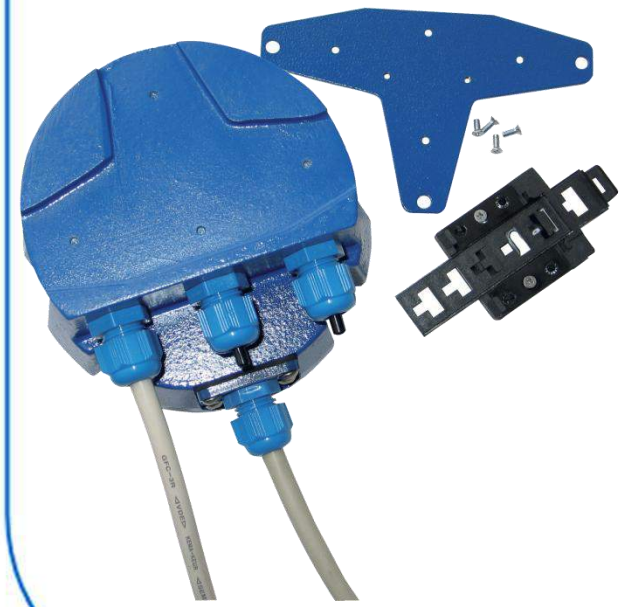
3. Compact and remote mounting

Mounting options

"meeting customers requirements“



Four possible ways to mount the transmitter:

1 Compact

3 Remote options:

- Remote Wall mounting
- Remote Panel Mounting
- Remote DIN-Rail Mounting

Compact version installation

In case of a compact flowmeter version, the transmitter will need no further installation, and should be ready for use.

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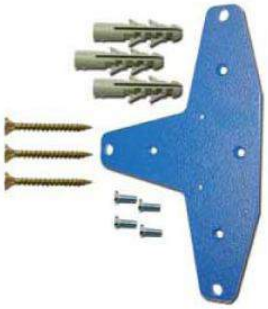
Remote Wall Mounting



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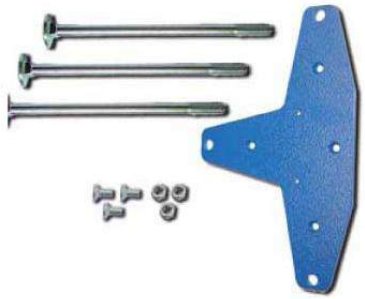
Remote Panel Mounting



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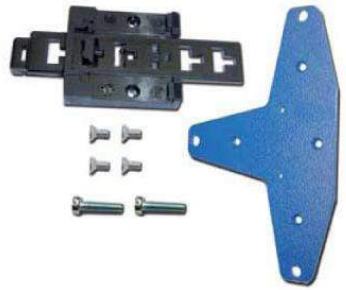
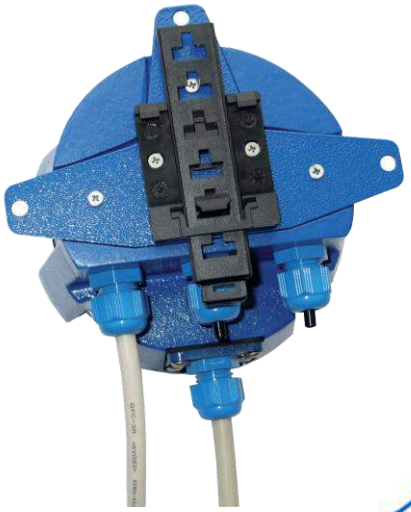
Remote DIN-Rail Mounting





Remote version installation

The cable entry into the sensor is protected by a junction box, which can (should) be potted to IP68

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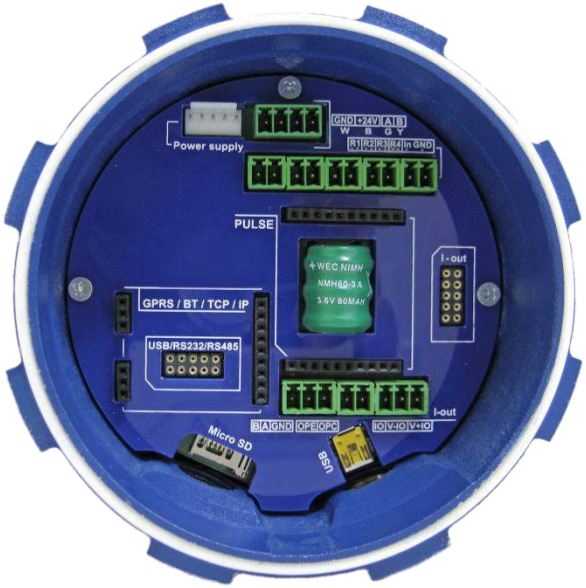
Opening transmitter

4. Modular

MAGX2

The MAGX2 Basic Transmitter Unit



The core element of any MAGX2 flowmeter.

Consists of the MAGX2 mother board, touch button controls, graphic display, transmitter housing.

Available in standard compact IP67 and in remote IP68 version. For remote versions, one of the three possible remote mounting kits is required.

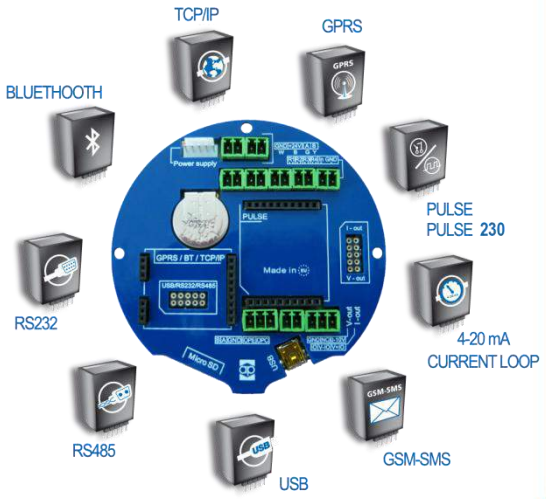
WRAS APPROVED PRODUCT

Powering MAGX2

- Connection of a flowmeter is to be done through a switch or circuit breaker because of safety purposes and also because the device does not have a network power switch.
- For any electrical work it is necessary to disconnect the device from network power, and this is done best through a switch.
- 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).

4.1. Modules

Analogue outputs	4-20mA Current loop Pulse output Pulse 230 output
Digital outputs (1 out of 6)	RS232 comm. (1.8 m. cable) USB Comm. (1.8 m. cable) Bluetooth (class1- 200m) RS485 Comm. (1 Km) TCP/IP (No limits) GPRS (No limits) GSM-SMS (No limits)
Data-logger	Standard micro SD card



4.2. Modules installation

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.

Choose the correct slot

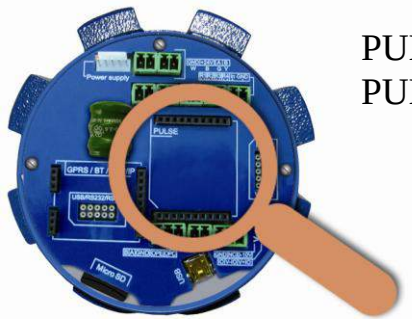
Always make sure you place the module in the correct slot of the motherboard! The name that is written on the module itself has to match the name written next to the slot.

GPRS

BLUETOOTH

TCP/IP

GSM-SMS



PULSE
PULSE 230

RS232

RS485

USB

4-20mA
CURRENT
LOOP

Placing in the correct position

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).

Examples of ***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.

4.3.Checking modules

It is possible to check analog module functionality using fixed function. This function will set the module with a stable output.

Module	Fixed function
Current	10 mA
Pulse - frequency	100 Hz
Pulse – each relay	Contact ON

You can set a fixed function by firmware or software and then measure with a multimeter to check if module working or not.

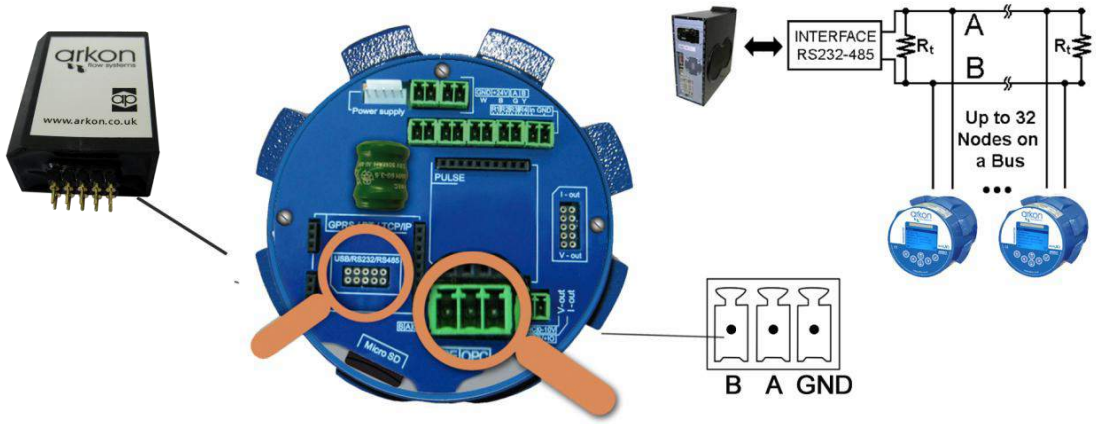
Flow simulation: It is also possible to **simulate flow** and check the **setting of the modules** for successful operation. In service settings – Flow simulation – ON and Simulated flow 0-100% of Flow Qn.

4.4.Communication modules

- **RS485**
- **RS232**
- **USB**
- **TCP/IP**
- **Bluetooth**
- **GPRS**
- **GSM-SMS**

Connecting to PC –RS485

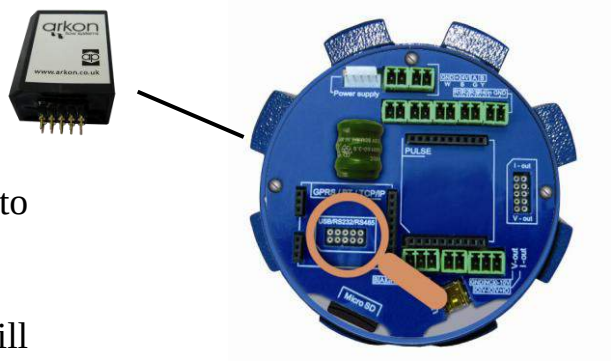
RS485 module is required. Terminator may be needed.



Connecting to PC –RS232

RS232 module and special cable are required.

Connecting to PC –USB



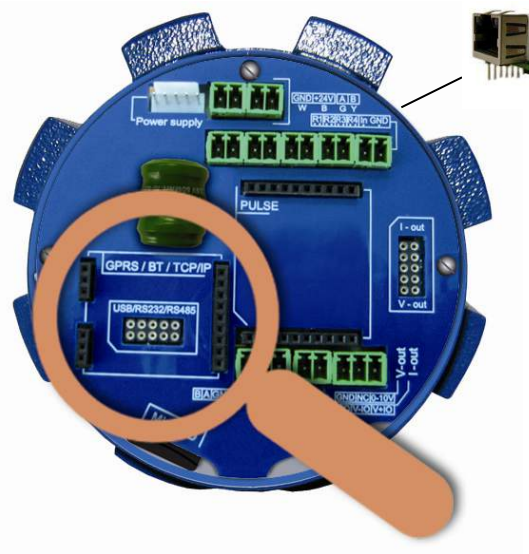
USB module and USB-A to mini USB cable are required.

For connection to a PC, you will need to install device drivers, which are on the MAGX2 product CD, or can be downloaded from the Internet.
www.arkon.co.uk/support

Connecting to PC –TCP/IP

TCP/IP module is required.

For connection to a PC, you will need to install device drivers, which are on the MAGX2 product CD, or can be downloaded from the Internet. Settings are documented in MAGX2 TCP/IP installation manual (www.arkon.co.uk/support)



Connecting to PC – Bluetooth

Bluetooth module and antenna are required.

