

# EU TYPE EXAMINATION CERTIFICATE

## n. IT-006-18-MI004-2213

### Revision 4

Issued in accordance with the Directive 2014/32/EU of the European Parliament and Council of February 26, 2014 on measuring instruments (MID) and with the Italian decree n° 22/2007 as modified by decree n. 84/2016 of 2016 May 19, which implements the Directive 2014/32/EU (MID) and 2015/13/EU.

Issued by: **Parco Scientifico e Tecnologico del Lazio Meridionale Srl**  
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Issued to: **ISOIL INDUSTRIA S.p.A.**  
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Type of instrument: Electromagnetic water meter intended as subassembly of heat meter  
*Strumento*

Type designation: **Sensors MS2500 DN25-DN400**  
*Modelli* **Converters Model MV800**

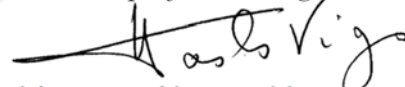
Measurement of	water volume
MID Accuracy Class	Class 1
Environmental Class	M2 / E1
Location	Closed
Environmental Temperature Range	-25 ÷ +55 °C
Water temperature	0 ÷ 180 °C
Maximum admissible pressure	40 bar
Applicable essential requirements	Annex I and Annex VI
Reference standards	EN 1434:2015

Date of issue: October 10<sup>th</sup>, 2019  
*Data di emissione del certificato*

Certificate valid until: November 24<sup>th</sup>, 2027  
*Certificato valido fino al*

On behalf of the Chief Executive Officer

*prof. Paolo Vigo*



#### CLAUSES

The principal characteristics and the approval conditions are set out in the following appendix, which forms a part of the approval documents and consists of 10 pages. Partial publication or distribution of this report is forbidden without written approval of PA.L.MER. In accordance with the European Directive 2014/32/EU (MID), the manufacturer has to inform Pa.L.Mer. about any modifications, even if not significant, made or planned to be made to the above mentioned product. Any modifications made to the model without Pa.L.Mer. approval could invalidate the certificate. In case of new revisions of the certificate the latter version supersedes and reply the previous version..

#### Pa.L.Mer. società consortile a r.l.

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## 1. Design of the instrument

### 1.1. Construction, sensors and indication of the measurement results

The water meter family, intended as subassembly of an heat meter, submitted to the present EU Type Examination is made up of an electromagnetic flanged water meter sensor MS2500 already MID approved (certificate CH-MI001-07007-01 issued by METAS NB 1259) based on the principle of electromagnetic induction. The coils present inside the tube create the magnetic field and two electrodes acquire a signal proportional to the speed of the water according Faraday law. A digital converter MV800, performs the signal processing function measurement and computer in order to count volume of cold and hot water. For further details refers to technical folder MV800+MS2500 rev.00. This report refers only to heating application according MID Directive

The family of water meters covers the nominal diameters in the range from 25-400 and consist in 14 nominal diameters. All the properties of the water meter, whether mentioned or not, shall not be in conflict with the legislation.

### 1.2. Technical documentation folder

<i>Technical Description of the meter:</i>	Technical folder MV800 + MS2500 rev.00
<i>Installation and operation instructions:</i>	
<i>Sealing Plan:</i>	
<i>Drawing of the meter and dimension of the housing:</i>	

## 2. Technical data

### 2.1. Range and accuracy class 1 according EN 1434-1:2015

DN	$q_s$	$q_p$	$q_i$
	$m^3/h$	$m^3/h$	$m^3/h$
25	16	16	0,16
32	25	25	0,25
40	40	40	0,4
50	63	63	0,63
65	100	100	1
80	160	160	1,6
100	250	250	2,5
125	400	400	4
150	630	630	6,3
200	1000	1000	10
250	1600	1600	20
300	2500	2500	31,25
350	2500	2500	31,25
400	4000	4000	50

The MPE is  $\pm(1 + 0,01 q_p/q)$  [%], but not more than 5%.



