RPmag
electromagnetic induction flow measurement

technical documentation EN Rev. A
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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 term of guarantee, whereas if the Product is replaced it will have 12 (twelve) months of guarantee. 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

### 2.1 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.

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<tr>
<th>No.</th>
<th>Description</th>
<th>Data</th>
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<td>Electrode</td>
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<tr>
<td>9</td>
<td>Protection</td>
<td>IP67</td>
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</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. Identification plate image
4-FEATURES

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

Range dimension / lining material
PTFE DN10 ÷ DN500
RUBBER DN65 ÷ DN2000

Sensor material
SS321

Housing material
aluminium

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

Measure range
<0,1 m3/h ÷ >11000 m3/h

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

Repeatability
±0,1%

Fluid conductivity
>5 μS/cm.

Power supply
85÷265 Vac, 24Vdc, 12Vdc.

Consumption
6W, max. 8W.

Ambient Temperature Limits
Remote version operating temperature:
RUBBER -10 ÷ +80°C; PTFE -40 ÷ +150°C
Compact version operating temperature:
RUBBER -10 ÷ +80°C; PTFE -40 ÷ +100°C
Storage temperature: -40÷85°C

Communication protocol
modbus or Hart (opt.)

Output
4÷20 mA: 0÷750 ohm load.
Frequency output: 0,1÷5000 Hz
Pulse output: 24 Vdc pull up open collector or galvanically isolated open collector (opt.)
Alarm output: 2 relays, 3A 230Vac N.O. (not available for 12Vdc power supply version)

Reverse Flow
Allow measure reverse flow.

Output Testing
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 0.1 and 5000 Hz

Start-up Time
0.5 seconds.

Low Flow Cutoff
Adjustable between 0.0 and 9.9% Qmax. Below selected value, output is driven to the zero flow rate signal level.

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

Damping
Adjustable between 0.1 and 99 seconds.

Compact version IP rating
IP67

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

Anti-condensation filter
Anti-condensation fi lter installed on converter
5-FLOW RANGE

5.1 FLOW RANGE GRAPHIC

Flow range from DN3 to DN500 (starting from DN10)

Flow range from DN600 to DN2000
### 5.2 FLOW RANGE TABLES

#### DN10 ÷ 300

<table>
<thead>
<tr>
<th>DN (mm)</th>
<th>Range: Minimum (0.5 m/s) / Maximum (10 m/s)</th>
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<tr>
<td>10</td>
<td>0.14 ÷ 2.9 m³/h</td>
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<td>15</td>
<td>0.3 ÷ 6 m³/h</td>
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<td>20</td>
<td>0.5 ÷ 12 m³/h</td>
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<td>25</td>
<td>0.6 ÷ 18 m³/h</td>
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<td>1.8 ÷ 42 m³/h</td>
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<td>3 ÷ 66 m³/h</td>
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<td>8.9 ÷ 180 m³/h</td>
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<td>11 ÷ 282 m³/h</td>
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<td>125</td>
<td>20 ÷ 450 m³/h</td>
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<td>30 ÷ 600 m³/h</td>
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<td>50 ÷ 1100 m³/h</td>
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<td>250</td>
<td>85 ÷ 1700 m³/h</td>
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<td>110 ÷ 2400 m³/h</td>
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#### DN350 ÷ 2000

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<td>350</td>
<td>180 ÷ 3300 m³/h</td>
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<td>450</td>
<td>270 ÷ 5400 m³/h</td>
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<td>320 ÷ 6600 m³/h</td>
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<tr>
<td>2000</td>
<td>6000 ÷ 110000 m³/h</td>
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### 5.3 LOAD LOSS

![Adaptation cones](image)

Adaptation cones
6-DIMENSIONS

6.1 REMOTE VERSION CONVERTER

6.2 WALL MOUNTING REMOTE VERSION CONVERTER
6.3 COMPACT VERSION DN10 + DN80 PN16 - PN40

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<th>PN 16 - PN 40</th>
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6.3 COMPACT VERSION DN100 ÷ DN1000 PN10 - PN16 - PN40

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6.4 REMOTE VERSION DN10 ÷ DN25 PN16 - PN40

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6.5 REMOTE VERSION DN32 + DN1000 PN10 - PN16 - PN40

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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 Rpmag includes control of the sensor pipe coils and one or more of the following configurations or options:
- 4÷20mA output
- Pulse output
- Alarm output
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 Rpmag 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. 10.4.4.2.6)

The upstream straight pipe should be longer than $5 \times DN$ to guarantee the accuracy of measurement. When the distance is more than $5 \times DN$ between the device (e.g. cone pipe, orifice plate, valve) and the sensor of flowmeter, their affection is negligible. And the downstream straight pipe should be more than $3 \times DN$

7.5 INSTALLATION IN PIPELINE

In principle, the measurement of the electromagnetic flowmeter is independence of the distribution of velocity as long as the distribution of velocity in measuring tube is symmetrical. Installation may be horizontal or vertical, but make sure no deposit on the electrodes when horizontal installation. See Fig. 13-A.