For connection to a PC, you will need to install Bluetooth device and its drivers and configure the device according to MAGX2 Bluetooth installation manual. (www.arkon.co.uk/support)

Connecting to PC – GPRS

GPRS module and antenna are required.

For connection to a PC, you will need to install GPRS modem and its drivers and configure the devices according to MAGX2 GPRS installation manual. (www.arkon.co.uk/support)

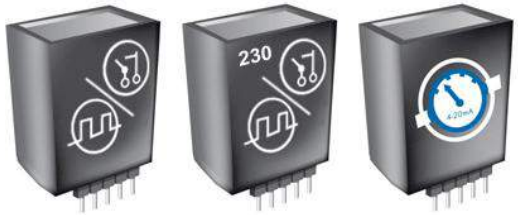
Using – GSM-SMS

GSM-SMS module and antenna are required.

Receive flow rate and total volume from MAGX2 by SMS in a specific interval.

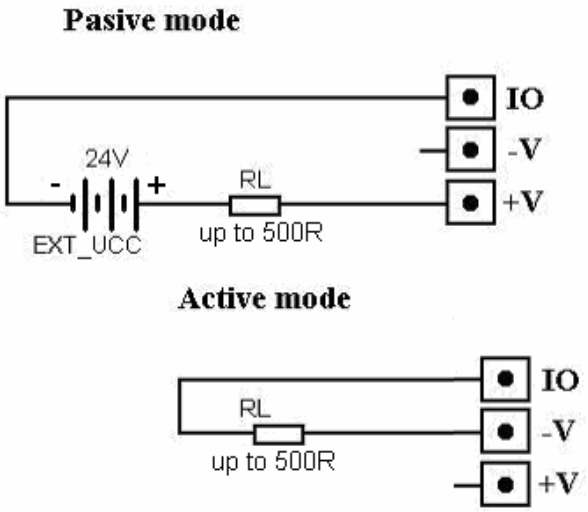
4.5. Analogue modules

- **4-20mA Current loop**
- **Pulse output**
- **Pulse 230 output**



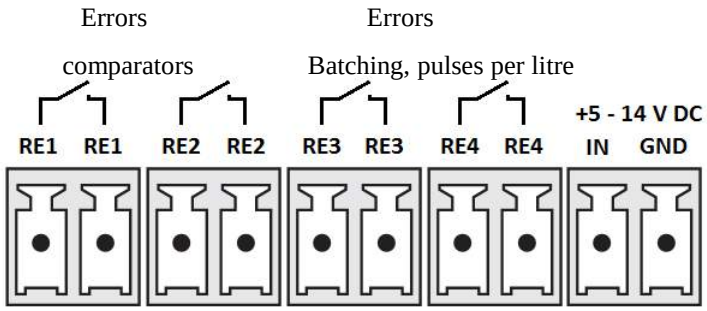
4-20mA Current loop

The 4-20mA output may be used for error detection and flow-dependent output.
It is possible to use it with four-wire powered systems as active or passive loop.



Pulse output

The Pulse output may be used for error detection, pulses per liters and dosing purposes.

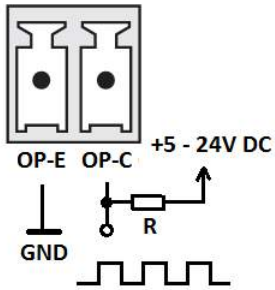


Max. switched power
130 VAC, 50VDC

0,5 A

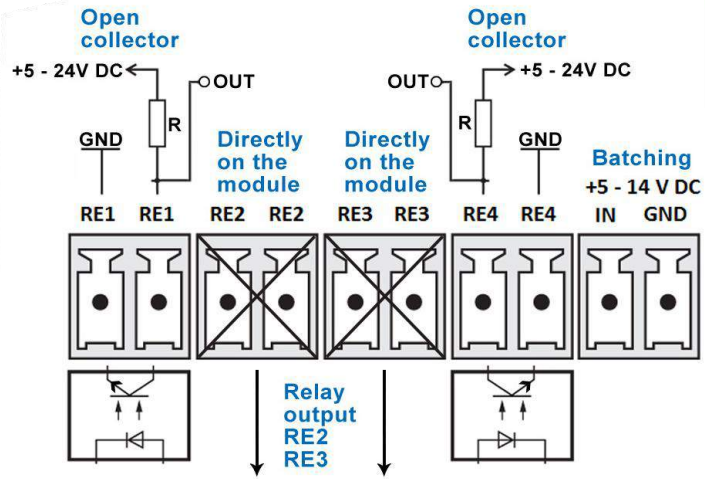
V DC	R
5 V	1k8
12 V	3k3
24 V	6k8

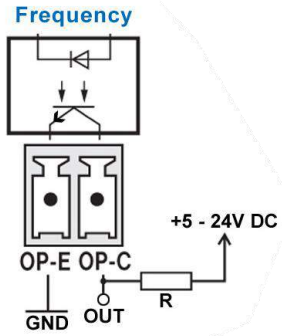
External power supply
External resistor R



Pulse 230 output

External power supply	V DC	5 V	12 V	24 V
External resistor R	R	1k8	3k3	6k8





5. MAGS1

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MAGS1

Features

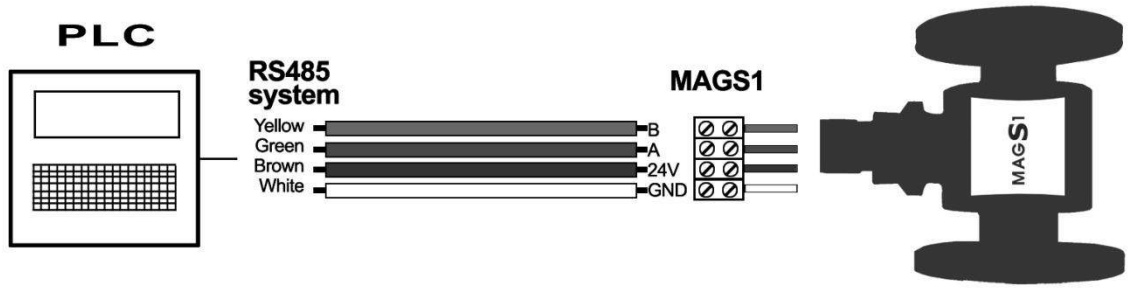
- Stand-alone (non-transmitter) version of flowmeter
- RS485 on Modbus RTU protocol connection (31 devices on one line – save wiring cost)
- 24VDC power supply
- Empty pipe detection, automatic electrode cleaning
- Available in wide range of sizes and pressure grades

Connections and Settings

The connection to pipe work is the same as every flowmeter-see above

You can imagine MAGS1 as a MAGX2 in remote version, just instead of MAGX2 transmitter you connect your PLC system.

Then you configure MAGS1 as a new device in your SCADA system or define registers for PLC unit.



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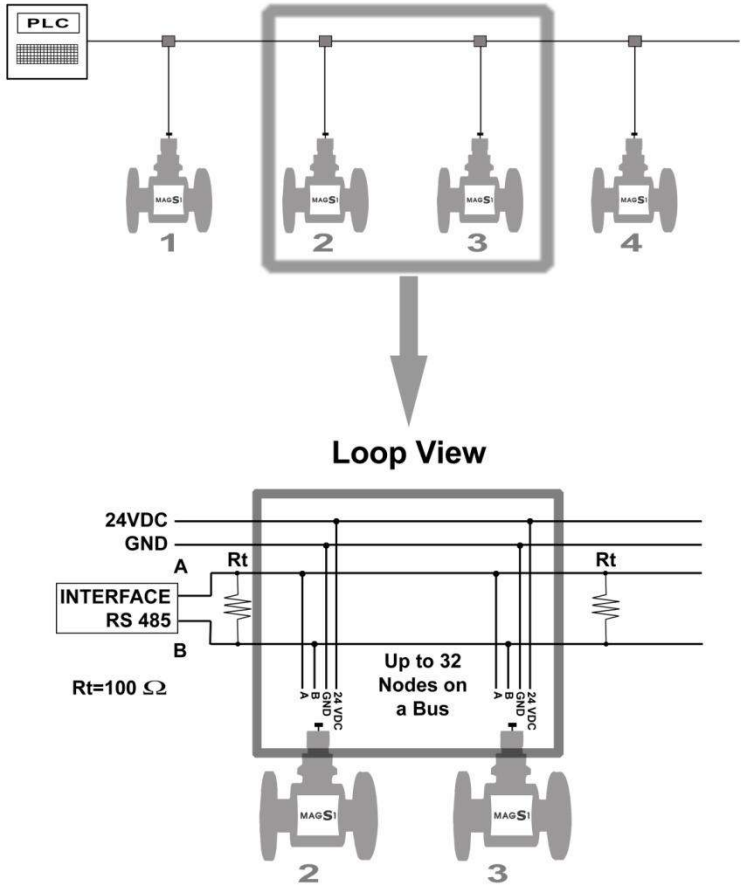
Multipoint Connection



6. Battery Powered

MAG B1

6. Battery Powered

MAGB1

Features

- Battery life up to 5 years (15 years with external battery pack)

  5x3.6 V battery pack optional
- ±0,5 % accuracy (0,5 - 10 m/s)
- One pulse output
- USB communication
- Firmware update possibility
- Data-logger up to 1820 records, selectable logging time
- Compact (Integral) or remote mounting
- VeriMag1 device for field verification
- RS485 output module

Battery life

The battery operation time depends on ambient temperature, conditions, flowmeter functions.

Excitation frequency [Hz]	6.25	3.125	1.5625	1/5	1/15	1/30	1/60
Average battery operation time [months]	2	4	8	36	48	60	60

Example 1:
•Excitation = 1/15
•Display Still ON
•Setting signal = Volume pulse
•USB connected
Than battery life is about **11** months.

Example 2:
•Excitation = 1/15
•Display Off
•USB disconnect
Than battery life is about **63** months

Battery exchange

If the battery indicator indicates low battery capacity, remove the battery by the following steps:

•Connect the new battery pack to the second connector (without losing data).
•Un-plug the old battery pack, remove it, reinstall new battery pack.
•Activate in USER menu Battery Change (see chapter 9.3)

NOTE: We strongly recommend using the battery supplied and approved by the manufacturer to keep the guaranteed specifications mentioned above! Battery can be ordered as Arkon Battery pack 39000.

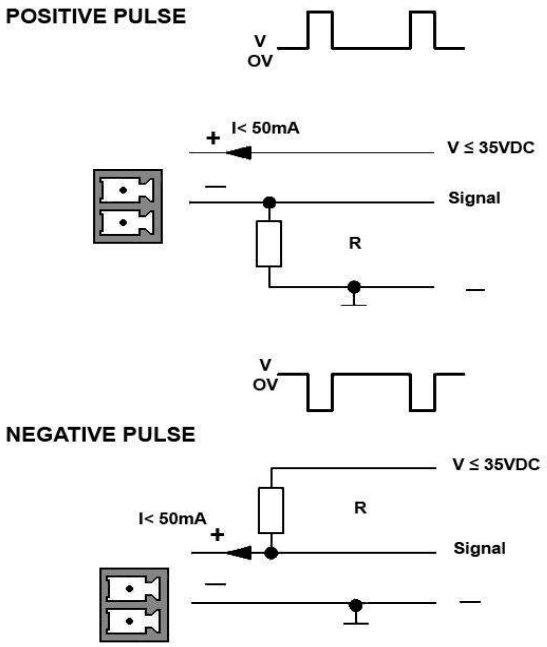
MAGB1 Connecting to PC – USB

The only way to setup MAGB1 flowmeter is via USB interface. The protocol used is Modbus RTU over virtual serial line.
USB-A to mini USB cable is required.

For connection to a PC, you will need to install device drivers, which are on the MAGB1 product CD, or can be downloaded from the Internet.
Using USB is battery consumable.

