RKmag

electromagnetic induction flow measurement with data logger
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1-WARRANTY

Products supplied by SGM LEKTRA are guaranteed for a period of 12 (twelve) months from delivery date according to the conditions specified in our sale conditions document.  
SGM LEKTRA can choose to repair or replace the Product.  
If the Product is repaired it will maintain the original warranty terms, whereas if the Product is replaced it will have 12 (twelve) months of warranty.  
The warranty will be null if the Client modifies, repair or uses the Products for other purposes than the normal conditions foreseen by instructions or Contract.  
In no circumstances shall SGM LEKTRA be liable for direct, indirect or consequential or other loss or damage whether caused by negligence on the part of the company or its employees or otherwise howsoever arising out of defective goods.

2-CALIBRATION CERTIFICATE

All the electromagnetic flowmeter are tested by 3 point rigs calibration.  
The producer releases a document on letterhead certifying the average error of the 3-point calibration.  
The calibration certificate is supplied with the unit.  
The company archives the test data of each electromagnetic flowmeter.  
The calibration rig is certificated by N.I.M. (National Institute of Metrology), which is internationally recognized by B.I.P.M. (Bureau International des Poids et Metrologie) and complies with NTC ISO IEC 17025 standard.  
All calibrations are made in accordance to EN 45001 standards and with an accuracy better than 99.97%.
3. PRODUCT

COMPACT VERSION
1. Sensor
2. Converter

REMOTE VERSION
1. Sensor
2. Connection housing
3. Connection cables
4. Converter, wall mounting

3.1 IDENTIFICATION

Each meter has an adhesive identification plate on which are the meter main data. The following picture describes the information and data on the identification plate.

<table>
<thead>
<tr>
<th>1</th>
<th>Model</th>
<th>RKMAGN0050B2B1A0A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Serial n°</td>
<td>FM005141720</td>
</tr>
<tr>
<td>3</td>
<td>Meter n°</td>
<td>032377</td>
</tr>
<tr>
<td>4</td>
<td>P.Supply</td>
<td>85÷265Vac 50÷60Hz</td>
</tr>
<tr>
<td>5</td>
<td>Connection</td>
<td>DN50</td>
</tr>
<tr>
<td>6</td>
<td>Lining</td>
<td>RUBBER</td>
</tr>
<tr>
<td>7</td>
<td>Electrode</td>
<td>SS316</td>
</tr>
<tr>
<td>8</td>
<td>Sens. Factor</td>
<td>0.2293</td>
</tr>
<tr>
<td>9</td>
<td>CE</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>QR code, connecting a product web page</td>
<td></td>
</tr>
</tbody>
</table>

1. Product code
2. Serial number
3. Production batch
4. Power supply
5. Process connection
6. Lining material
7. Electrodes material
8. Sensor factor
9. Protection
10. QR code, connecting a product web page
## 4-FEATURES

**Flow rate range**  
RKMAG is able to process signals from fluids with flow rates of up to 10m / s in both directions (bidirectional meter).

**Range dimension / lining material**  
ABS DN50 ÷ DN150

**Sensor material**  
ABS

**Housing material**  
epoxy painting aluminium

**Electrodes material**  
SS316L - Hastelloy C - Titanium - Tantalum - Platinum

**Measure range**  
<3m³/h ÷ >600m³/h

**Accuracy**  
±0,5% standard; ±0,2% optional

**Repeatability**  
±0,1%

**Fluid conductivity**  
>5μS/cm.

**Power supply**  
85÷265Vac, 24Vac/dc, 12Vdc.

**Consumption**  
6W, max. 8W.

**Ambient Temperature Limits**  
Remote version operating temperature: ABS -20 ÷ +120°C  
Compact version operating temperature: ABS -20 ÷ +75°C  
Storage temperature: -40÷85°C

**Communication protocol**  
Modbus RTU or Bluetooth App Android (opt.) or Hart (opt.)

**Data Logger**  
Internal data logger to USB pen drive for flow measurements and analog inputs storing;  
the measurement storage interval can be set from 15 to 3600 seconds

**Output**  
4÷20mA: 0÷500Ω  
Frequency output: 0,1÷10000 Hz  
Pulse output: 24Vdc galvanically isolated or open collector galvanically isolated 24V 20mA (opt)  
Alarm output: 2 relays, 3A 230Vac N.O.

**Input signals**  
RKMAG has 2 active analog inputs at 24Vdc for 2-wire transmitters connection (eg. Temperature or pressure) and 1 digital input for an external contact connection for the integrated batch function restart and for partial totalizer management.

**Reverse Flow**  
Allows measure and totalization of reverse flow.

**Output Testing**  
Relays output: Transmitter can switch relays at testing value.  
Current Source: Transmitter can be commanded to supply a specified test current between 4.0 and 20.0 mA.  
Frequency Source: Transmitter can be commanded to supply a specified test frequency between 1 and 10000 Hz.

**Low Flow Cutoff**  
Adjustable. Below selected value, instantaneous flow and outputs are driven to the zero flow rate signal level.

**Humidity Limits**  
0-100% RH to 150 °F (65 °C), not condensing.

**Damping**  
Adjustable between 1 and 99 seconds.

**Compact version IP rating**  
IP67

**Remote version IP rating**  
sensor IP67 / IP68 (by request) - converter IP67

**Anti-condensation filter**  
Anti-condensation filter installed on converter

---

```
# Flow rate range
RKMAG is able to process signals from fluids with flow rates of up to 10m / s in both directions (bidirectional meter).

# Range dimension / lining material
ABS DN50 ÷ DN150

# Sensor material
ABS

# Housing material
epoxy painting aluminium

# Electrodes material
SS316L - Hastelloy C - Titanium - Tantalum - Platinum

# Measure range
<3m³/h ÷ >600m³/h

# Accuracy
±0,5% standard; ±0,2% optional

# Repeatability
±0,1%

# Fluid conductivity
>5μS/cm.

# Power supply
85÷265Vac, 24Vac/dc, 12Vdc.

# Consumption
6W, max. 8W.

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Remote version operating temperature: ABS -20 ÷ +120°C  
Compact version operating temperature: ABS -20 ÷ +75°C  
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Modbus RTU or Bluetooth App Android (opt.) or Hart (opt.)

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Current Source: Transmitter can be commanded to supply a specified test current between 4.0 and 20.0 mA.  
Frequency Source: Transmitter can be commanded to supply a specified test frequency between 1 and 10000 Hz.

# Low Flow Cutoff
Adjustable. Below selected value, instantaneous flow and outputs are driven to the zero flow rate signal level.

# Humidity Limits
0-100% RH to 150 °F (65 °C), not condensing.

# Damping
Adjustable between 1 and 99 seconds.

# Compact version IP rating
IP67

# Remote version IP rating
sensor IP67 / IP68 (by request) - converter IP67

# Anti-condensation filter
Anti-condensation filter installed on converter
```
5-FLOW RANGE