To install an rectifier or straight pipe is necessary to normalize the flow profile if there are pipe elbow, flow regulation valve or half-open ball valve in front of the sensor. See fig.13-B.

---

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

Fig.13-B. Requirement to install the flowmeter straight pipes
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.

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.
The electromagnetic flowmeter cannot 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_url)

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

![Fig.15-B Near pumps installation](image_url)

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_url)
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 not be subjected to excessive vibrations, large ambient temperature changing, and long-time shower. It should be prevented from the leakage of the corrosive liquid.

7.7 PIPE CONNECTION
The sensor itself cannot be used as its support, it should be supported by the connecting pipes. And the sensor should not withstand too big fastening stress. It should be taken to account to eliminate the affection of the stress caused by thermal expansion.
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 DN65 to DN300, it should be less than 2mm; for the sensor over DN350, it should be less than 4mm.

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

c) The threads of the fasten bolts and nuts should be in good condition. The bolts should be fastened using torque spanner with certain torque according the size of flange.

d) It should take separate measure to prevent the lining from heat when weld or flame cutting in the pipe closed to sensor. If the sensor is installed in a well or immersed in water, the connecting box for sensor must be filled and sealed with sealing glue after commissioning.

7.9 ACCESSORIES

5.9.1 Grounding ring (fig. 13)
Material: SS 316L or Hastelloy C
Thickness: 3mm for SS 316L or 1mm for Hastelloy C
For the non-conductive pipe, the grounding rings should be installed between the flanges of sensor and pipe to make the flowmeter and measured medium same potential.
7.10 EQUIPOTENTIALITY AND ELECTRICAL INTERFERENCE REDUCTION

The measuring circuit considers the measured fluid as zero potential. The measured fluid is grounding potential in most of application, therefore grounding connection actually means connecting to measured fluid. The grounding cable for sensor is connected to metal pipe welding with flanges. The metal tube isolates from the measuring fluid because of lining, so the flanges of sensor should be connected to the flanges contacting directly measuring fluid using wires. The resistance for grounding connection should be less than 10ohm. In most of application, it is unnecessary to take special measure for installing sensor, only require the signal cable separate from the main cable. If the sensor with cathode protection or the process with electroanalysis the main current must not go through the measuring fluid in the sensor.

The following measure should be taken in order to reduce the affection of magnetic field:

a) In metal piping, the device is made potential equalization via the connection between the sensor and the adjoining pipe. The bolt connection for flanges can not be used instead of the electric connection, it must have an additional electric connection as shown in Fig.18A.

![Fig.18A Sensor equipotentiality](image1)

b) For the non-inductive pipe, the grounding rings should be installed between the both flanges for sensor and the both flanges for pipe. See Fig.18B.

![Fig.18B Grounding with non-conductive pipes](image2)
c) Some systems, such as pipes with cathodic protection, may be affected by potential disturbance because not all the line is at ground potential. In order to eliminate this type of interference, it must be isolate the line with two rubber pipes as shown in Fig.19A.

7.11 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 shipped 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 on the power supply. One minute later, the value displayed in the indicator will reach some amount, which means the connections of wires are correct. If the flow direction is wrong, then change the flow direction on the converter.

3) Zero verification. Shut off the valve tight in downstream first and then the valve in upstream, to let the medium in the pipeline stops. The displayed value should be 0. The value displayed can be corrected at the converter if the value is different than 0: ensure that no leaks.

7.12 MAINTENANCE

In general, they are not necessary maintenance and supply of the magnetic flowmeter. Only in the case in which 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-ELECTRICAL CONNECTIONS

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
RPmag transmitter is designed to be powered with 85 ÷ 265Vac (50 to 60 Hz), 24Vdc, 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 OUTPUT

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

8.4.1 Analog output

The current output is powered from the transmitter. The circuit resistance must be equal to or less than 750 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 RPMAG flowmeter and SLM2XH3 flow totalizer unit.
8.4.2 Digital output

When digital output is set in frequency mode, it generates an 0.1÷5000Hz 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 P+ and P- terminals

N.B. - When the RPmag pulse output is connected to an acquisition system that requires a current higher than 2.3mA, 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 10mA, a 2.4Kohm pull-up resistor must be connected (according to the calculation R = V / I = 24V / 10mA = 2.4Kohm) between an external power supply of 24 Vdc and the acquisition system input terminal

The below drawing shows the connection diagram between the RPMAG flowmeter and the 199-B1X counter unit
8.4.4 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 D01, for the #1 alarm threshold, and D02 terminals for #2 alarm threshold.