PULSE output for MAGB1

As an analogue output MAGB1 has pulse output configurable to an error detection or flow dependent. The output is galvanically isolated open drain with following connection:



Recommended resistance R=1 k Ω

PULSE output for MAGB1settings

The output can be set to:

- **OFF** (default)
- **Flow +** output ON, for any positive flow
- **Flow –** output ON, for any negative flow
- **Error** output ON, for any error identified by the device
- **Air Detect** output ON, during air detection (empty pipe)
- **Fixed** output ON, fixed status signal
- **ON In** output ON, if the actual flow is within the given range with hysteresis
- **ON Out** output ON, if the actual flow is outside the given range with hysteresis
- **ON > Flow1** output ON, if the actual flow is the bigger than the value set as Flow 1 and hysteresis 1
- **ON < Flow1** output ON, if the actual flow is smaller than the value set as Flow 1 and hysteresis 1
- **Volume pulse** – the output generate a pulse when the preset volume has passed the sensor (the pulse width can be set in Pulse width or Pulse width type). The battery current consumption is higher if you choose this option.

PULSE output for MAGB1-Volume Pulse

Volume Pulse H – volume Litres

Volume Pulse L – decimal fraction of the volume Litres * 0.00000001 (to get the value multiply decimal fraction of desired volume by 100,000,000)

For example: you need to generate pulse every 11.0053 litres. You have to setup 11 to Volume Pulse H and 00530000 to Volume Pulse L.

Pulse Width – width of the generated pulse in ms (1 – 1000 ms).

Pulse Width Type – Pulse Width or Duty Cycle 50%

7. VeriMAG1

- Stand-alone smart field testing instrument
- Checks the MAGB1 flowmeter towards its original calibration certificate
- Determine internal fault, inaccuracies or early signs of failure
- Capable of storing 60 meter tests in internal storage
- Easy to operate with a user-friendly software

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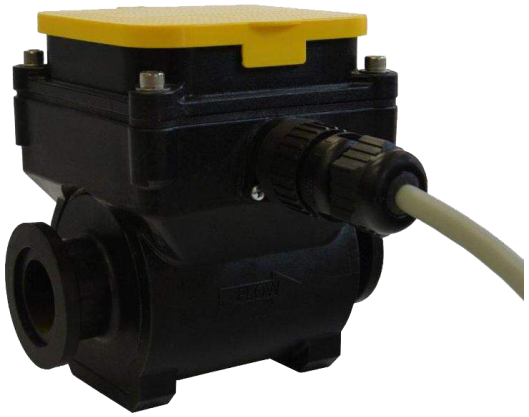
8. Agrimag

AgrimagP



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Agrimag

Features

- Agrimag is a user friendly low cost flowmeter
- Powered by 6x AA batteries
- Battery life of 1-3 years
- Accuracy of 1%
- Connections offered: Manifold clamping flanges compatible with fitting kits for DIN, BSP, NPT and other common connections
- Available in DIN 25, 50, 80 mm (1”, 2” and 3”) sizes
- It is one piece built in polypropylene

AgrimagP

Features

- AgrimagP is a user friendly low cost flowmeter with output
- Accuracy of 1%
- Powered by external power supply
- Power supply range is 9-35VDC
- Output preset for full range at 1000Hz/Flow max
- Connections offered: Manifold clamping flanges compatible with fitting kits for DIN, BSP, NPT and other common connections
- Available in DIN 25, 50, 80 mm (1”, 2” and 3”) sizes
- It is one piece built in polypropylene

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Agrimag AgrimagP

Features

- Almost no maintenance is needed
- Turns off after some time with no flow
- Reports any error by text on the screen

Agrimag AgrimagP

SPECIFICATIONS

Measurable media	Conductive fluids
Min. Media electrical conductivity Flow range	≥20µS/cm 0,1 to 10 m/s
Displayed values	Flow range (m3/h, l/s, l/m, US gal/min, UK gal/min), Volume (m3, l, US Gal, UK Gal) Total, Batch volume
Accuracy	±1% of reading from 100% to 10% of full scale ±3% of reading from 10% of full scale to cut-off
Full scale	1”: 0.5 – 4.8 l/s 2”: 1.9 – 18.9 l/s 3“: 5.0 – 49.0 l/s
Power supply Agrimag	6 AA alkaline batteries, expected lifetime 1 year
Power supply AgrimagP	9-35VDC Power supply available in special connector
Flow direction	Bi-directional measurement

Agrimag AgrimagP

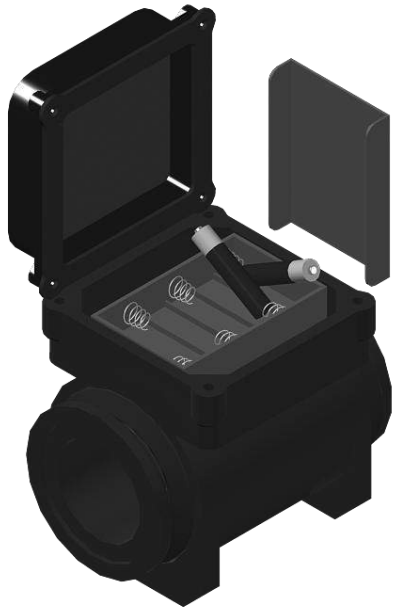
SPECIFICATIONS

Ambient temperature	- 12 to 54ºC (10 to 130ºF)
Display	LCD 128 x 64 px graphical, sleep mode
Control	3 touch buttons
Low flow cut-off	2% of full scale
Electronics protection	Nema 4X standard
Other features	Test of excitation coils
	Earthing through 3rd and 4th electrodes
	Empty pipe detection - battery conservation
Excitation frequency	1/1,67s
Samples per Average	4 excitations
Coils resistance	100Ω
Agrimag P – Frequency output	Open collector proportional to flow 0-1000Hz for 0-Qmax. Max Switching voltage 24 VDC, max. current 50mA

Agrimag

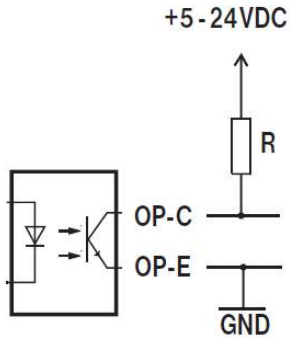
Battery exchange

1. Unscrew 4x IMBUS 4 screws.
2. Carefully open the display part of the flowmeter.
3. Open battery holder and remove batteries.
4. Install new six pieces AA batteries 1,2-1,6V.
5. Close battery holder.
6. Close display part of the flowmeter, mind the cables.
7. Tight the 4x IMBUS 4 screws.



AgrimagP

- The voltage power supply range is 9 - 35VDC.
- Maximum current consumption 20mA.
- Connection to the unit is done via CA6 connector - a part of the delivery - standard 1m.
- Maximum cable length is 20mts.
- The power supply input is protected against reverse polarity and voltage spikes.
- Each AgrimagP is equipped with 0-1000Hz frequency output proportional to actual flow.
- Standard open collector circuit.
- Max switching voltage 24VDC, max. current 50mA.
- A1":211,765 pulses/lt
  A2":52,941 pulses/lt
  A3":20,455 pulses/lt
- Colour coding:
  Brown … +U
  White … GND
  Green … OPE



External power supply
External resistor R

VDC	R1
5V	1k8
12V	3k3
24V	6k8

Keyboard Settings

On/Off

Turns the meter on, switching the meter off.

Batch Reset

Clears the Batch volume.

Batch/Total

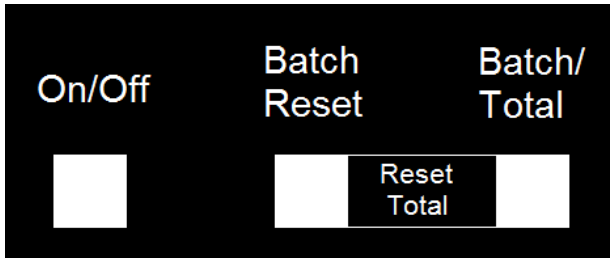
Switches between totalizers

Combination Batch Reset and Batch/Total together

Clears the Total volume.

Combination On/Off and Batch/Total together

Changes the unit of a system (l/s and USG/min, resp. litres and gallons, etc.)



Fittings

AGRIMAG SIZE		
25 mm		
PIPE CONNECTION	PART NUMBER	DESCRIPTION
Male BSP	M100BSP	1" Manifold x 1" Male BSP
Female NPT	M100050FPT	1" Manifold x 1/2" Female NPT
	M100075FPT	1" Manifold x 1" Female NPT
	M100FPT	1" Manifold x 1.1/4" Female NPT
Male NPT	M100075MPT	1" Manifold x 3/4" Male NPT
	M100MPT	1" Manifold x 1" Male NPT
	M100125MPT	1" Manifold x 1.1/4" Male NPT
Male NPT 316SS	M100MPTSS	1" Manifold x 1" Male NPT SS
Flanged Couplings	M100CPG	1" Manifold x 1" Manifold
Male QDC	M100A	1" Manifold x 1" Male QDC
Hose Barb	M100075BRB	1" Manifold x 3/4" Hose Barb
	M100BRB	1" Manifold x 1" Hose Barb
	M100125BRB	1" Manifold x 1.1/4" Hose Barb
Socket weld 316 SS	M100SWFSS	1" Manifold x 1" Socket weld fitting

Fittings

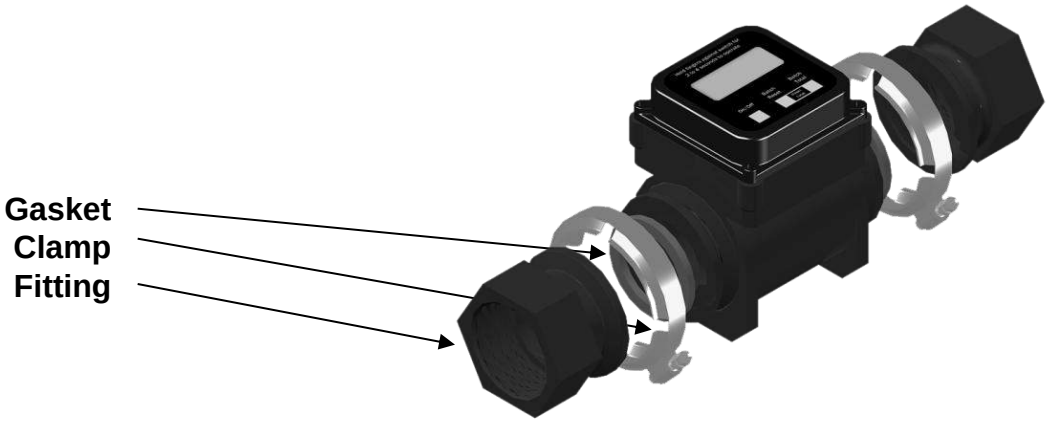
50 mm		
PIPE CONNECTION	PART NUMBER	DESCRIPTION
Male BSP	M220BSP	2" Manifold x 2" Male BSP
Female NPT	M220FPT	2" Manifold x 2" Female NPT
Male NPT	M220MPT	2" Manifold x 2" Male NPT
Male NPT 316SS	M220150MPTSS	2" Manifold x 1.1/2" Male NPT SS
	M220MPTSS	2" Manifold x 2" Male NPT SS
Flanged Couplings	M220CPG	2" Manifold x 2" Manifold
	M220CPG6	2" Manifold x 2" Manifold x 6" long
Female QDC	M220D	2" Manifold x 2" Female coupler QDC
Male QDC	M220A	2" Manifold x 2" Male QDC
Hose Barb	M220125BRB	2" Manifold x 1.1/4" Hose Barb
	M220150BRB	2" Manifold x 1.1/2" Hose Barb
	M220BRB	2" Manifold x 2" Hose Barb
Socket weld 316 SS	M220SWFSS	2" Manifold x 2" Socket weld fitting
	M220375SWFSS	2" Manifold x 2" Socket weld Fitting 3.3/4"