5.1 FLOW RANGE GRAPHIC

Flow range from DN3 to DN500 (starting from DN10)
5.2 FLOW RANGE TABLES

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>Range: Minimum (0.5 m/s) / Maximum (10 m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3 ÷ 66 m³/h</td>
</tr>
<tr>
<td>80</td>
<td>8.9 ÷ 180 m³/h</td>
</tr>
<tr>
<td>100</td>
<td>11 ÷ 282 m³/h</td>
</tr>
<tr>
<td>150</td>
<td>30 ÷ 600 m³/h</td>
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</tbody>
</table>

5.3 LOAD LOSS

Adaptation cones
6-DIMENSIONS

6.1 REMOTE VERSION CONVERTER

6.2 WALL MOUNTING REMOTE VERSION CONVERTER
### 6.3 COMPACT VERSION DN50 ÷ DN150 PN16

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>L (mm)</th>
<th>ØA (mm)</th>
<th>ØB (mm)</th>
<th>E (mm)</th>
<th>D (mm)</th>
<th>N-ØL (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>200</td>
<td>165</td>
<td>125</td>
<td>150</td>
<td>340</td>
<td>4-Ø18</td>
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<tr>
<td>80</td>
<td>200</td>
<td>200</td>
<td>160</td>
<td>185</td>
<td>370</td>
<td>8-Ø18</td>
</tr>
<tr>
<td>100</td>
<td>250</td>
<td>220</td>
<td>180</td>
<td>205</td>
<td>385</td>
<td>8-Ø18</td>
</tr>
<tr>
<td>150</td>
<td>300</td>
<td>285</td>
<td>240</td>
<td>285</td>
<td>500</td>
<td>8-Ø22</td>
</tr>
</tbody>
</table>
6.5 REMOTE VERSION DN50 ÷ DN150

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>L (mm)</th>
<th>ØA (mm)</th>
<th>ØB (mm)</th>
<th>E (mm)</th>
<th>D (mm)</th>
<th>N-ØL (mm)</th>
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</thead>
<tbody>
<tr>
<td>50</td>
<td>200</td>
<td>165</td>
<td>125</td>
<td>150</td>
<td>275</td>
<td>4-Ø18</td>
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<tr>
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<td>250</td>
<td>220</td>
<td>180</td>
<td>205</td>
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<td>8-Ø18</td>
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<tr>
<td>150</td>
<td>300</td>
<td>285</td>
<td>240</td>
<td>285</td>
<td>435</td>
<td>8-Ø22</td>
</tr>
</tbody>
</table>
7-INSTALLATION

7.1 SAFETY MEASURE

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol. Please refer to the following safety messages before performing an operation preceded by this symbol.

7.2 WARNINGS

7.2.1 Explosions could result in death or serious injury
- Verify that the operating atmosphere of the sensor pipe and transmitter is consistent with the appropriate hazardous locations certifications.
- Do not remove the transmitter cover in explosive atmospheres when the circuit is alive.

7.2.2 Failure to follow safe installation and servicing guidelines could result in death or serious injury
- Make sure only qualified personnel perform the installation.
- Do not perform any service other than those contained in this manual unless qualified.

7.2.3 High voltage that may be present on leads could cause electrical shock
- Avoid contact with leads and terminals.

7.3 PRE-INSTALLATION

There are several pre-installation steps that make the installation process easier. They include identifying the options and configurations that apply to your application, setting the hardware switches if necessary, and consideration of mechanical, electrical, and environmental requirements. Please remember that the sensor pipe liner is vulnerable to handling damage. Never place anything through the sensor pipe for the purpose of lifting or gaining leverage. Damaged liner can render the sensor pipe useless.

7.3.1 Identify Options and Configurations

Standard application of the RKMAG includes control of the sensor pipe coils and one or more of the following configurations or options:
- 4÷20mA output
- Pulse output
- Alarm output
- Data logger

Be sure to identify the options and configurations that apply to your situation, and keep a list of them nearby during the installation and configuration procedures.

7.3.2 Mechanical Considerations

The mounting site for the RKMAG Integral Mount Transmitter should provide enough room for secure mounting, easy access to the conduit ports, full opening of the transmitter covers, and easy readability of the local operator interface (LOI) screen. The LOI can be rotated in 90° increments.

7.3.3 Lift

The flowmeter can be lifted using the lift as shown in following pictures. The safe load and measure for the lift should reach to the relative requirement. Don’t lift the flowmeter using the rope to tie the connection between the sensor and the transmitter (compact version) or the connecting box (remote version).
7.4 INSTALLATION GENERAL CRITERIA
The flowmeter can test automatically flow direction. Because the direction arrow marked on the nameplate is flow direction when calibrated in factory, you should install the flowmeter to make the actual flow direction same as the flow direction arrow marked on the nameplate. If this is not possible, simply reverse the direct flow direction through the “Indication” (see par. 10.4.3.4.1)
Because of RKmag particular inner shape the mounting of the unit requires no straight pipe lengths before and after the meter.

7.5 INSTALLATION IN PIPELINE
Installation may be horizontal or vertical, but make sure no deposit on the electrodes when horizontal installation. See Fig.13-A.

Fig.13-A. Installation in horizontal or vertical pipeline

Install the instrument in a straight pipe section. See fig.13-B.

Fig.13-B.
The electromagnetic flowmeter must be installed so that the pipe is always completely filled with fluid. In partially filled pipe case, the flowmeter must be installed with the siphon phenomenon, for which the pipe stretch where the meter is installed is kept always full. See Fig.14-A.

Fig.14-A Installation in partially filled pipes

The electromagnetic flowmeter must not be installed in the pipe section with a free pipe outlet that could run empty. When installing in a downstream pipe, please make sure the pipe is always fully filled with medium. See Fig.14-B.

Fig.14-B Installation in pipe without emptying
The electromagnetic flowmeter can not be installed at the pipe highest point, because air or gas accumulations may occur in the measuring pipe. See Fig.15-A

![Fig.15-A Installation at highest point](image)

The electromagnetic flowmeter can not be installed upstream of a pump to prevent cavitation, which can damage the sensor lining. See Fig.15-B

![Fig.15-B Pump proximity installation](image)

Install a siphon (a) with a vent valve (b) downstream of the sensor in down pipes longer than 5 meters. This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. See Fig.15-C

![Fig.15-C Installation in proximity of a > 5m down pipe section](image)
7.6 INSTALLATION PRECAUTIONS

An all-weather cover should be used to prevent the housing from the direct sunlight or rain when the device is outdoors. The flowmeter should be placed away from excessive vibrations, large ambient temperature changes, and long-time showers. It should be protected from the leakage of corrosive liquids.