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

The below drawing shows connection example diagram between RPMAG flowmeter and a PC.
8.5 REMOTE VERSION

During the remote version installation comply with the following information to ensure correct measurements:

1) The cables must be laid in an armored conduit or fixed along their path to avoid errors in measurement, especially with low conductivity fluids.

2) The cables should be away 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 6.5.2.

Connect the sensor to the converter according to the below diagram.
### 8.5.1 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 black</td>
<td>coil</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5 brown</td>
<td>coil</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>braid</td>
<td>shield</td>
<td></td>
</tr>
<tr>
<td>Tripolar</td>
<td>1 white</td>
<td>electrode 1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2 yell./green</td>
<td>common GND</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3 brown</td>
<td>electrode 2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>braid</td>
<td>shield</td>
<td></td>
</tr>
</tbody>
</table>

![Shielded bipolar cable](image)

![Shielded tripolar cable](image)

### 8.5.2 Connecting cables length

Maximum length of the connecting cables between the sensor and the converter 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.
### 8.5.3 Connection cables

#### 8.5.3.1 - Coil cable technical specification

**Shielded bipolar cable FR20H2R 2x1.5 section**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductors</td>
<td>Tinned copper stranded wire, class 5</td>
</tr>
<tr>
<td>Insulations</td>
<td>PVC R2 Ø 2,8mm ± 0,1</td>
</tr>
<tr>
<td>Conductors Colors</td>
<td>Black - Brown</td>
</tr>
<tr>
<td>Cable stranding</td>
<td>Concentric with polyester tape</td>
</tr>
<tr>
<td>Shielding</td>
<td>Tinned copper braid</td>
</tr>
<tr>
<td>Sheath</td>
<td>PVC RZ resistant to hydrocarbons; Ø 8,2mm ± 0,30; RAL5015 blue color</td>
</tr>
<tr>
<td>Marking</td>
<td>SGM-LEKTRA RODANO MILANO ITALY - 525B005A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-25++70°C (fixed installation)</td>
</tr>
<tr>
<td>Test voltage</td>
<td>3KV V.c.a.</td>
</tr>
<tr>
<td>Working voltage</td>
<td>450/750V</td>
</tr>
<tr>
<td>Conductors electrical resistance</td>
<td>CEI 20-29</td>
</tr>
<tr>
<td>Reference Standards</td>
<td>CEI 20-22 II-IEC 332.3A-ROHS 2011/65/UE(ROHS 2)</td>
</tr>
</tbody>
</table>

---

#### 8.5.3.2 - Electrodes signal cable technical specification

**Shielded tripolar cable FR20H2R 3x1.5 section**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductors</td>
<td>Tinned copper stranded wire, class 5</td>
</tr>
<tr>
<td>Insulations</td>
<td>PVC R2 Ø 2,8mm ± 0,1</td>
</tr>
<tr>
<td>Conductors Colors</td>
<td>White - Brown - Yellow/Green</td>
</tr>
<tr>
<td>Cable stranding</td>
<td>Concentric with polyester tape</td>
</tr>
<tr>
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<td>Tinned copper braid</td>
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<tr>
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<tr>
<td>Test voltage</td>
<td>3KV V.c.a.</td>
</tr>
<tr>
<td>Working voltage</td>
<td>450/750V</td>
</tr>
<tr>
<td>Conductors electrical resistance</td>
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</tr>
<tr>
<td>Reference Standards</td>
<td>CEI 20-22 II-IEC 332.3A-ROHS 2011/65/UE(ROHS 2)</td>
</tr>
</tbody>
</table>
9-LOCAL OPERATOR INTERFACE (LOI)

LOI is an operator communications center for the RPmag. 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
LOI option contains a four-line, 16-character liquid crystal display (LCD) that is back-lit and visible from any angle. There are four touch keys on the pad, and a infrared decoder to receive keys that on the remote encoder. Following table lists and details the functions of the LOI keys.