Fittings

80 mm		
PIPE CONNECTION	PART NUMBER	DESCRIPTION
Male BSP	M220BSP	2" Manifold x 2" Male BSP
Female NPT	M300BSP	3" Manifold x 3" Male BSP
	M300FPT	3" Manifold x 3" Female NPT
Male NPT	M300MPT	3" Manifold x 3" Male NPT
Male NPT 316SS	M300220MPTSS	3" Manifold x 2" Male NPT SS
Flanged Couplings	M300MPTSS	3" Manifold x 3" Male NPT SS
	M300CPG	3" Manifold x 3" Manifold x 4" long
Female QDC	M300CPG7	3" Manifold x 3" Manifold x 7" long
Hose Barb	M300A	3" Manifold x 3" Male QDC
	M300220BRB	3" Manifold x 2" Hose Barb
	M300BRB	3" Manifold x 3" Hose Barb
Socket weld 316 SS	M300SWFSS	3" Manifold x 3" Socket weld fitting
	M300375SWFSS	3" Manifold x 3" Socket weld Fitting 3.3/4"

Fittings

Clamps and gaskets						
	PART NUMBER	***Size 25mm***	***PART NUMBER***	***Size 50mm***	***PART NUMBER***	***Size 80mm***
Clamp	FC100	Pair	FC220	Pair	FC300	Pair
Gasket	M101G	Pair EPDM	M221G	Pair EPDM	M301G	Pair EPDM
	M100GV	Pair Viton	200GV	Pair Viton	M301GV	Pair Viton



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Example of Fitting Kit

All the fitting kits except the spare clamp pair and spare gasket pair includes:
2 fittings parts + 2 clamps + 2 gaskets.

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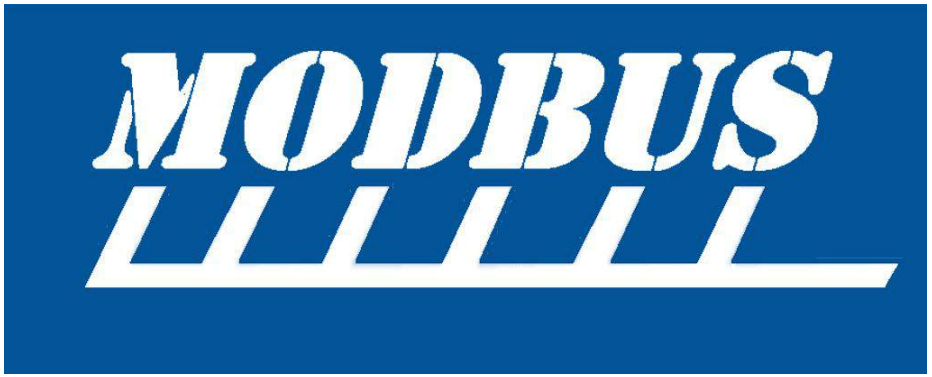
9. Modbus

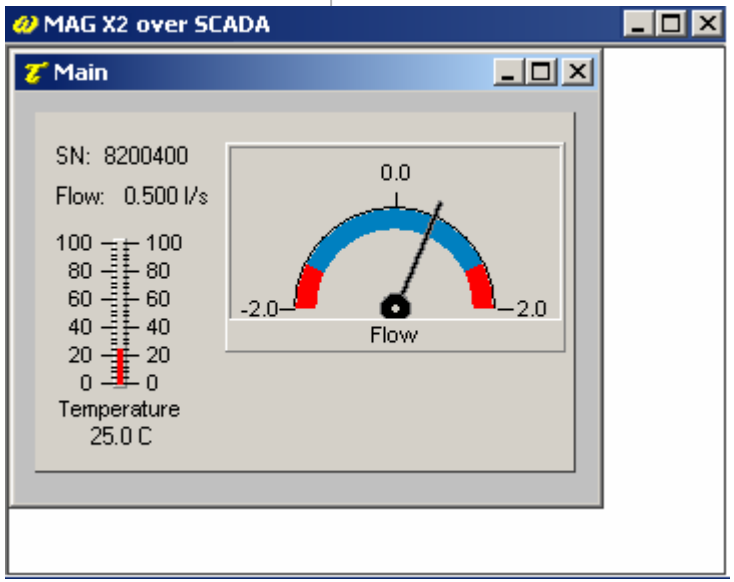


9.1. Modbus specification

ARKON Flowmeter Modbus RTU specification	
Device type	Slave
Baud rates	4800, 9600, 19200, 38400 bits/sec.
Number of stations Recommended:	max. 31 per segment without repeaters
Device address range	1-247
Protocol	Modbus RTU
Electrical interface	USB, RS232, RS485- 2 wire, TCP/IP, Bluetooth, GPRS, GSM-SMS
Supported function code	3 read holding registers
	16 write multiple registers
	17 report slave ID
Broadcast	No

Item	Value	Comments
Slave address	1-247	Device address
Baud rate	4800, 9600, 19200, 38400	Communication speed
Parity/framing	Even, 1 stopbit	Communication parameters
	Odd, 1 stopbit	
	None, 2 stopbit	
	None, 1 stopbit	
Response delay	0-255 msec.	The minimum time from when a slave receives a request and until it returns a response. This makes it possible to send data to slow masters without overwhelming its receiver.
Interframe spacing	3,5-25 chars	The minimum interframe space between two Modbus RTU messages in sequence is configurable.

9.2. MAGX2 (MAGB1) in SCADA software



SCADA SIELCO SISTEMI – WINLOG LITE

Software vs Firmware vs Modbus

General menu structure has been made and it is common for all – software, firmware and Modbus. It is divided into 6 main sections.

- **Info** show read only information about flowmeter.
- **Display** allows you to change readout units (m^3/h, l/s…).
- **User Settings** consist setting for modules, air detector, Modbus, date/time and some other settings for user.
- **Service Settings** is for deleting volume counters. (not in MAGB1)
- **Factory Settings** allows you calibration and some very important settings for measurement.
- **Authorize** is the last chance when you forget user password. (not in MAGB1)

For more information see: **www.arkon.co.uk/support**

MAGX2 software manual
MAGX2 Modbus protocol User Guide
MAGB1 User Guide

10. Maintenance

Cleaning

The flowmeter does not require any special maintenance. Dependent on the media being measured it is recommended that approx. once a year, 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.

11. Calibration

Calibrations

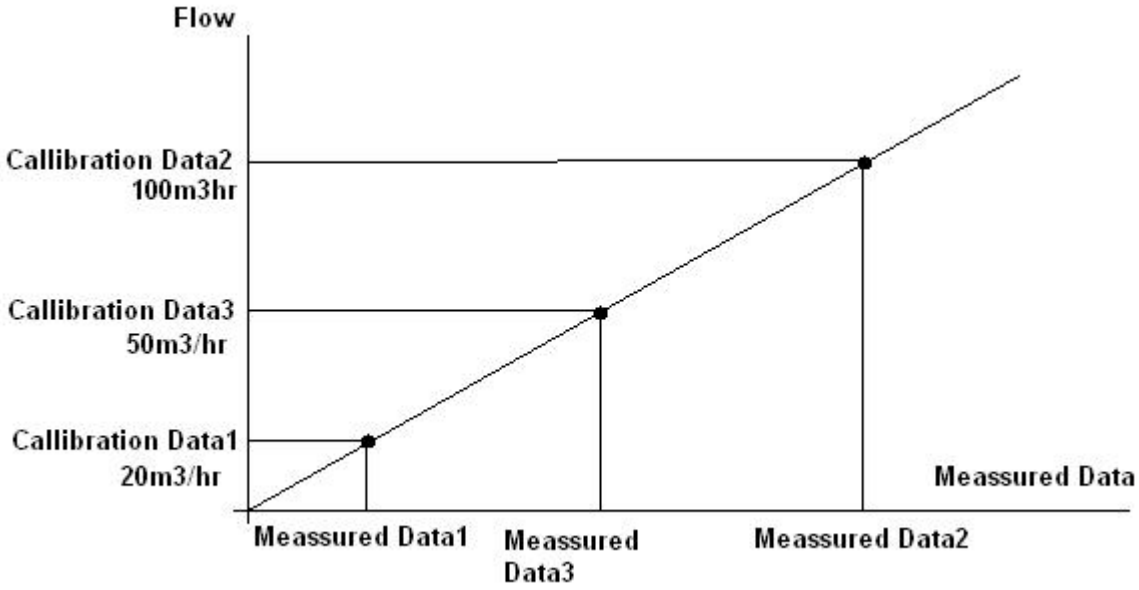
- All MAGX2, MAGB1 and MAGS1 are calibrated at one of the Czech Republic calibration laboratory facilities. All those laboratories are traceable to the main Czech national standards that are maintained in the Czech Metrology Institute (CMI). CMI is the Czech national metrology body and is traceable to international standards such as TUV Germany and Delft Netherlands.

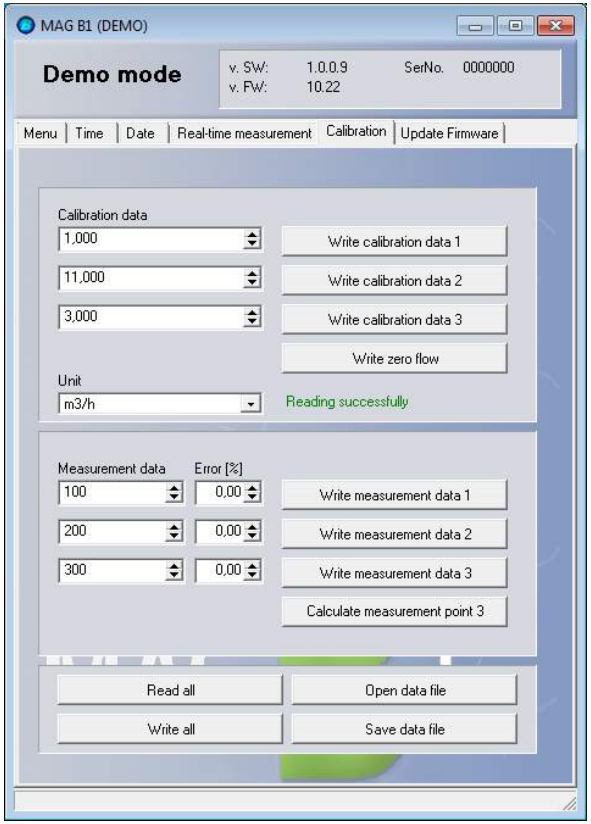
- All our flowmeters are wet calibrated, i.e. the flow rate is calibrated directly by comparison with a traceable flowmeter. If re-calibration is requested, the MAGX2, MAGB1 and MAGS1 should be recalibrated as a whole unit including the sensor. Accuracy of the flowmeter depends not only on the stability of the electronic unit, but also on the stability and mechanical changes of the liner. This is generally valid for all electromagnetic flowmeters.

- We offer a standard **3 point calibration**, on request we can offer up to a 10 point calibration at an extra cost.

- **MAGX2 and MAGB1 software** enables the entering of a measured misreading (error) during calibration directly in percentage. This simplifies the calibration making it much easier to complete.

Calibration can be done only with flowmeter connected to PC using MAGX2 and MAGB1 software.





Write calibration data button use value next to it and takes measured data (from AD conv.) from flowmeter.