7.7 PIPE CONNECTION

The sensor should be supported by the connecting pipes, as it cannot withstand its own weight. Mechanical and thermal stress must be avoided.
7.8 MOUNTING REQUIREMENTS

a) The sensor pipe and the line pipes must have the same axis. For the sensors under DN50, the axial difference between the measuring tube and operating pipe should be less than 1.5mm for the sensors from DN80 to DN150.

b) The gasket between flanges should have a good corrosive resistance. The gasket must not extend to the pipe inside.

c) Bolt threads and nuts should be in good condition. Bolts should be tightened at the recommended torque as shown in the following table.

<table>
<thead>
<tr>
<th>DN</th>
<th>Recommended Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 80 / 100</td>
<td>35Nm</td>
</tr>
<tr>
<td>150</td>
<td>55Nm</td>
</tr>
</tbody>
</table>

d) Bolts and nuts should be tightened at 180°, tighten sequence is shown as follow.

e) Caution: avoid warming of pipe coating due to welding or flame cut of pipe. For submerged installation, the electrical connection enclosure must be sealed with protective resin (IP68 version).

7.9 PREPARATION FOR OPERATION

Strictly check the instalment and wirings before it gets into operation!

It shall be pointed out that the instrument, including the sensor and converter has been fully adjusted, calibrated with actual flow, and inspected under strict measures. All the units are certified. No further adjustments are required when put it into operation. Observing the contents in this manual, to check and analyze any malfunction

The following steps are to be followed to get the instrument into operation.

1) Make sure that the sensor is completely filled with fluid.

2) Turn the power supply ON. After approx. one minute, the display will show a value which indicates that the wire connection is correct. If the flow value is negative, it can be adjusted.

3) Zero verification. Shut off the valve tight in downstream first and then the valve in upstream, to let the liquid stops to flow in the pipeline. The displayed value should be 0. The value displayed can be corrected at the converter if the value is different than 0.

7.10 MAINTENANCE

Generally, no extraordinary maintenance is needed on magnetic flowmeter. Only in case the product can adhere to the inner wall of the sensor, and its electrodes, it is necessary to perform periodic cleaning operations.

Be careful not to damage the lining and the electrodes.
8.1 **CABLE ENTRY**
The compact version converter enclosure has n. 2 M20x1.5 cable glands.
The converter enclosure remote version has n.2 M20x1.5 cable glands for power supply and outputs signal, and 2 M16x1.5 cable glands for sensor pipe connection.

8.2 **ELECTRICAL CONNECTION REQUIREMENTS**
Before making the electrical connections, consider the following standards and be sure to have the correct power supply, ducts and other accessories.

8.2.1 **Power supply voltage**
RKMAG transmitter is designed to be powered with 85 ÷ 265Vac (50 to 60 Hz), 24Vac/dc, 12Vdc voltage.

8.2.2 **Power supply voltage interruption**
Power supply wires must be connected to the device via a circuit breaker or an external disconnecting switch. The switch or circuit breaker should be clearly labeled and located close to the transmitter.

8.2.3 **Infiltration and humidity prevention**
To avoid the humidity infiltration inside the converter and sensor pipe is recommended:
- fully well tighten the cap and the cable glands
- position the cable so that it forms a downward curve at the M20x1.5 and/or M16x1.5 output (see below figure); in this way the condensation and/or rain water will tend to drip from the curve bottom.

8.3 **POWER CONNECTION**
To connect the power supply to the meter, complete the following steps:
1) Open the box connections cover.
2) Insert the power supply cable through the cable gland.
3) Follow the sequent list to connect the power supply cable:
   **AC Units:**
   - Connect the GND grounding terminal
   - Connect the wire to terminal N.
   - Connect the phase to terminal L.
   **DC Units:**
   - Connect the GND grounding terminal
   - Connect + 24Vdc or 12Vdc to terminal L (+).
   - Connect 0V to terminal N (-).
8.4 Dip-Switch configuration

For the RKMAG flowmeter proper operation, the dip-switch relative to the interface connection to the external diagnostic unit must be set to “ON” as shown in the following drawing.

![Dip-Switch configuration diagram](image)

8.5 OUTPUT

To connect the analog and/or impulsive output follow the instructions of the following points.

8.5.1 Analog output

The current output is powered from the transmitter. The circuit resistance must be equal to or less than 500 ohm.

Follow the below steps to connect the signal cable to the transmitter:
1) Insert the signal cable through the cable gland.
2) Connect the two wires to I+ and I- terminals.

The below drawing shows the connection diagram between the RKMAG flowmeter and SLM2XH3 flow totalizer unit.

![Connection diagram](image)
8.5.2 Digital output

When digital output is set in frequency mode, it generates an 0.1÷10000Hz output signal proportional to the measured flow rate; however if it's set in pulsed mode generates an output signal in relation to the totalized volume increase. The signal is normally used in combination with an external totalizer, a pulse counter or an acquisition system. The resistance in the circuit must be equal to or greater than 100Kohms.

Follow the below steps to connect the signal cable to the transmitter:
1) Insert signal cable through the cable gland.
2) Connect two wires to F/P+ and F/P- terminals

N.B. - When the RKMAG pulse output is connected to an acquisition system that requires a current higher than 11mA, a properly sized pull-up resistor must be connected to ensure the minimum current required by the acquisition system connected (see drawing below); example: if the acquisition system requires a min. current of 15mA, a 1,6 Kohm pull-up resistor must be connected (according to the calculation R = V / I = 24V / 15mA = 1,6Kohm) between an external power supply of 24 Vdc and the acquisition system input terminal

The below drawing shows the connection diagram between the RKMAG flowmeter and the 199-B1X counter unit.
8.5.3 Alarm output

Follow the below steps to connect the signal cable to the transmitter:
1) Insert the signal cable through cable gland.
2) Connect two wires to RL1, for the #1 alarm threshold, and RL2 terminals for #2 alarm threshold.

The below drawing shows the connection diagram between the RKMAG flowmeter and the 199-B2X multifunction counter unit.
8.5.4 RS485 serial output
Communicate via MODBUS RTU is possible in models with RS485 serial port.
Connect the serial cable to A+ and B- terminals

The below drawing shows connection example diagram between RKMAG flowmeter and a PC.
8.6 INPUTS

8.6.1 AN1 and AN2 analog inputs

The two analogue current inputs have a 100ohm input impedance.
To connect the signal cable to the transmitter, follow the steps below:
1) Insert the signal cable through the cable gland.
2) Connect the two wires to AN1 + and AN1- (or AN2 + and AN2-)

In the drawing below it shows the wiring diagram of the flow meter “RKMAG” and the pressure transmitter “KPT”.