<table>
<thead>
<tr>
<th>LOI KEY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Left Arrow]</td>
<td>Enter; Moves to the previous display field; Save parameters</td>
</tr>
<tr>
<td>![Up Arrow]</td>
<td>Moves the cursor to the next higher field; Changes user-selected variables in a field to next higher value; Changes parameters on a predefined list; Change display page; Change parameters page when browsing parameters</td>
</tr>
<tr>
<td>![Down Arrow]</td>
<td>Moves the cursor to next lower field; Changes user-selected variables in a field to next lower value; Changes parameters on a predefined list; Change display page; Change parameters page when browsing parameters</td>
</tr>
<tr>
<td>![Right Arrow]</td>
<td>Toggle keypad lock (keep pushed for 3 seconds)</td>
</tr>
<tr>
<td>![Left Arrow] ![Up Arrow]</td>
<td>Enter menu; Moves cursor to next user-selected variable; Changes parameters on a predefined list; Aborts a chosen operation; Aborts browse parameters</td>
</tr>
<tr>
<td>![Left Arrow] ![Down Arrow]</td>
<td>Zero Trim (from RUN mode)</td>
</tr>
</tbody>
</table>
9.4 DISPLAY ROTATION

Each magnetic flowmeter installation is different from application to application; therefore, the display can be rotated to accommodate various setup using 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.
9.5 CONVERTER ROTATION

To a greater functionality and adaptation to the application the entire converter, in addition to the display, can be rotated. Follow the following steps to make the change.

⚠ 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-DATA ENTRY

The LOI keypad has no numerical keys. Enter numerical data using the following procedure:

1. Access the appropriate function.
2. Use to highlight the digit you want to enter or change.
3. Use or to change the highlighted value.
   - For numerical data, or toggles through the digits 0-9, decimal point; For alphabetical data, they toggle through the letters of the alphabet A-Z, digits 0-9, and the symbols &, +, -, *, /, $, @, %, and the blank space (or are also used to toggle through pre-determined choices that do not require data entry.).
4. Use to highlight and change other digits you want to change.
5. Push to confirm data entry.

10.1 KEYBOARD LOCK

Pushing from RUN mode, for 5 seconds, keyboard will be locked. Display will show simbol as shown in adjacent picture. 
Pushing from RUN mode, for 5 seconds, keyboard will be un-locked.

10.2 LCD CONTRAST

By holding down button from RUN mode, you can increase (by pressing the button ) or decrease (by pressing ) the LCD screen contrast according to your needs.

10.3 DISPLAY PAGE

The RPmag, in RUN mode, has three pages to display data and status, press or to change page.

- Primary page
  - Flow Rate
    - Forward total
    - Flow % value indicator

- Secondary page
  - Net total
  - Reverse total
  - Flow velocity

- Alarm page
  - This page will not appear if there is no alarm

---ALARM---

COIL
10.4 LOI MENU
Push key from run mode: display will show the list of configuration menu as shown here next.
Press or keys to select the desired menu, then press key to access.

8.4.1 BASIC

10.4.2 BASIC CONFIGURATION (BASIC)
Press key from run mode: the display will be as shown here next, then press to enter in “Basic” menu.
Push or keys to select the desired function and press key to access.

10.4.2.1 - PV Units
PV Units variable specifies the format in which the flow rate will be displayed.
Default: m³/h.
Range: L/s; m³/s; G/s; L/m; m³/m; G/m; L/h; m³/h; G/h.

Press key, the display will be as shown here next.
With or select the unit.

Push key to confirm, the display will be as shown here next.
Press key to exit and confirm the selection; press key to exit and delete the selection.

10.4.2.2 - PV Decimal
PV Decimal specifies how many decimals are displayed after the decimal point.
Default: 2
Range: 1÷3

Press key: the display will be as shown here next.
With or select the decimal number places to display.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.
10.4.2.3 - Total Units
Total Units specifies the counter display unit
Default: m3
Range: L, Litri; m3, Metri cubi; G, galloni

Press the key: the display will be as shown here next.
With or select the counter display unit

Press to confirm, the display will be as shown here next.
press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.2.4 - Total Decimal
Total Decimal specifies how many decimals are displayed after decimal point.
Default: 3
Range: 1÷3

Press the key: the display will be as shown here next.
With or select the decimal number places to display.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.2.5 - Damping (s)
Damping(S) sets the delay time in seconds for changes in reading. It `used to mitigate the fluctuations in flow measurement..
Default: 2; Range: 0.1÷99.9

Press the key the display will be as shown here next.
With or change the digit, with moves the cursor.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.
10.4.4 SYSTEM CONFIGURATION (SYSTEM)

Press the key from run mode, then press the key to select “System” and press the button to enter. Press the or keys to select the desired function and press the key to access.