Write measurement data doesn't take any data from flowmeter but writes values "manually"

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Accredited Calibration rig, Brno, Czech Republic

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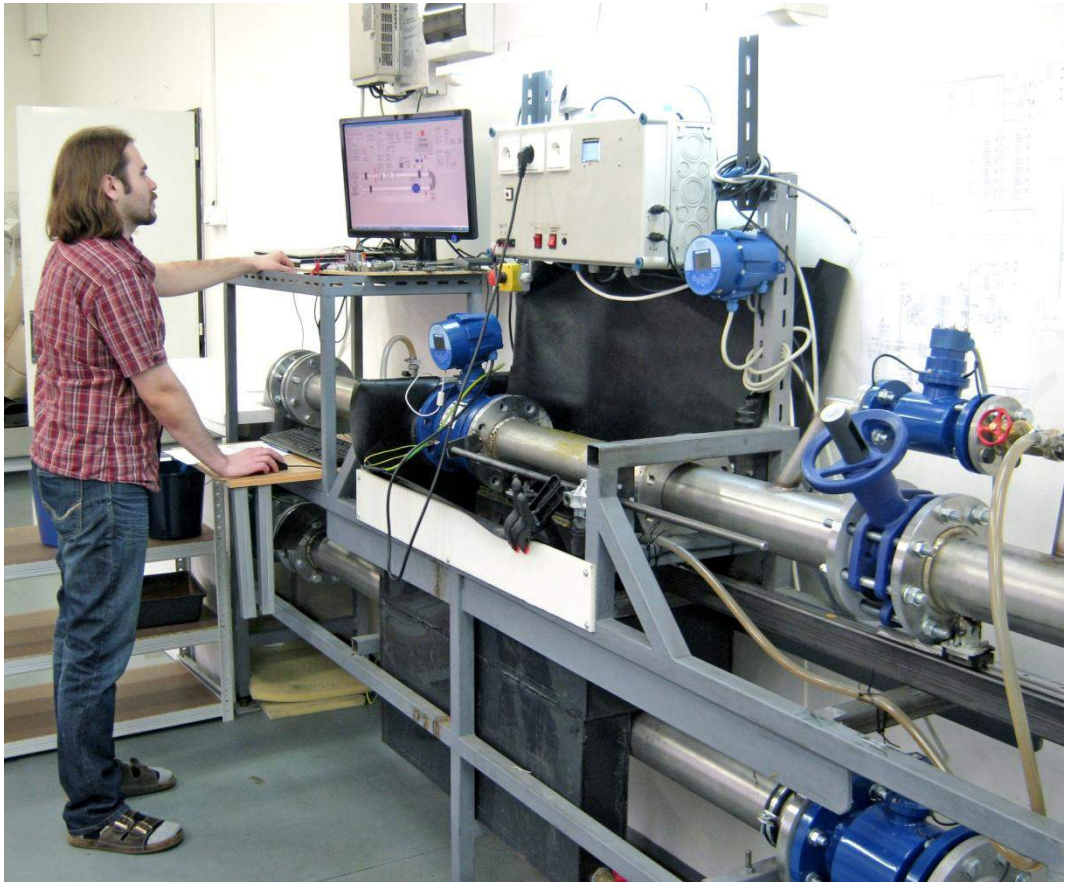


Arkon internal calibration rig Brno, Czech Republic

12. Main rules, troubleshooting, procedures

Main rules

- Any connection or disconnection of any module has to be done with network power to the meter switched off.
- For any electrical work it is necessary to disconnect the device from network power.
- Use the manuals.
- Whole flowmeter tube should be flood all the time.
- Always open transmitter with transmitter special key.
- **Double-check the wiring and module connection before powering**

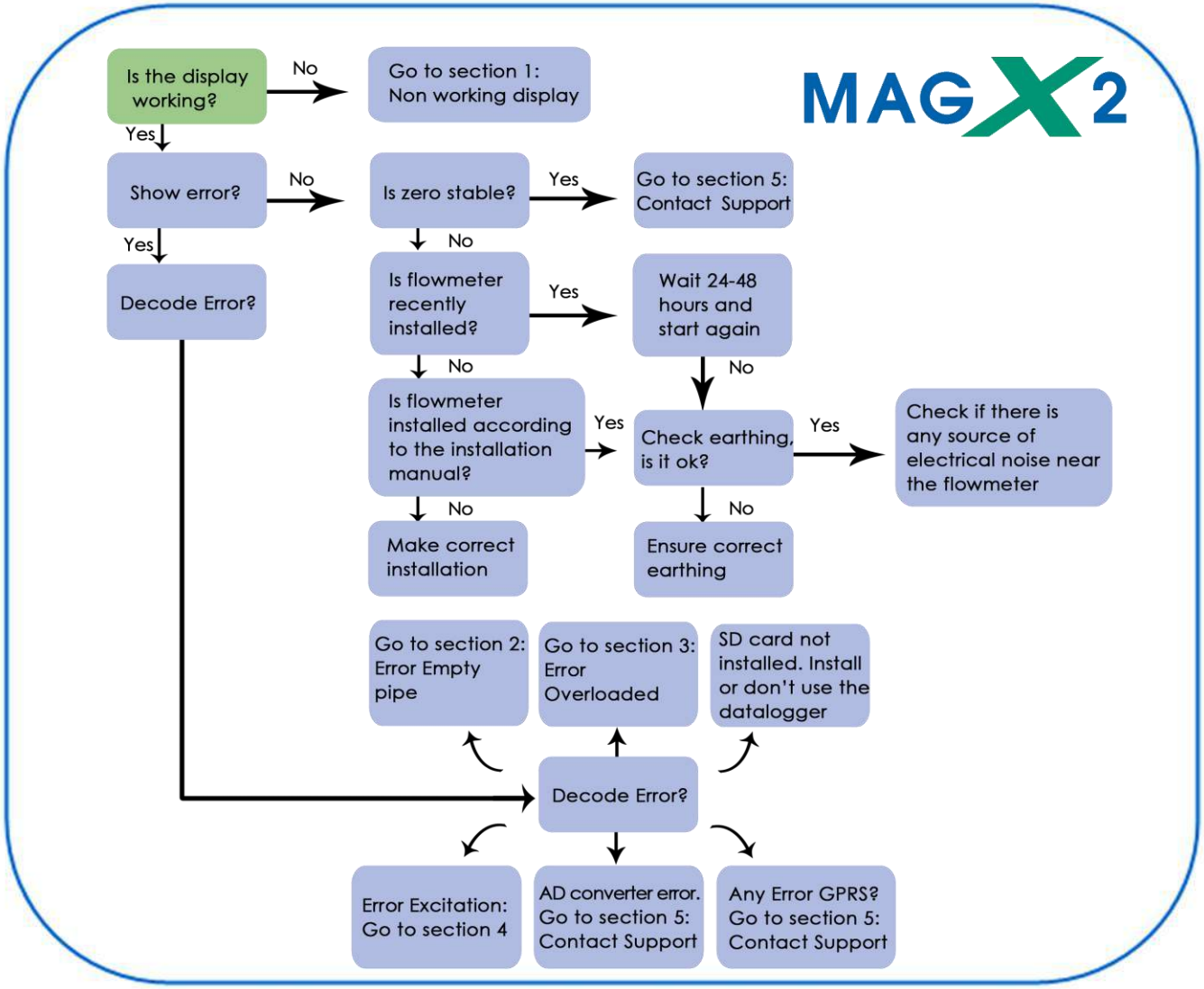
Troubleshooting

If the readings are unstable:

- Check earthing. Resistance to the ground should be less than 1 Ohm.
- For remote installation check if there is some noise source near cable or flowmeter.
- Check if flowmeter is completely flood.
- Execute self-cleaning procedure.
- Enlarge number of Samples per average in user menu.
- Make sure that flow is really stable.
- Few hours after installation readings can be unstable because liner needs to absorb some medium (i.e. water). Specially when flowmeter is dry for a long time.

Troubleshooting

MAGX2


MAGX2
Is the display working?
No
Go to section 1: Non working display
Yes
Show error?
No
Is zero stable?
Yes
Go to section 5: Contact Support
Yes
Decode Error?
No
Is flowmeter recently installed?
Yes
Wait 24-48 hours and start again
No
No
Is flowmeter installed according to the installation manual?
Yes
Check earthing, is it ok?
Yes
Check if there is any source of electrical noise near the flowmeter
No
Make correct installation
No
Ensure correct earthing
Go to section 2: Error Empty pipe
Go to section 3: Error Overloaded
SD card not installed. Install or don't use the datalogger
Decode Error?
Error Excitation: Go to section 4
AD converter error. Go to section 5: Contact Support
Any Error GPRS? Go to section 5: Contact Support

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MAG X2

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)

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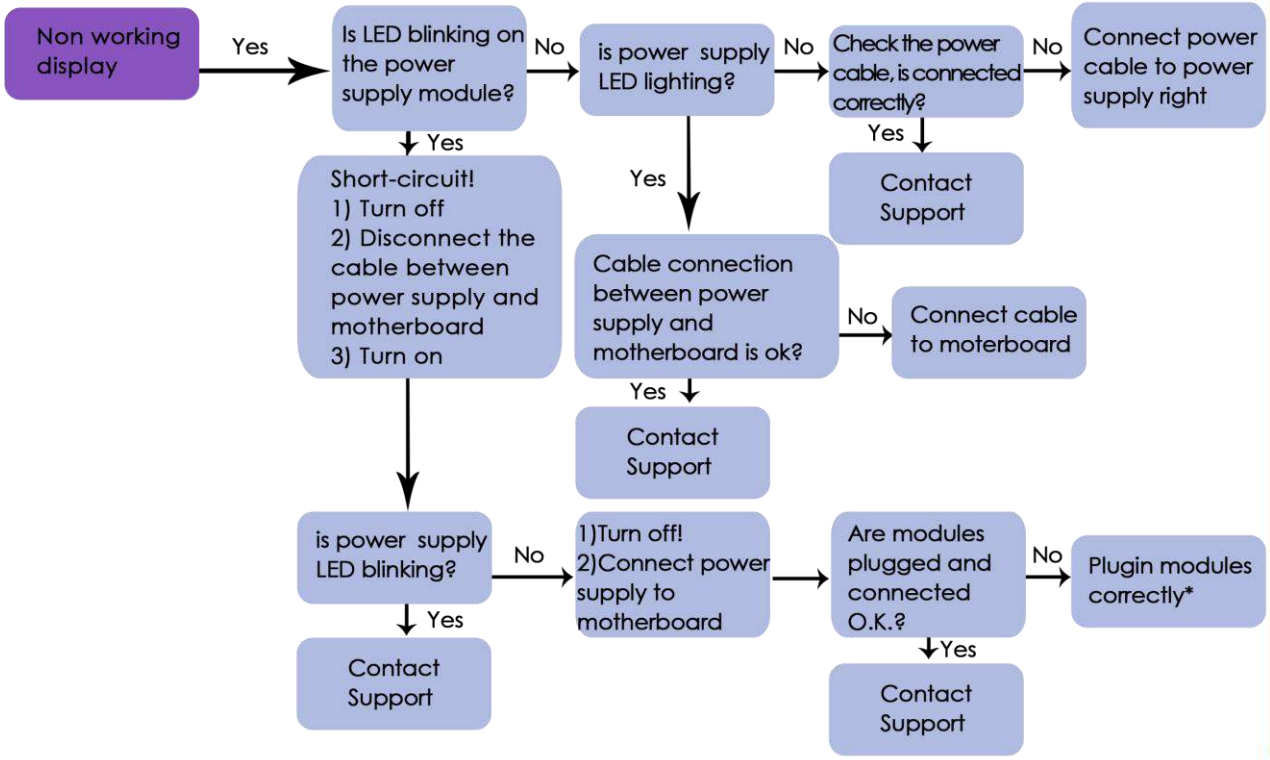
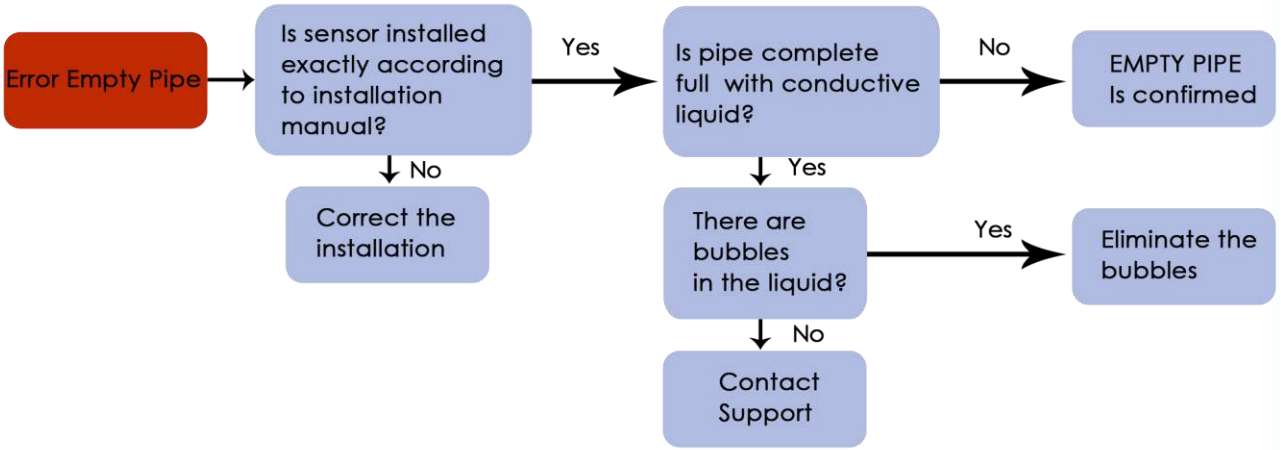
MAG X 2