![Diagram showing electrical connections of RKMAG and KPT](image-url)
8.6.2 AN1 and AN2 analog active inputs

The two analog current inputs have a 100ohm input impedance. To connect the signal cable to the transmitter, follow the steps below:

1) Insert the signal cable through the cable gland.
2) Connect the two wires to AN1- and 0V (or AN2- and 0V)

In the drawing below it shows the wiring diagram of the flow meter “RKMAG” and an active 4÷20mA transmitter.
8.6.3 D.I. digital input
The “D.I.” optically isolated digital input can be driven by a normally open contact, with a minimum voltage of 10Vdc up to a maximum of 26Vdc. Closing the contact as “DI” terminals, the batch counter will be reset and the RL1 output will again be energized with closed contact. N.B. - The batch counter can be reset only when its value is equal or greater than the threshold set (see “BATCH” parameter). Activing the partial totalizer function (PARTIAL TOT), it is possible, closing the contact, in order: start, stop and reset the counting.
8.7 REMOTE VERSION

During the remote version installation comply with the following information to ensure correct measurements:
1) The cables must be as short as possible, especially with low conductivity fluids.
2) The cables should be far from electrical machinery and switching devices such as contactors or solenoid valves.
3) The cables must not be in conduit with power cables or cables for the switching devices control.
4) When necessary, ensure the equipotential between sensor and transmitter.
5) The maximum cable length is a fluid conductivity function. Refer to paragraph 8.7.2.

Connect the sensor to the converter according to the below diagram.
8.7.1 Remote version wiring

<table>
<thead>
<tr>
<th>Cable</th>
<th>Wire</th>
<th>Function</th>
<th>Terminal position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar</td>
<td>4</td>
<td>black</td>
<td>coil</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>brown</td>
<td>coil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>braid</td>
<td>shield</td>
</tr>
<tr>
<td>Tripolar</td>
<td>1</td>
<td>white</td>
<td>electrode</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>yell./green</td>
<td>common GND</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>brown</td>
<td>electrode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>braid</td>
<td>shield</td>
</tr>
</tbody>
</table>

8.7.2 Connecting cables length

Maximum length of the connecting cables between the sensor and the convertor is determined by the fluid conductivity value.

In the graph below the gray highlighted area indicates the allowed cable length in relation to the fluid conductivity value. With an 150 microS fluid conductivity, for example, the connection cables will have a maximum length of 150 meters.
### 8.7.3 Connectiong cables

#### 8.7.3.1 - Coil cable technical specification

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#### 8.7.3.2 - Electrodes signal cable technical specification

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<tr>
<td>Conductors electrical resistance</td>
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<tr>
<td>Reference Standards</td>
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</tbody>
</table>
9-LOCAL OPERATOR INTERFACE (LOI)

LOI is an operator communications center for the RKMAG. Through the LOI, the operator can access any transmitter function for changing configuration parameter settings, checking totalized values, or other functions.

9.1 SAFETY MESSAGES
Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol. Please refer to the following safety messages before performing an operation preceded by this symbol: ⚠️

9.2 WARNINGS
Explosions could result in death or serious injury
-Verify that the area of installation and operation comply with the characteristics of the measuring tube and the transmitter.
-Make sure only qualified personnel perform the installation.
-Do not perform any service other than those contained in this manual unless qualified.

High voltage that may be present on leads could cause electrical shock
-Avoid contact with leads and terminals.

9.3 LOI Features
The LOI has the VL701 program module has 4 buttons which allow to perform all operational, control and programming instrument functions.

In the configuration menus, is possible:

1. Submenus and parameters access; press \( \text{CF} \) to select and press \( \text{ENT} \) to access.
2. Parameter options choice: press \( \text{CF} \) to select the option and press \( \text{ENT} \) to store the option. Press \( \text{ENT} \) to exit without saving.
3. Configure the parameter values; in some parameters the configuration is done by setting a value (eg, in the MAX FLOW parameter is possible to change the number):
   - press \( \text{CF} \) to select the digit to be modified (the digit is highlighted in inverse), press \( \text{ENT} \)
   - to change the highlighted digits number, press \( \text{ENT} \)
   - save the set value and exit automatically. Press \( \text{ENT} \) to exit without saving.
9.4 VL701 DISPLAY MODULE

The VL701 programming module can be mounted and removed from the RKMAG without affecting the unit operation. Unscrewing the cover, the VL701 module can be mounted (by clockwise rotation until it clicks) or dismounted (by rotation counterclockwise) as shown in figure.

9.5 DISPLAY ROTATION

If it is necessary the display can be rotated, as indicated in the following procedure:

1. Disconnect power supply from transmitter.
2. Unscrew the transparent cover.
3. Remove the two screws that secure the “display/electronics” bracket to the container, paying attention to the wiring between the electronics and the terminal.
4. Rotate the display / electronics bracket to set the position (minimum 90° rotation).
5. Tighten the two screws that secure the “display/electronics” bracket to the container.
6. Tighten the transparent cover.
9.6 DATA LOGGER USB PORT
To access the USB port it is necessary to dismount the VL701 module display (see par. 9.4). The USB port is used to connect the pen drive, necessary for the internal data logger functioning.
9.7 CONVERTER ROTATION

To a greater functionality and adaptation to the application the entire converter, in addition to the display, can be rotated. By following the below steps:

⚠ Disconnect the power supply voltage
1. Remove the four screws that secure the converter to the sensor pipe.
2. Slightly lift the converter paying attention to the electrical connections between the sensor pipe and the terminal.
3. Turn the converter (minimum 90° rotation) bringing it to the desired position.
4. Fix the converter to the sensor with the 4 fixing screws.
10-PROGRAMMING

10.1 DATA ENTRY
The LOI keypad has no numerical keys. Enter numerical data using the following procedure:
1. Access the appropriate function.
2. Use SCROLL to highlight the digit you want to enter or change.
3. For numerical data, UP ARROW scrolls the digits from 0 to 9
   (UP ARROW or SCROLL are also used to toggle pre-determined choices that do not require
data entry).
4. Use SCROLL to highlight and change other digits you want to change.
5. Push ENTER to confirm data entry.

10.2 KEYBOARD LOCK
Simultaneously pressing the LEFT ARROW and SCROLL keys from RUN mode, for 5 seconds,
keyboard will be locked. Display will show PADLOCK symbol.

Simultaneously pressing the LEFT ARROW and SCROLL keys from RUN mode, for 5 seconds,
keyboard will be un-locked.