To access the menu “System” may need to enter the correct password.
The default password: 0200
After entering, you can change the password

Note: If forget password can not access the menu.

10.4.4.1 - Language

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

Press key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.2 - Signal

Press key to enter the submenu “Signal”

10.4.4.2.1 - Qmax (m3/h)

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

Press key: the display will be as shown here next.
With or change the digit, with moves the cursor.

Press to confirm, the display will be as shown here next.
Press key to exit and confirm the selection; press key to exit and delete the selection.
10.4.4.2 - LowCutoff %
Low Cutoff specifies the Qmax% value below which the instantaneous flow measurement reading (direct or reverse) and the outputs are forced to zero.
Default: 1.0 Range: 0.0÷9.9

Press the key: the display will be as shown here next.
With or change the digit, with moves the cursor.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.3 - Max Limit %
When the measure variation is lower than Max Limit%, or higher but with a lower time period than that set in Limit Time (s), the measure is not detected. When the measure variation is higher than Max Limit% and with a higher time period than that set in Limit Time (s), the measure is detected.
Default: 0.0; Range: 0.0÷9.9

Press the key: the display will be as shown here next.
With or change the digit, with moves the cursor.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.4 - Limit Time (s)
Sets the time limit used by the function Max Limit%.
Default: 00.0 Range: 00.0÷99.9

Press the key: the display will be as shown here next.
With or change the digit, with moves the cursor.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.
10.4.4.2.5 - Direction
This parameter enables the flow direction measurement
Default: Bid (bidirectional)
Range: Fwd (forward); Rev (reverse); Bid. (bidirectional)

Press the key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.2.6 - Indication
Set what is the positive flow direction compared to the arrow on the sensor.
Default: Fwd (forward)
Range: Fwd (forward); Rev (reverse)

Press the key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.2.7 - Density(g/ml)
Sets the fluid specific weight to convert the measured volume value by weight.
Default: 1;
Range: 0.100÷9.999

Press the key: the display will be as shown here next.
With or change the digit, with moves the cursor.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.
10.4.4.3 - Pulse Output
Press the \[\text{key}\] to enter the sub menu “Pulse Output”.

10.4.4.3.1 - Freq Max (Hz)
Sets the maximum frequency in relation to Qmax. The digital output is active as a frequency output only when the parameter “Liter / Pulse” is set to 0.0.
Default: 1000.0; Range: 100.0÷5000.0

Press the \[\text{key}\]: the display will be as shown here next.
With \[\uparrow\] or \[\downarrow\] change the digit, with \[\rightarrow\] moves the cursor.

Press \[\text{to confirm}\], the display will be as shown here next.
Press the \[\text{key}\] to exit and confirm the selection; press the \[\text{key}\] to exit and delete the selection.

10.4.4.3.2 - Liter/Pulse
Set the volume per pulse. When this parameter is set to 0.0, the digital output is active as a frequency output (see “Freq Max (Hz)”).
Default: 0.0; Range: 0.0055÷max. according to the DN

Press the \[\text{key}\]: the display will be as shown here next.
With \[\uparrow\] or \[\downarrow\] change the digit, with \[\rightarrow\] moves the cursor.

Press \[\text{to confirm}\], the display will be as shown here next.
Press the \[\text{key}\] to exit and confirm the selection; press the \[\text{key}\] to exit and delete the selection.

10.4.4.3.3 - Pulsewidth (ms)
Sets the pulse width in ms.
Default: 000.5; Range: 0000.0÷1000.0

Press the \[\text{key}\]: the display will be as shown here next.
With \[\uparrow\] or \[\downarrow\] change the digit, with \[\rightarrow\] moves the cursor.

**WARNING** - The “Pulsewidth (ms)” parameter must be set to 0.0 when the digital output is used as a frequency output

Press \[\text{to confirm}\], the display will be as shown here next.
Press the \[\text{key}\] to exit and confirm the selection; press the \[\text{key}\] to exit and delete the selection.
10.4.4.3.4 - Pulse Level
Sets the pulse output energy level. When set LOW the pulse count is low, when set HIGH, the pulse count is high.
Default: Active H (HIGH); Range: Active L (LOW) ÷ Active H (HIGH)

Press the key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.4 - RS485 Output
Press key to enter the sub menu “RS485 Output”.