Section 1: Non working display



*before switch off the flowmeter

Section 2: Empty pipe



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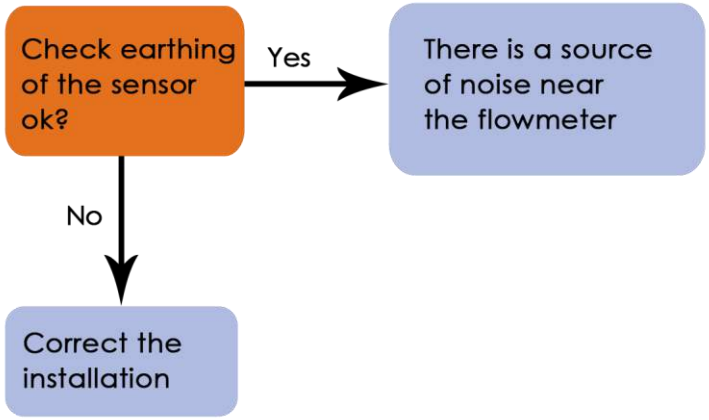
MAGX2

Section 3: Error overloaded



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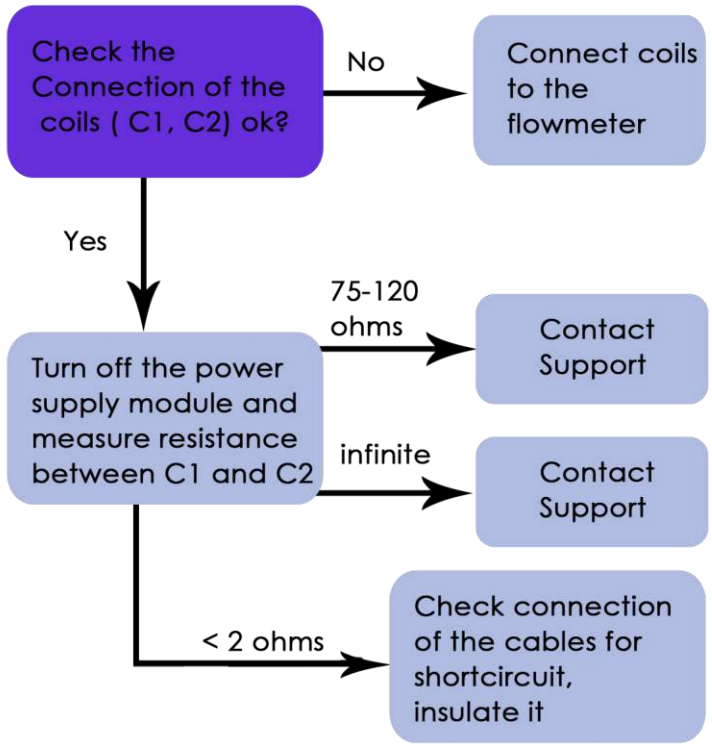
MAG X2

Section 4: Error excitation



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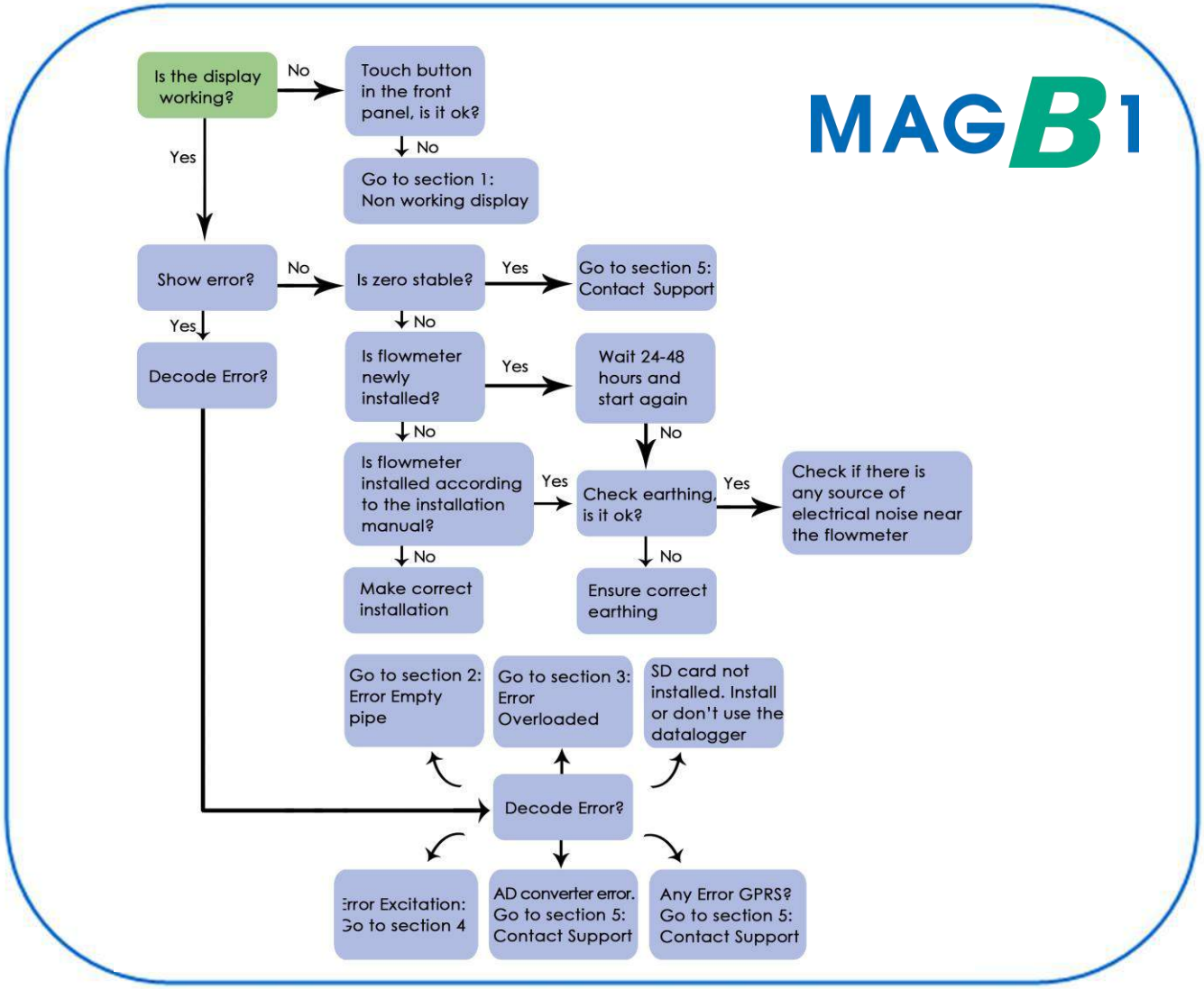
Troubleshooting

MAGB1

flow systems

MAGB1



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MAGB1

Error position	Error Description
0	Empty Pipe (Air Detect)
1	Overloaded
2	EEPROM Erase
3	EEPROM Write
4	Excitation
5	AD Converter error
6	Low Battery
7	Overload Flow
8-15	RESERVED (non-use)

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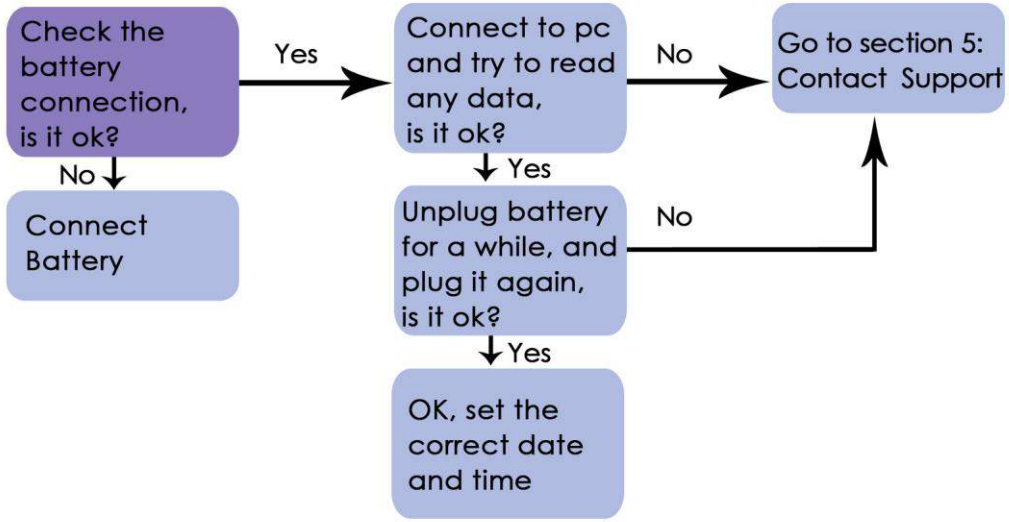
MAGB1