10.3 DISPLAY PAGES
The RKMAG, in RUN mode, has six pages to display data and status, press UP ARROW or SCROLL
to change page

10.3.1 MAIN PAGE

10.3.2 SECOND PAGE

Page 32 of 64
### 10.3.3 ALARMS PAGE

The symbol “!” will be displayed when there are system alarms.
Press SCROLL to access the alarms page.
Press SCROLL again to return to the main page (MAIN)
Press ENTER to clear the error history (CLEAN)

### 10.3.4 BATCH PAGE

- Preset value
- Increase in the batch partial counter
- Relay output status (closed contact)
- Instantaneous flow rate indicator

### 10.3.5 PARTIAL TOTALIZER PAGE

- Increase in the partial totalizer.
- Press START to begin the totalization:
  - STOP to arrest
  - RESET to reset the totalizer

### 10.3.6 INFO PAGE

- Instrument serial number
- Event counter of the sensor fundamental parameters
- Pipe diameter (DN)
- Current Firmware revision
- Configuration index of the product
- Q3/Q1 ratio
- Sensor K

---

**EMPY PIPE**

**MAIN CLEAN**

**BATCH**

0.500m³

0.500 m³

49.08m³/h

**PARTIAL TOTAL**

0.000 m³

**INFO PAGE**

SN FM0123456789
Enter Counter=0
DN 100 mm
FW 2.06
IC 1.0.04
Q3/Q1 200.00
SENSOR K 0,05755
10.4 LOI MENÙ

Press ENTER key from run mode: display will show the list of configuration menu as shown here next.

Press UP ARROW or SCROLL keys to select the desired menu, then press ENTER key to access.

### 10.4.1 BASIC SETUP menu

<table>
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<tr>
<th>BASIC SETUP</th>
<th>DAMPING</th>
<th>MEAS. UNIT FLOW</th>
<th>FLOW DIGIT</th>
<th>MEAS. UNIT TOT</th>
<th>TOT DIGIT</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>m³/h</td>
<td>2</td>
<td>m³</td>
<td>2</td>
</tr>
</tbody>
</table>

### 10.4.2 BASIC CONFIGURATION (BASE SETUP)

Press ENTER key from run mode, the display will be as shown here next, then press ENTER to enter in “BASIC SETUP” menu.

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

#### 10.4.2.1 – DAMPING

It sets the integration time for measurement. Lower values mean fast response, higher values are suggested for reduction of fluctuations in flow measurement.

Default: 25s;
Range: 1÷100s

Press ENTER key, the display will be as shown here next. With UP ARROW or SCROLL select the option.

Press ENTER to confirm. The ☺ to confirm the parameter edit storage.
10.4.2.2 MEAS. UNIT FLOW

It specifies the instantaneous flow measurement unit. Default: m³/h.
Range: l/s; l/m; l/h; l/D; m³/s; m³/m; m³/h; m³/D; GAL/s;
GAL/m; GAL/H; GAL/D; FT³/s; FT³/m; FT³/H; FT³/D;
IMPGAL/s; IMPGAL/m; IMPGAL/H; IMPGAL/D; MI/D;
MGAL/D; TON/H; KG/H.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm. The ☺ to confirm the parameter edit storage.

10.4.2.3 FLOW DIGIT

It indicates how many decimals are displayed after the decimal point. Default: 2
Range: 1+3

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm. The ☺ to confirm the parameter edit storage.

10.4.2.4 – MEAS. UNIT TOT

It specifies how many decimals are displayed after the decimal point. Default: m³
Range: l; m³; gal; ft³; impGal; Mi; Mgal;

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm. The ☺ to confirm the parameter edit storage.

10.4.2.5 – TOT DIGIT

It specifies how many decimals are displayed after decimal point. Default: 0
Range: 1+3

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm. The ☺ to confirm the parameter edit storage.
## 10.4.3 SYSTEM SETUP

### SYSTEM SETUP

- **Language**
  - English / Italiano / Chinese

- **Data Logger**
  - Connect USB
  - Disconnect USB
  - Writing Rate: 0015 s
  - Enable Data Logger: No

- **Data Time**
  - Year: yyyy
  - Month: MM
  - Day: GG
  - Hours: HH (24h Format)
  - Minutes: mm

- **Flow Setup**
  - Flow Direction: Normal Flow Dir
  - En. Flow Measure: Forward
  - Maximum Flow: 0250.000 m³/h
  - Minimum Flow Cut Off: 001.00 m³/h
  - Density: 1
  - Batch: 0001.00 m³
  - Partial Total: No

- **Digital Output**
  - Freq. Max: 10000 Hz
  - Vol / Pulse: 00000000
  - Pulse Length: 002 ms
  - Pulse Front: Active Low
  - Dgt Out Copy RL1: No

- **RS485 Setup**
  - Network ID: 001
  - Baud Rate: 9600
  - Parity: None
  - Stop Bit: 1 Bit
10.4.4 SYSTEM CONFIGURATION (SYSTEM SETUP)

Press ENTER key from run mode: the display will be as shown here next, then press SCROLL key to select “SYSTEM SETUP” menu and press ENTER to enter.

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.4.1 LANGUAGE

Allows menu language selection.
Default: ENGLISH; Range: ENGLISH - ITALIANO – CHINESE

Press ENTER key, the display will be as shown here next.

With UP ARROW or SCROLL select the option. Press ENTER to confirm.

The ☑ to confirm the parameter edit storage.

10.4.4.2 - DATA LOGGER

The USB pen drive data logger function is set in this menu. Press ENTER to confirm.

The display will be as shown here next. Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.4.2.1 CONNECT USB

Connect the pen drive to the USB port.

Press ENTER, after the “WAIT” message, the “USB CONNECTED” message will appear. If the “USB NOT FOUND” message is displayed, verify that the pen drive is inserted correctly into the USB port.
10.4.4.2 - DISCONNECT USB

Disconnect the pen drive to the USB port.

Press ENTER, after the “WAIT” message, the “REMOVE USB” message will appear.

10.4.4.2.3 WRITING RATE

Set the time interval between a storage and the next.
Default: 60s
Range: 15÷3600s

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.

10.4.4.2.4 ENABLE DATALOGGER

Enables or disables the data logger function.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.

10.4.4.3 - DATE TIME

In the system clock and the calendar are set in this menu.

The display will be as shown here next.
Press UP ARROW or SCROLL keys to select the desired function and press ENTER per accedervi.

10.4.4.3.1 YEAR

Sets the year in the yyyy format.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.
### 10.4.4.3.2 MONTH
Sets the month in the MM format.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.

### 10.4.4.3.3 DAY
Sets the day in the dd format.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.

### 10.4.4.3.4 HOURS
Sets the hours in the HH format.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.

### 10.4.4.3.5 MINUTES
Sets the minutes in the mm format.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.
10.4.4.4 FLOW SETUP

The configuration parameters of the flow measurement are set in this menu.

Press ENTER to access.
The display will be as shown here next.
Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.4.4.1 MAX FLOW

Set the flow measurement 100%. This value adjusts the analog output end scale (20mA) and the frequency output end scale.
The range is related to the sensor DN.
The default value is the maximum flow rate for the MID approval according to the sensor pipe DN.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☻ to confirm the parameter edit storage.
10.4.4.2 MIN FLOW CUT OFF
It specifies the Qmax% value below which the instantaneous flow measurement reading (direct or reverse) and the outputs are forced to zero. The default is 1% of the declared maximum flow rate for the MID approval according to the sensor pipe DN.