10.4.4.4.1 - RS Protocol
Sets the RS485 output communication protocol.
Default: MOD-BUS RTU
Range: MOD-BUS RTU ÷ MOD-BUS ASC

Press the key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.4.2 - Baudrate
Sets the RS485 output Baud Rate.
Default: 9600
Range: 1200 - 2400 - 4800 - 9600

Press the key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.
10.4.4.3 - Data Bit
Sets the RS485 output Data Bit.
Default: 8
Range: 8 - 7

Press key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.4 - Parity
Sets the RS485 output Parity.
Default: NONE
Range: EVEN; ODD; NONE

Press the key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.5 - Stop Bit
Sets the RS485 output Stop Bit.
Default: 1
Range: 1 - 2

Press the key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press key to exit and confirm the selection; press the key to exit and delete the selection.
10.4.4.6 - Dev Address
Set the unity UID in RS485 network
Default: 001
Range: 001÷999

Press the key: the display will be as shown here next.
With or change the digit, with moves the cursor.

Press to confirm, the display will be as shown here next.
Press key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.5 - Total Admin
Press the key to enter the sub menu “Total Admin”.
To access the menu “Total Set” may need to enter the correct password.
The default password: 0020
Note: After entering, you can change the password. If forget password can not access the menu

10.4.4.5.1 - Clear Total
Reset totalizer
Default: NO
Range: NO - YES

Press key: the display will be as shown here next.
With or select the parameter setting.

Press to confirm, the display will be as shown here next.
Press key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.5.2 - FWD Preset (m3)
Predetermines the positive totalizer value
Default: 0000000000
Range: 1÷9999999999

Press the key: the display will be as shown here next.
With or change the digit, with moves the cursor.
Press to confirm, then press key to exit and confirm the selection
10.4.4.5 - REV Preset (m3)
Predetermines the negative totalizer value
Default: 000000000
Range: 1÷9999999999

Press the key: the display will be as shown here next.
With or change the digit, with moves the cursor.
Press to confirm, then press key to exit and confirm the selection.

10.4.4.6 - Load Setting
Load factory settings.
Default: NO Range: YES - NO

Press key: the display will be as shown here next.
With or select the parameter setting.
Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

10.4.4.7 - Switch Config
Press to enter the “Switch Config” sub menu

10.4.4.7.1 - Switch1 Config
Sets the function assigned to the D01 relay. The available functions are:
- **Direction**: the negative instantaneous flow measuring signaling is enabled.
  When the instantaneous flow value is negative (ex. -12.34m3/h), the relay is energized and the contact to the D01 terminal is closed
- **Upper Alm**: the high flow rate alarm signaling is enabled;
  When the instantaneous flow rate value is higher than the threshold value, set the parameter “UpAlm Val %FS” (see par. 10.4.4.7.4), the relay is energized and the contact to the D01 terminal is closed
- **Lower Alm**: the low flow rate alarm signaling is enabled;
  When the instantaneous flow rate value is lower than the threshold value, set the parameter “LowAlm Val %FS” (see par. 10.4.4.7.5), the relay is energized and the contact to the D01 terminal is closed

Default: Direction Range: Direction; Upper Alm; Lower Alm

Press key: the display will be as shown here next.
With or select the parameter setting.
Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete the selection.
10.4.4.7.2 - Switch2 Config
Sets the function assigned to the D02 relay. The available functions are:

- **Direction**: the negative instantaneous flow measuring signaling is enabled. When the instantaneous flow value is negative (ex. -12.34m³/h), the relay is energized and the contact to the D02 terminal is closed

- **Upper Alm**: the high flow rate alarm signaling is enabled; When the instantaneous flow rate value is higher than the threshold value, set the parameter “UpAlm Val %FS” (see par. 10.4.4.7.4), the relay is energized and the contact to the D02 terminal is closed

- **Lower Alm**: the low flow rate alarm signaling is enabled; When the instantaneous flow rate value is lower than the threshold value, set the parameter “LowAlm Val %FS” (see par. 10.4.4.7.5), the relay is energized and the contact to the D02 terminal is closed

Default: Direction Range: Direction; Upper Alm; Lower Alm

Press **key**: the display will be as shown here next.
With **or** select the parameter setting.

Press **to confirm, the display will be as shown here next.
Press the **key to exit and confirm the selection; press the **key to exit and delete the selection.

10.4.4.7.3 - Switch1 Select
Associated to the D01 exit (default), or to the P +/- open collector output, the function set to the Switch1 Config parameter (see connections to pag.22).