Section 1: Non working display

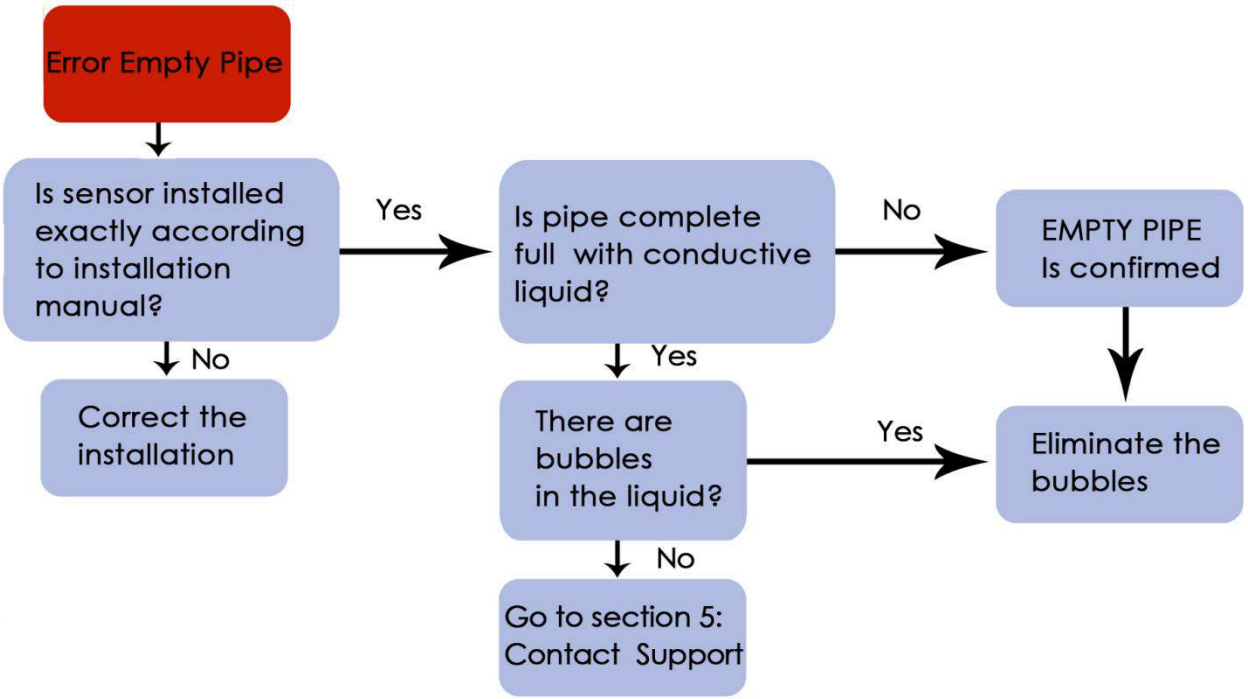


orkon

flow systems

MAGB1

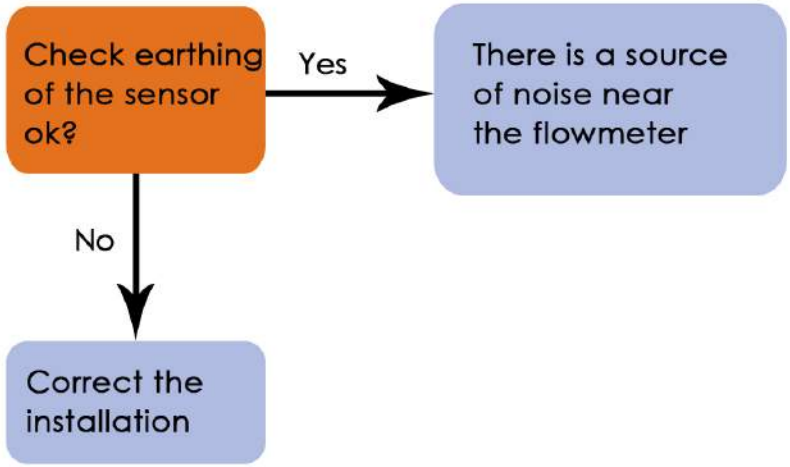
Section 2: Empty pipe



flow systems

MAGB1

Section 3: Error overloaded

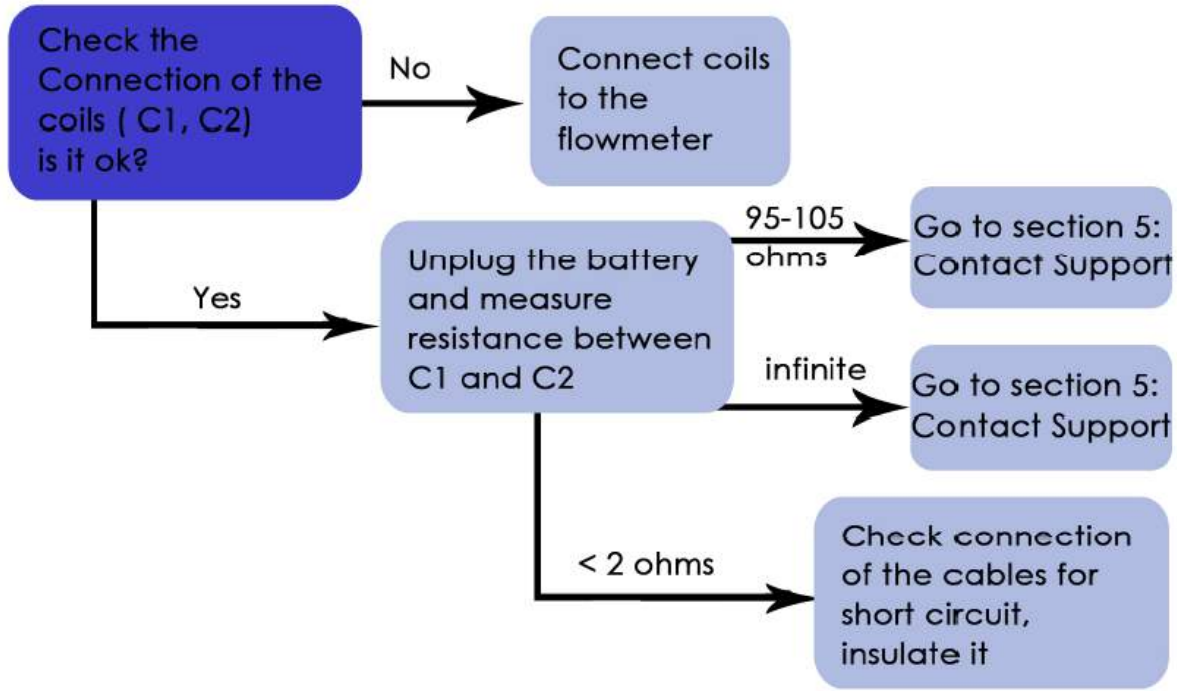


orkon

flow systems

MAGB1

Section 4: Error excitation



flow systems

MAGB1

Test No:	Check resistance:	Expected Value:	Probable cause if different value:
1	(E1 x GND) (E2 x GND) (E1 x E2)	1 kΩ to 1 MΩ With a full sensor tube > 1 MΩ With an empty sensor tube	Lower value: Short-circuit on the electrode Higher value: If the value with a full sensor tube is higher, the electrode is not connected.
2	C1 x C2 (EXCITATION)	95 to 105 Ω	Lower value: Short-circuit on the excitation coils Higher value: Disconnected or interrupted excitation.
3	C1 x GND of electrodes C2 x GND of electrodes	> 10 MΩ	Lower value: Coils not insulated from the sensor body
4	GND from electrodes x earthing screw	< 2 Ω	GND from electrodes x earthing screw

All measurement must be done within the device disconnected from battery and sensor disconnected from motherboard!