Press ENTER key, the display will be as shown here next. With UP ARROW change the digit, with SCROLL moves the cursor. Press ENTER to confirm. The ☺ to confirm the parameter edit storage.

10.4.4.4.6 BATCH
Activating the batch function, the system automatically sets:
- RL1 alarm when the partial batch counter value reaches the set threshold value (relay de-energized with open contact).
- DI is the input for a normally open button; it has the restart function of the batch counter and, at the same time, the resetting of the RL1 contact (energized relay with closed contact)
The unit volume is a function of the MEAS. UNIT TOT parameter setting (totalisers unit)
Default: 0 (disabled BATCH function);
Range: 0000.00÷9999.99.

Press ENTER key, the display will be as shown here next. With UP ARROW change the digit, with SCROLL moves the cursor. Press ENTER to confirm. The ☺ to confirm the parameter edit storage.
In RUN mode, pressing the UP ARROW key, is possible to monitor the count, and the output relay status:

a) Predetermined batch value  
b) Counted value  
c) Instantaneous flow rate value  
d) RL1 relay output state (energized with closed contact)

When the counter (b) reaches the batch predetermined value (a), RL1 is de-energized instantaneously, and the display shows:

a) Predetermined batch value  
b) The counted value is highlighted to indicate that the predetermined batch value has been reached (orexceeded)  
c) Instantaneous flow rate value  
d) RL1 relay output state (de-energized with closed contact)

By pressing the button (normally open) connected to DI, the batch is restarted, the counter is reset (b) and RL1 output is rearmed (relay energized with closed contact).
10.4.4.7 PARTIAL TOTAL

Activating the PARTIAL TOTALIZER function, the system automatically sets the DI input for normally open button or the LEFT ARROW to start, stop and reset the totalizer. The unit volume is a function of the MEAS. UNIT TOT parameter setting (totalizer unit).

Default: NO (Disabled partial totalizer)

Range: NO; SI.

Press ENTER key, the display will be as shown here next.

With UP ARROW changes the digit, with SCROLL moves the cursor.

Press ENTER to confirm.

The ☺ to confirm the parameter edit storage.

In run mode, pressing the UP ARROW key is possible to monitor the count.

Press the button (N.O.) connected to the DI input or the LEFT ARROW to get start the counting: pressing again the button, the counter is stopped and pressing once again the button, the partial totalizer will be resetted.

10.4.4.5 DIGITAL OUTPUT

The F/P digital output parameters are set in this menu.

Press ENTER to access.

The display will be as shown here next.

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access

10.4.4.5.1 FREQ. MAX

Sets the maximum frequency in relation to MAX FLOW.

The digital output is active as a frequency output only when the parameter “VOL/PULSE” is set to 0

Default: 10000Hz;

Range: 100÷10000 Hz.

Press ENTER key, the display will be as shown here next.

With UP ARROW change the digit, with SCROLL moves the cursor.

Press ENTER to confirm.

The ☺ to confirm the parameter edit storage.
10.4.4.5.2 VOLUME/PULSE
Sets the volume per pulse. When this parameter is set to 0, the digital output is active as a frequency output (see “FREQ. MAX”). The measurement unit depends on the setting to MEAS. UNIT TOT parameter.
Default: 0000.00; Range: 0000.00÷9999.99

Press ENTER key, the display will be as shown here next. With UP ARROW change the digit, with SCROLL moves the cursor. Press ENTER to confirm.

The ☺ to confirm the parameter edit storage.

10.4.4.5.3 PULSE LENGTH
Sets the pulse width in ms.
Default: 0002ms; Range: 0001÷100ms

Press ENTER key, the display will be as shown here next. With UP ARROW change the digit, with SCROLL moves the cursor. Press ENTER to confirm.

The ☺ to confirm the parameter edit storage.

10.4.4.5.4 PULSE FRONT
Sets the pulse output energy level. When set ACTIVE LOW the pulse count is low, when set ACTIVE HIGH, the pulse count is high.
Default: ACTIVE LOW; Range: ACTIVE LOW; ALTO.

Press ENTER key, the display will be as shown here next. With UP ARROW or SCROLL select the option. Press ENTER to confirm.

The ☺ to confirm the parameter edit storage.
10.4.4.5 DGT OUT COPY RL1

Associated to the RL1 exit (default), or to the F/P open collector output, the function set to the DGT OUT COPY RL1 parameter.
The available functions are:
- NO; the RL1 output is associated with the function set to the parameter “RL1 FUNC” (default setting)
- YES; the F/P open collector output is associated with the function set to the parameter “RL1 FUNC”; eg, with “RL1 FUNC” set to “MAX”, the F/P output state is low (0Vdc) during the non-alarm condition, and is high (24Vdc) during the alarm condition.
N.B. - Selecting the “YES” function the F/P output can not be used as an pulse counter or frequency output
Default: NO; Range: YES; NO

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.
The ☺ to confirm the parameter edit storage.

10.4.4.6 RS485 SETUP

The configuration parameters of the RS485 port are set in this menu.
Press ENTER to access.

The display will be as shown here next.
Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.
10.4.4.6.1 NETWORK ID
Set the unity UID in RS485 network
Default: 001
Range: 001÷247.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.

The ☑ to confirm the parameter edit storage.

10.4.4.6.2 BAUD RATE
Sets the RS485 output Baud Rate.
Default: 9600; Range: 9600; 19200; 38400; 56000; 57600; 115200.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.

The ☑ to confirm the parameter edit.

10.4.4.6.3 PARITY
Sets the RS485 output Parity.
Default: NONE
Range: NONE; ODD; EVEN.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.

The ☑ to confirm the parameter edit.

10.4.4.6.4 STOP BITS
Sets the RS485 output Stop Bit
Default: 1 BIT
Range: 1 BIT; 2 BITS.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.

The ☑ to confirm the parameter.
10.4.5 TEST menu

TEST → TEST 4-20mA → 12 mA
TEST FREQ. → 05000 Hz
TEST RELAYS → TOGGLE RL1 → 1 OFF
                        TOGGLE RL2 → 2 OFF
TEST DGT INPUT → PRESS THE BUTTON
TEST PULSE OUTPUT → PRESS OK

10.4.6 OUTPUT SIGNAL TEST (TEST)

Press ENTER key from run mode: the display will be as shown here next, then press SCROLL key to select “SYSTEM SETUP” menu and press ENTER to enter.
Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.6.1 TEST 4-20mA

“TEST 4-20mA” force the 4÷20mA signal output to the value set for the test
Example: Setting the testing value at 16.2 mA, the actual output signal value is forced to 16.2mA. When exiting the TEST function, the 4-20mA output signal returns to be in compliance with the actual measurement FLOW set function..
Default: 12mA. Range: 4÷20mA

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm the test value.
Press LEFT ARROW to exit.
10.4.6.2 TEST FREQ

“TEST FREQ” force the frequency signal output to the value set for the test.
Example: Setting the testing value at 2000Hz, the actual output signal value is forced to 2000Hz. When exiting the TEST function, the frequency output signal returns to be in compliance with the actual measurement flow set function. Default: 5000 Hz.
Range: 0÷10000 Hz

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm the test value.
Press LEFT ARROW to exit.