The available functions are:

- **Kout-1**: the D01 output is associated with the function set to the parameter “Switch1 Config” (default setting)

- **Fout**: the P +/- open collector output is associated with the function set to the parameter “Switch1 Config”; eg. with “Switch1 Config” set to “Upper Alm”, the P +/- output state is low (0Vdc) during the non-alarm condition, and is high (24Vdc) during the alarm condition.

N.B. - Selecting the “Fout” function, the D01 relay is disabled and the P +/- output can not be used as an pulse counter or frequency output.

Default: Kout-1 Range: Kout-1; Fout

Press **key**: the display will be as shown here next.
With **or** select the parameter setting.

Press **to confirm, the display will be as shown here next.
Press the **key to exit and confirm the selection; press the **key to exit and delete the selection.
10.4.4.7.4 - UpAlm Val %FS
Set the high flow rate alarm threshold; the value is expressed in% of Qmax.
Ex.: with Qmax (see par. 10.4.4.2.1) to 250m3/h, and with the threshold set at
70%, the alarm is activated when the measured flow rate is greater than 175m3/h
(250*70% = 175
Default: 100.0 Range: 0.0÷130.0
Press key: the display will be as shown here next.
With or select the parameter setting.
Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete
the selection.

10.4.4.7.5 - LowAlm Val %FS
Set the low flow rate alarm threshold; the value is expressed in% of Qmax.
Ex.: with Qmax (see par. 8.4.4.2.1) to 250m3/h, and with the threshold set at 20%, the
alarm is activated when the measured flow rate is lower than 50m3/h (250*20% = 50)
Default: 010.0 Range: 0.0 ÷ 130.0
Press key: the display will be as shown here next.
With or select the parameter setting.
Press to confirm, the display will be as shown here next.
Press the key to exit and confirm the selection; press the key to exit and delete
the selection.
10.4.5 CALIBRATION

10.4.6 SYSTEM CALIBRATION (CALIBRATION)

Press \( \downarrow \) from run mode, then press \( \uparrow \) to select “Calibration” and press \( \downarrow \) button to enter. Press \( \uparrow \) or \( \downarrow \) to select the desired function and press \( \downarrow \) key to access.

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

Press \( \downarrow \) key: the display will be as shown here next.
With \( \uparrow \) or \( \downarrow \) select the parameter setting.

Press \( \downarrow \) to confirm, the display will be as shown here next.
Press the \( \downarrow \) key to exit and confirm the selection; press the \( \downarrow \) key to exit and delete the selection.

10.4.6.2 - Tube Trim
Push \( \downarrow \) to enter in “Tube Trim”.

10.4.6.2.1 - Empty Trim
ATTENTION: pipe must be empty before continue.
Performs a empty pipe recognition self calibration.
Default: NO
Range: NO - YES

Press \( \downarrow \) key: the display will be as shown here next.
With \( \uparrow \) or \( \downarrow \) select the parameter setting.

Press \( \downarrow \) to confirm, the display will be as shown here next.
Press the \( \downarrow \) key to exit and confirm the selection; press the \( \downarrow \) key to exit and delete the selection.
10.4.6.2.2 - Full Trim

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

Press ✎ key: the display will be as shown here next.
With ▽ or ▼ select the parameter setting.

Press the → key to confirm, the display will be as shown here next.
Press the ◄ key to exit and confirm the selection; press the ◄ key to exit and delete the selection.

10.4.6.2.3 - Tube Region %

Sets the system sensitivity level to recognize the air presence in the sensor: higher the value, greater the sensitivity.
Default: 40.0; Range: 0.0÷97.9

Press ✎ key: the display will be as shown here next.
With ▽ or ▼ select the parameter setting.

Press the → key to confirm, the display will be as shown here next.
Press the ◄ key to exit and confirm the selection; press the ◄ key to exit and delete the selection.

10.4.6.3 - Loop Trim

Press ✎ to enter the submenu “Loop Trim”.

10.4.6.3.1 - 4mATrim

Performs calibration of 4mA. Procedure: connect to analog output terminals a milliammeter; insert the detected current measurement; the system will perform an auto calibration function.
Default: 4.000  Range: 3.000÷5.000

Press ✎ key: the display will be as shown here next.
With ▽ or ▼ select the parameter setting.

Press the → key to confirm, the display will be as shown here next.
Press the ◄ key to exit and confirm the selection; press the ◄ key to exit and delete the selection.
10.4.6.3.2 - 20mA Trim
Performs calibration of 20mA. Procedure: connect to analog output terminals a milli-ammeter; insert the detected current measurement; the system will perform an auto calibration function.
Default: 20.000. Range: 19.000÷21.000
Press \[\text{key} \] key: the display will be as shown here next.
With \[\text{or} \] select the parameter setting.
Press \[\text{key} \] to confirm, the display will be as shown here next.
Press the \[\text{key} \] to exit and confirm the selection; press the \[\text{key} \] to exit and delete the selection.