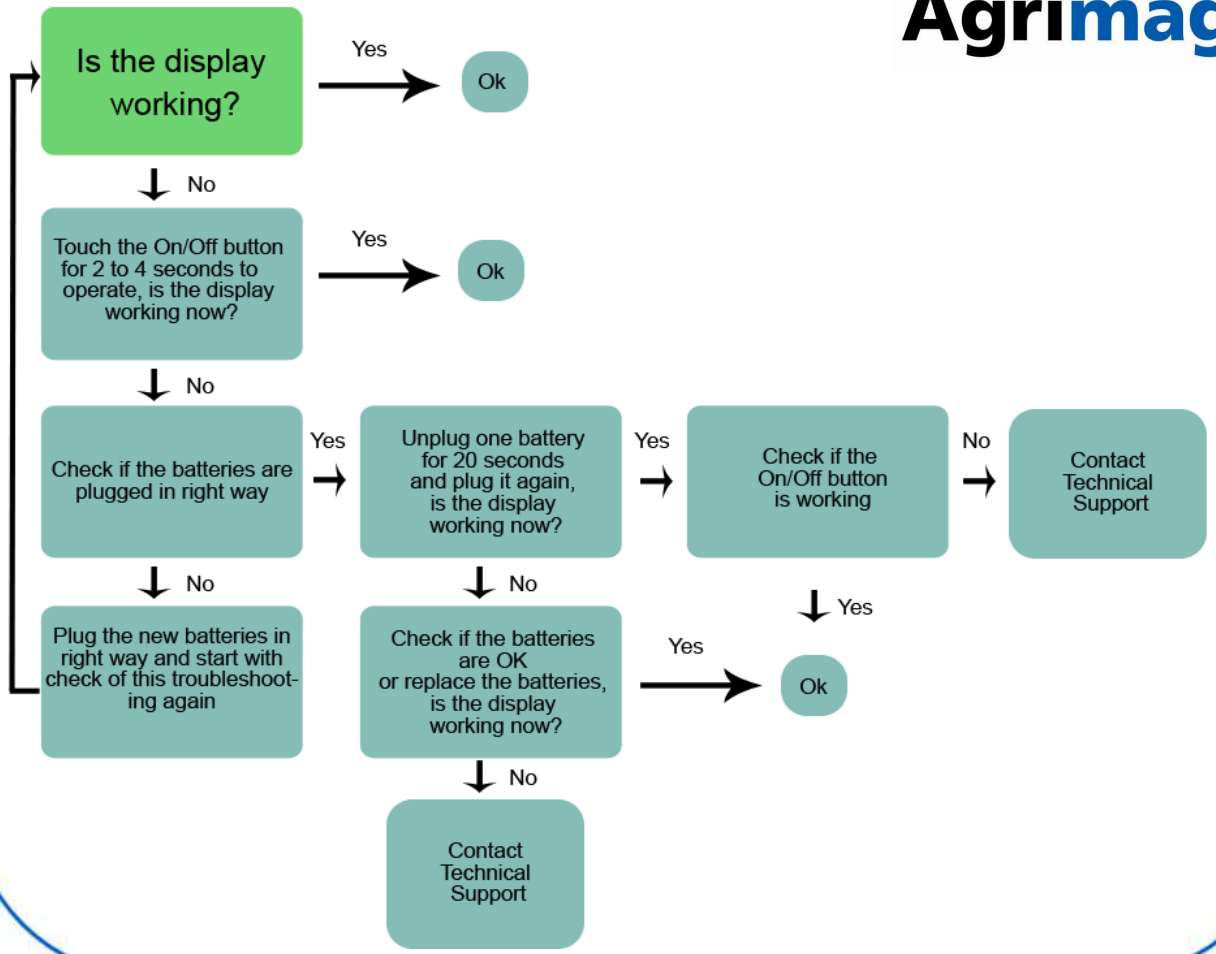
flow systems

Troubleshooting

Agrimag

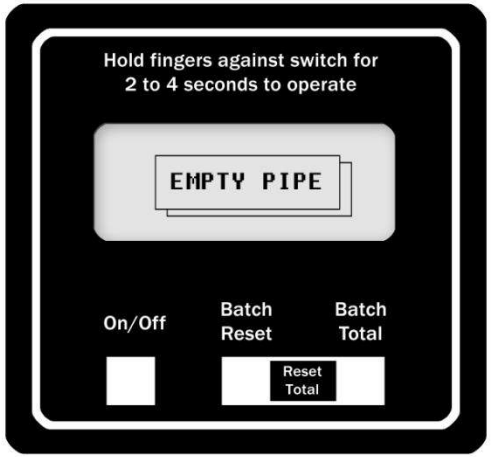
1. Non working display

Agrimag

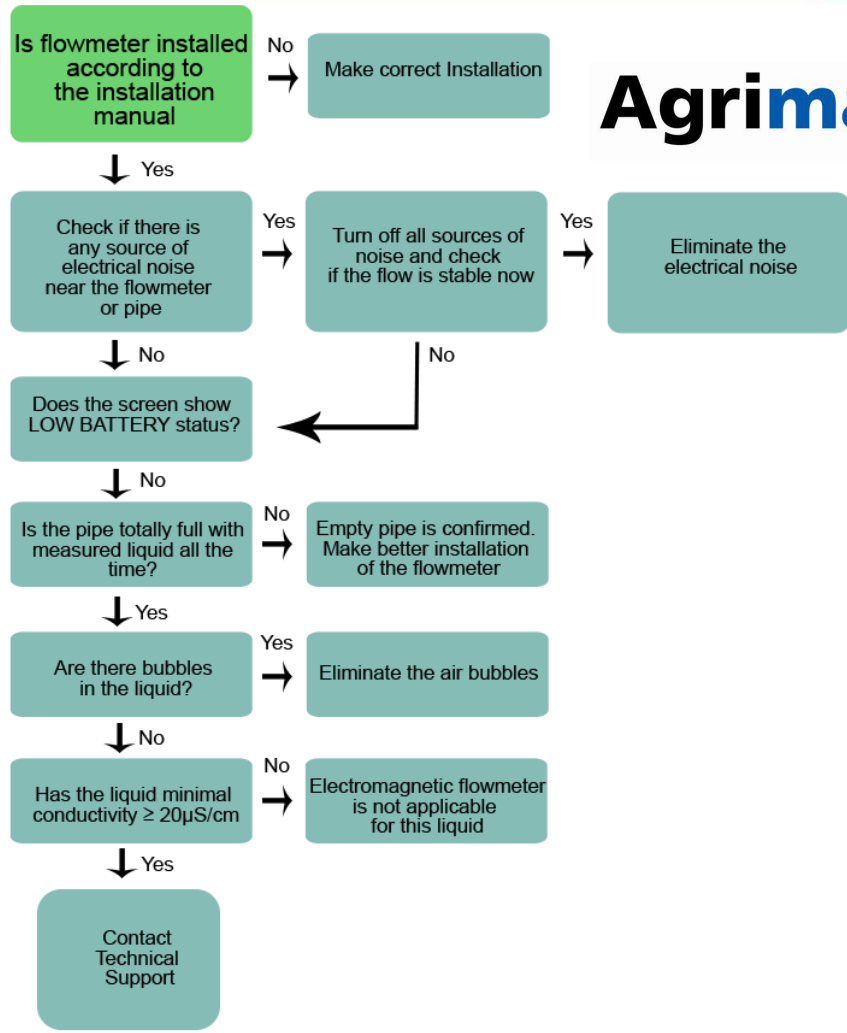


Agrimag

2. Non stable flow or Empty Pipe alam

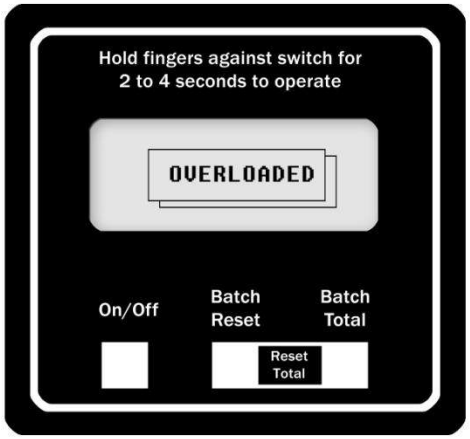


Agrimag


Is flowmeter installed according to the installation manual
No
Make correct Installation
Yes
Check if there is any source of electrical noise near the flowmeter or pipe
Yes
Turn off all sources of noise and check if the flow is stable now
Yes
Eliminate the electrical noise
No
No
Does the screen show LOW BATTERY status?
No
Is the pipe totally full with measured liquid all the time?
No
Empty pipe is confirmed. Make better installation of the flowmeter
Yes
Are there bubbles in the liquid?
Yes
Eliminate the air bubbles
No
Has the liquid minimal conductivity ≥ 20µS/cm
No
Electromagnetic flowmeter is not applicable for this liquid
Yes
Contact Technical Support

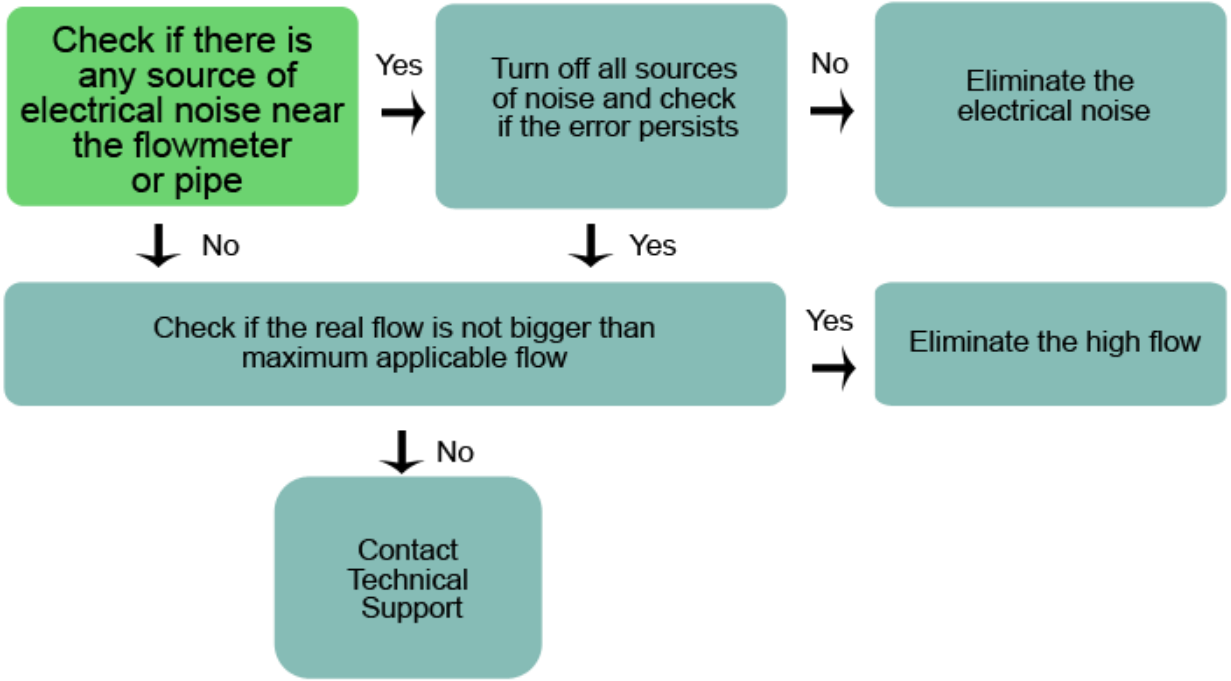
Agrimag

3. Error Overload



Agrimag

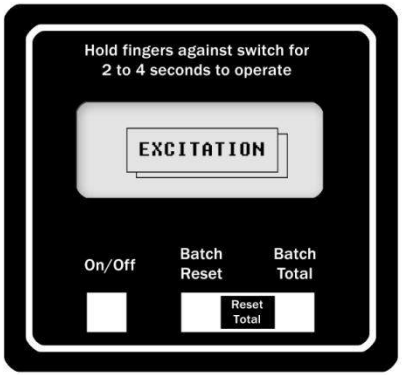
3. Error Overload



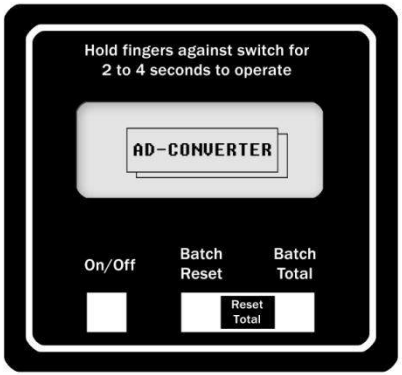
flow systems

4. Error Excitation
5. Ad-Converter
6. Low Battery

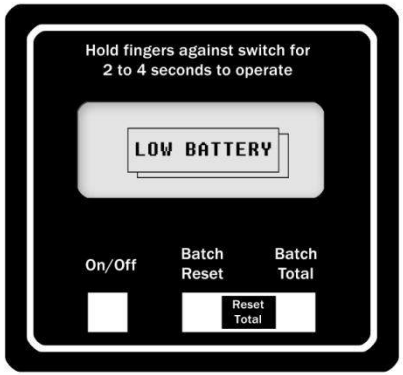
Agrimag



Contact Technical Support



Contact Technical Support



Replace the batteries and install them correctly

Procedures

P_20_Load calibration data MAGX2

P_21_Procedure Sensor Test MAGX2

P_23_Procedure Transmitter Exchange MAGX2

P_24_Procedure Service Menu Encoding MAGX2

P_25_Firmware Update MAGX2

P_26_Procedure Bluetooth Installation MAGX2

P_27_Procedure TCP-IP Installation MAGX2

P_28_Procedure GPRS Installation MAGX2

P_40_Load calibration data MAGB1

P_41_Procedure Sensor test MAGB1

P_42_Procedure Transmitter exchange MAGB1

P_43_Procedure Service Menu Encoding

P_44_Firmware Update MAGB1

www.arkon.co.uk/support

All procedures will be continuously available on the Arkon´s website during 2010.

13. Certificates

CE Certificate: MAGB1

CE Certificate : MAGS1

CE Certificate : MAGX2

WRAS Approval

CE Certificate : Agrimag

VOP-026 Šternberk, s.p.
Locality Vyškov
V. Nejedlého 651, 682 03 Vyškov, Czech Republic

CERTIFICATE
N° VTÚPV – 004 / 2012

Applicant: Arkon Flow Systems, s.r.o., Příkop 4, 602 00 Brno, Czech Republic

Product: Battery Powered Electromagnetic Flowmeter

Type: Agrimag

Manufacturer: Arkon Production, s.r.o., Borkova 334/92, 612 00 Brno, Czech Republic

Rating and principal characteristics: Voltage 9 V (6x4A Battery Powered); Weight 2 kg; Dimensions 190x150x100 cm

Test results are described in the Test Reports No.: 7240-036/2012, 7240-044/2012

The sample of tested product conforms to the EMC requirements of the following standards:

- EN 55011: 2009
- EN 61326-1: 2006

This certificate is valid until: 30.01.2015

Vyškov 30.01.2012

Milan Sendek
Certification Head

ISO Certificate

BUREAU VERITAS Certification

Certificación

Arkon Flow Systems, s.r.o.
Příkop 4, Brno
Czech Republic

Norma

ISO 9001:2008

ACTIVIDAD COMERCIAL RELACIONADA CON SUMINISTROS DE MEDIDORES DE FLUJO Y EQUIPOS DE MEDICIÓN, INCLUIDOS PROYECTOS Y DESARROLLO DE PROGRAMAS DE APLICACIÓN.

GOST Aproval certificate for Russian Market

ФЕДЕРАЛЬНОЕ АГЕНТСТВО
ПО ТЕХНИЧЕСКОМУ РЕГУЛИРОВАНИЮ И МЕТРОЛОГИИ

СЕРТИФИКАТ
об утверждении типа средств измерений

PATTERN APPROVAL CERTIFICATE
OF MEASURING INSTRUMENTS

CH.C.32.001.A № 63829

Действителен до
10 июня 2016

Настоящий сертификат удостоверяет, что на основании положительных результатов испытаний утвержден тип: Датчики измерения расхода и скорости

серия MAG

Фирма "Arkon Flow Systems, s.r.o.", Чехия

который зарегистрирован в Государственном реестре средств измерений под № 69200-11 и допущен к применению в Российской Федерации.

Описание типа средства измерений приведено в приложении к настоящему сертификату.

Заместитель Руководителя

В.Н.Кустиков

Продлен до

Заместитель Руководителя

Approval from Sultanate of Oman Ministry of Commerce and Industry

Sultanate of Oman
Ministry of Commerce and Industry

سلطنة عمان
وزارة التجارة والصناعة

شهادة تسجيل وكالة تجارية

ARKON FLOW SYSTEMS S.R.O.

Invest Easy

arkon flow systems

Technical support materials

- MAGB1 User Guide
- MAGX2 Software User Guide
- MAGX2 Firmware User Guide
- MAGX2 Modbus Protocol User Guide
- MAGS1 User Guide
- Agrimag User Guide
- Technical Procedures
- First Installation Guide and Troubleshooting
- Procedures

www.arkon.co.uk/support
Technical support (MSN, email):
support@arkon.co.uk

Arkon Flow Systems, s.r.o.

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Czech Republic

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Fax: +973-17-293654

E-mail: middle-east@arkon.co.uk

www.arkon.co.uk

Thank you for your attention

Arkon Flow Systems, s.r.o.
www.arkon.co.uk