10.4.6.3 TEST RELAYS

Test the RL1 and RL2 relay outputs is possible in this menu.
Press ENTER to access.

The display will be as shown here next.
Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.6.3.1 TOGGLE RL1/2

Forcing the status change of the output RL1/2 relay

Press ENTER key, the display will be as shown here next.
Press ENTER to switch from the OFF state to the ON state.
Press LEFT ARROW to exit.
10.4.6.4 TEST DGT INPUT
To verify the “D.I.” digital input funcion.

Not available on this instruments.

10.4.6.5 TEST PULSE OUTPUT
To verify the F/P pulse output funcionality.

Each time the ENTER key is pressed, the F/P output generates a pulse with a length equal to what set in the “PULSE LENGTH ms” parameter, and simultaneously increments the test counter shown in the display center.
10.4.7 Menù. INFO

Press ENTER key from run mode: the display will be as shown here next, then press SCROLL key to select “INFO” menu and press ENTER to enter.

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.8 SYSTEM INFORMATION (INFO)
10.4.8.1 PIPE DN

Press ENTER to access.

It is useful to check correspondence with the “Connection” data reported on the adhesive rating plate located on the sensor pipe. The display shows the set DN of the measuring pipe.

10.4.8.2 SENSOR K

Press ENTER to access.

It is useful to check correspondence with the “SENSOR K” data reported on the adhesive rating plate located on the sensor pipe. The display shows the set SENSOR K of the measuring pipe.

10.4.8.3 TOTAL h

Press ENTER to access.

The display shows the total hours of the flowmeter operation.

10.4.8.4 LAST RESET

Press ENTER to access.

The display shows the date and time of the last reset of the totalizer.
10.4.8.5 FW VERSION

Press ENTER to access.

The display shows the firmware version.

10.4.8.6 I.C.

Press ENTER to access.

The display shows the configuration index (I.C.) of the flowmeter.

10.4.8.7 WELCOME TEXT

Press ENTER to access.

The display will be as shown here next.
With UP ARROW/SCROLL change the digit, with ENTER moves the cursor.
To confirm press ENTER until the cursor reaches the end of second row and automatically comes back to info menu.
10.4.9 CALIBRATION Menu.

10.4.10 SYSTEM CALIBRATION (CALIBRATION)

Press ENTER key from run mode: the display will be as shown here next, then press SCROLL key to select “CALIBRATION” menu and press ENTER key to access.

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.10.1 ZERO FLOW

Zero flow measurement calibrate. The sensor must be full and the flow stopped.
Default: NO Range: YES - NO.

Press ENTER key, the display will be as shown here next. With UP ARROW or SCROLL select the option. Premere ENTER o confirm.
10.4.10.2 4mA OUTPUT

Performs calibration of 4mA.

Press ENTER key, the display will be as shown here next. Connect a mA meter to the analog output; if the detected current measurement is different from 4 mA it is possible to correct the value of the output current with UP ARROW (UP) or SCROLL (DOWN). Press ENTER (OK) to confirm.

10.4.10.3 20mA OUTPUT

Performs calibration of 20mA.

Press ENTER key, the display will be as shown here next. Connect a mA meter to the analog output; if the detected current measurement is different from 20 mA it is possible to correct the value of the output current with UP ARROW (UP) or SCROLL (DOWN). Press ENTER (OK) to confirm.

10.4.10.4 PIPE SETUP

Performs the calibration of empty pipe sensitivity press. ENTER to access.

The display will be as shown here next. press UP arrow or SCROLL keys to select the desired function and press ENTER key to access.

10.4.10.4.1 ENABLE E.P. FUNCT.

Enables or disables the empty pipe detection. Default: YES Range: YES - NO

Press ENTER key, the display will be as shown here next. With UP arrow or SCROLL select the option. Press ENTER to confirm.
10.4.10.4.2 FULL PIPE

ATTENTION: pipe must be full before continue.
Performs a full pipe recognition self calibration.
Default: NO Range: YES - NO.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.
The successful calibration is confirmed by the OK symbol.

10.4.10.4.3 EMPTY PIPE

ATTENTION: pipe must be empty before continue.
Performs an empty pipe recognition self calibration.
Default: NO Range: YES - NO.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.
The successful calibration is confirmed by the OK symbol.

10.4.10.4.4 EPH

Sets the system sensibility level to recognize the air presence in the sensor: the higher the value, the greater the sensitivity.
Default: 15%
Range: 010÷90%.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☐ to confirm the parameter edit storage.
10.4.10.5 ANALOG INPUT

The measuring ranges of the analog inputs can be set in this menu.
Press ENTER to access.

The display will be as shown here next.
Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.10.5.1 ANALOG INPUT UM

Specifies the measurement unit of analog signals to AN1 and AN2 inputs.
Default: mA; Range: mA; °C; °F; kPa; Pa; bar; mbar; psi; mH2O; mmH2O; mmHg; atm.

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.
The ☑ to confirm the parameter edit storage.
10.4.10.5.2 4mA VALUE

Set the value to be associated to the begin scale of the analog inputs.
Default: +000000.00
Range: -999999.99÷+999999.99.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.

The ☺ to confirm the parameter edit storage.

10.4.10.5.3 20mA VALUE

Set the value to be associated to the end scale of the analog inputs.
Default: +000000.00
Range: -999999.99÷+999999.99.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.

The ☺ to confirm the parameter edit storage.
10.4.11 RELAYS SETUP MENU

10.4.12 RELAY CONFIGURATION (RELAYS SETUP)

Press ENTER key from run mode: the display will be as shown here next, then press SCROLL key to select “RELAYS SETUP” menu and press ENTER to enter.

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.12.1 RL1/RL2 FUNC

Submenu for output relay RL1/RL2 settings.

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.12.1.1 NONE

Disable the RL1/RL2 output
Press ENTER to confirm.
10.4.12.1.2 MIN-MAX

Settings for the activation of the RL1/RL2 alarm

Press UP ARROW or SCROLL keys to select the desired function and press ENTER key to access.

10.4.12.1.2.1 INPUT SOURCE

Associates the alarm signal to a measured variable
Default: FLOW Range: FLOW; ANALOG 1; ANALOG 2; ANALOG 1- ANALOG 2

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.
The ☰ to confirm the parameter edit storage.