10.4.6.4 - K Character
Press \[\text{key} \] to enter the function. “K Character “is the measure correction coefficient.
Default: 1. Range: 0.97÷1.03
To access the menu “Total Set” may need to enter the correct password.
The default password: 0003
After entering, you can change the password
Note: If forget password can not access the menu.
Press \[\text{key} \] key: the display will be as shown here next.
With \[\text{or} \] select the parameter setting.
Press \[\text{key} \] to confirm, the display will be as shown here next.
Press the \[\text{key} \] to exit and confirm the selection; press the \[\text{key} \] to exit and delete the selection.
10.4.7 TEST

10.4.8 OUTPUT SIGNAL TEST (TEST)

Premere il tasto dalla modalità run, poi premere il tasto per selezionare “Test”, quindi premere il tasto per accedervi.

10.4.8.1 - Loop Test

“Loop Test” 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 a Qmax set function
Default: 012 Range: 4.0÷20.0

Press key: the display will be as shown here next. With or select the parameter setting. Press to exit.

10.4.8.2 - Pulse Test

“Pulse Test” 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 a Qmax set function
Default: 1000 Range: 1.0÷5000.0

Press key: the display will be as shown here next. With or select the parameter setting. Press to exit.
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>Check the connections</td>
</tr>
<tr>
<td>Output at 4 mA</td>
<td>Transmitter in multidrop mode</td>
<td>Configure Poll Address to 0 to take transmitter out of multidrop mode</td>
</tr>
<tr>
<td></td>
<td>Low Flow Cutoff set too high</td>
<td>Configure Low Flow Cutoff to a lower setting or increase flow to a value above the low flow cutoff</td>
</tr>
<tr>
<td></td>
<td>Flow is in reverse direction</td>
<td>Enable Reverse Flow 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 Reverse Flow function</td>
</tr>
<tr>
<td></td>
<td>Electronics failure</td>
<td>Replace the electronics boards</td>
</tr>
<tr>
<td>Reading doesn’t appear to be within rated accuracy</td>
<td>Transmitter, control system, or other receiving device not configured properly</td>
<td>Check all configuration variables for the transmitter, flowtube, 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>Use replaceable electrodes. Downsize flowtube to increase flowrate above 3 ft/s. Periodically clean flowtube</td>
</tr>
<tr>
<td></td>
<td>Air in line</td>
<td>Move the flowtube 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 1 ft/s (specification issue)</td>
<td>See accuracy specification for specific transmitter and flowtube</td>
</tr>
<tr>
<td></td>
<td>Auto zero was not performed when the flowtube is full, or flowrate is zero</td>
<td>Perform the auto zero function</td>
</tr>
<tr>
<td></td>
<td>Sensor pipe failure</td>
<td>Perform Sensor pipe tests electrode</td>
</tr>
<tr>
<td></td>
<td>Sensor pipe failure–Shorted or open coil</td>
<td>Perform Sensor pipe tests coil</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. Change coil drive to 33 Hz.
2. Increase the damping.

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, or move magnetic flowmeter</td>
</tr>
<tr>
<td></td>
<td>Sludge flows—Mining/Coal/Sand/Slurries (other slurries with hard particles)</td>
<td>Decrease flow rate below 10 ft/s</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>Use replaceable electrodes Downsize flowtube to increase flow rate above 3 ft/s. 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>
</tbody>
</table>

| Meter output is unstable | Electrode incompatibility                           | Check Magnetic Flowmeter Material Selection Guide for chemical compatibility with electrode material |
|                         | Improper grounding                                  | Check ground wiring. See wiring and grounding procedures                           |
|                         | High local magnetic or electric fields              | Move magnetic flowmeter (20–25 ft. away is usually acceptable)                     |
|                         | Control loop improperly tuned                       | Check control loop tuning                                                         |
|                         | Sticky valve (look for periodic oscillation of meter output) | Correct valve sticking                                                            |
|                         | Sensor pipe failure                                 | Perform Sensor pipe Tests                                                         |
|                         | Analog output loop problem                          | Check that the 4–20 mA loop matches the digital value. Perform loop test            |
12-FACTORY TEST AND QUALITY CERTIFICATE

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

RPMAG ........................................................................................................ serial n°: ..............................................................

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: ..................................................