10.4.12.1.2.2 TH VALUE

Set the alarm threshold.
The associated measurement unit is in relation to the “ INPUT SOURCE “ setting”.

Press ENTER key, the display will be as shown here next.
With UP ARROW change the digit, with SCROLL moves the cursor.
Press ENTER to confirm.
The ☰ to confirm the parameter edit storage.

10.4.12.1.2.3 MIN/MAX

Set the relay operation mode: minimum or maximum alarm with relay de-energized and open contact
Default: MIN Range: MIN – MAX

Press ENTER key, the display will be as shown here next.
With UP ARROW or SCROLL select the option.
Press ENTER to confirm.
The ☰ to confirm the parameter edit storage.
10.4.12.1.3 NEG. DIRECTION

Activate the RL1/RL2 output as a reverse instantaneous negative flow rate alarm.
Press ENTER to confirm.

10.4.12.1.4 ALARM

Activate the RL1/RL2 output for diagnostic alarm: coil connection interruption; empty pipe
Press ENTER to confirm.
Problems in the magnetic flowmeter system are usually indicated by incorrect output readings from the system, error messages, or failed tests. Consider all sources when identifying a problem in your system.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Potential Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output at 0 mA.</td>
<td>No power to transmitter.</td>
<td>Check power source and connections to the transmitter.</td>
</tr>
<tr>
<td></td>
<td>Analog output improperly configured.</td>
<td>Check the connections</td>
</tr>
<tr>
<td></td>
<td>Electronics failure.</td>
<td>Replace the electronics boards</td>
</tr>
<tr>
<td>Output at 4mA</td>
<td>Min Flow Cutoff set too high</td>
<td>Configure the Min flow cutoff to a lower value or increase the flowrate above the min flow cut off value.</td>
</tr>
<tr>
<td></td>
<td>Flow is in reverse direction</td>
<td>Enable Invert Flow Dir function</td>
</tr>
<tr>
<td></td>
<td>Shorted coil</td>
<td>Check coil</td>
</tr>
<tr>
<td></td>
<td>Empty pipe</td>
<td>Fill pipe</td>
</tr>
<tr>
<td></td>
<td>Electronics failure</td>
<td>Replace the electronics boards</td>
</tr>
<tr>
<td>Pulse output at zero, regardless of flow</td>
<td>No power to transmitter</td>
<td>Check power source and connection to the transmitter</td>
</tr>
<tr>
<td></td>
<td>Wrong wiring</td>
<td>Check pulse output wiring at digital output terminals. Refer to wiring diagram for pulse output</td>
</tr>
<tr>
<td></td>
<td>Reverse flow</td>
<td>Enable Invert Flow Dir function</td>
</tr>
<tr>
<td></td>
<td>Electronics failure</td>
<td>Replace the electronics boards</td>
</tr>
<tr>
<td></td>
<td>Transmitter, control system, or other receiving device not configured properly</td>
<td>Check all configuration variables for the transmitter, flowpipe, communicator, and/or control system. Perform a loop test to check the integrity of the circuit</td>
</tr>
<tr>
<td></td>
<td>Electrode Coating</td>
<td>Downsize flowtube to increase flowrate above 3 m/s. Periodically clean flowpipe</td>
</tr>
<tr>
<td></td>
<td>Air in line</td>
<td>Move the flowpipe to another location in the process line to ensure that it is full under all conditions</td>
</tr>
<tr>
<td></td>
<td>Flow rate is below 0.3 m/s (specification issue)</td>
<td>See accuracy requirement for specific transmitter and flowpipe</td>
</tr>
<tr>
<td></td>
<td>The “Zero flow” calibration was not performed when the flowpipe is full, or flowrate is zero</td>
<td>Perform the “zero flow” function</td>
</tr>
<tr>
<td></td>
<td>Empty pipe</td>
<td>Perform the full pipe and empty pipe calibration</td>
</tr>
<tr>
<td></td>
<td>Coil Error</td>
<td>Check the coil connection</td>
</tr>
<tr>
<td></td>
<td>Transmitter failure</td>
<td>Replace the electronics boards</td>
</tr>
</tbody>
</table>
In some circumstances, process conditions themselves can cause the meter output to be unstable. The basic procedure for addressing a noisy process situation is outlined below. Complete them in order. When the output attains the desired stability, no further steps are required:

1. Increase the Damping
2. Check the Ground connection

If the basic steps for troubleshooting are not sufficient contact our technical support.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Potential Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noisy Process</td>
<td>Chemical additives upstream of magnetic flowmeter</td>
<td>Move injection point downstream of magnetic flowmeter.</td>
</tr>
<tr>
<td></td>
<td>Sludge flows–Mining/Coal/Sand/Slurries (other slurries with hard particles)</td>
<td>Decrease flow rate.</td>
</tr>
<tr>
<td></td>
<td>Styrofoam or other insulating particles in process</td>
<td>Consult factory</td>
</tr>
<tr>
<td></td>
<td>Electrode coating</td>
<td>Downsize flowtube to increase flow rate. Periodically clean Sensor pipe.</td>
</tr>
<tr>
<td></td>
<td>Air in line</td>
<td>Move the Sensor pipe to another location in the process line to ensure that it is full under all conditions</td>
</tr>
<tr>
<td>Meter output is unstable</td>
<td>Electrode incompatibility</td>
<td>Check the chemical compatibility with electrode material</td>
</tr>
<tr>
<td></td>
<td>Improper grounding</td>
<td>Check ground wiring. See wiring and grounding procedures</td>
</tr>
<tr>
<td></td>
<td>High local magnetic or electric fields nearby</td>
<td>Move magnetic flowmeter far from the electromagnetic noise sources</td>
</tr>
<tr>
<td></td>
<td>Sticky valve (look for periodic oscillation of meter output)</td>
<td>Correct valve sticking</td>
</tr>
<tr>
<td></td>
<td>Analog output loop problem</td>
<td>Check that the 4–20 mA loop matches the digital value. Perform loop test</td>
</tr>
</tbody>
</table>
12-FACTORY TEST AND QUALITY CERTIFICATE

In conformity to the company and check procedures I certify that the equipment:

(Electromagnetic induction flow measurement)

is conform to the technical requirements on Technical Data and it is made in conformity to the procedure

Quality Control Manager: ..........................................................    Production and check date: ..................................................

This mark on the instrument indicates that the product and its electronic accessories must not be disposed of with other household waste at the end of their useful life.
To avoid possible damage to the environment or human health resulting from uncontrolled waste disposal, please return the equipment directly to a specialized recycling company, in compliance with local regulations.

This instrument is powered by a battery type 2,4V triple-A, 0.6Ah NiMH; at the end of the life of the battery or the instrument, do not disperse it in the environment. The battery must be disposed of in the appropriate collection centers.