## 2.2. Initial verification requirements

The water meter shall be tested at the end of the manufacturing process according to EN 1434-5:2015 Initial verification. Ensure that working water temperature range is  $20\text{ °C} \pm 15\text{ °C}$ ;

$$q_i \leq q \leq 1.2 q_i$$
$$0.1 q_p \leq q \leq 0.11 q_p$$
$$0.9 q_p \leq Q \leq 1.1 q_p$$

The error indications determined at each of the above flow rates shall not exceed the maximum permissible errors. If the error determined lies outside the MPE, the test shall be repeated twice unless otherwise stated. The test is then declared satisfactory if both the arithmetic mean of the result of the three tests and at least two of the test results are within or at the MPE. The initial verification can be performed with testing equipment that perform volumetric or gravimetric (static or dynamic) measurement principle. The testing equipment must remain in the range of flow rates mentioned in the “Technical specifications”.

## 2.3. Setting to work requirements.

The water meters do not require a straight run of pipe either upstream or downstream, nor a flow conditioner.

## 3. Software specification

The legally relevant software version can be visualized on display on menu 12- function Firmware Info. The application software is stored in the processor memory. The meter has a unique software identification for the metrologically relevant part, each modification will be identified by a new version code, incremented by a progression of the last digit. Anytime a new software version has been released by the manufacturer it need to be approved by NB Pa.L.Mer.

Software type	P
Software Version	1.01.0014.XXXX (CRC : 7F69A609)
Risk Class	C
Extension	I1

Completeness and correctness of software structure submitted for type evaluation (requirements of Welmec 7.2 Rev.5):

Yes

No

Remarks: None



## 4. Security sealing

The flow meter have to be provided in order to prevent any unauthorized manipulation of the meter, of a key software protection. For each flow meter manufactured only one key is calculated.

It is not permitted to issue this key to the final utilizer. The converter case of the meters are sealed as follows:



N° 4 adhesive MID label are applied in the points as shown here above, Yellow for manufacturer and White for installer. For further details see Fascicolo tecnico MV800 + MS2500 rev.00.

The legalization plan is compliant to the requirements of Welmec 3.11

### 4.1. Labeling and inscriptions

The label contains the following MID requested inscriptions according EN 1434-2:2015 par 9.1.4., as shown in Figure 2:

- a) name of the manufacturer, or his trade mark;
- b) type, year of manufacture, serial number;
- c) meter factor
- d) ( $\Theta_{\min}$  and  $\Theta_{\max}$ );
- e) limits of ( $q_i$ ,  $q_p$  and  $q_s$ ) flow-rates
- f) one or two arrows to indicate the direction of the flow
- g) maximum admissible working pressure
- h) nominal pressure
- i) MID accuracy class
- j) environmental class
- k) heat conveying liquid if other than water
- l) voltage level for external power supply



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Conv. Mod.	<b>ConvModel</b>
Conv.s/n	<b>ConvMatricola</b>
Power S./MP	<b>18 - 30 VDC / 1 W</b>
Sensor Mod.	<b>SensModel</b>
Sens s/n	<b>SensMatricola</b>
DN	<b>SensDn</b>
PN	<b>SensPn</b>
IP	<b>SensIp</b>
Fittings	<b>SensFitt</b>
Lining	<b>SensLining</b>
Sens T	<b>5 - ST</b> Conv T <b>-25+55°C</b>
Electrodes	<b>SensElectrodes</b>
KA	<b>SensKA</b>
AClass	<b>AccClass</b> EEC <b>M2/E1</b>
Pul.value	<b>1=PulseV</b>
Pul. Time	<b>PulseT</b>
qi-qp-qS	<b>QiQpQs</b>

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Figure 2 – Metrological converter label



## 5. Pattern evaluation test

### 5.1. Tests performed

The meter has been submitted to the following tests, according to the main applicable parts of EN 1434-4:2015. The above performed test has been selected according the technical evaluation of the previous MID certification issued by METAS NB 1259 certificate n° CH-MI001-07007-01.

Test performed	EN 1434-4	Applicability
Performance test	7.4	A
Dry Heat	7.5	N/A
Cold	7.6	N/A
Static deviations in supply voltage	7.7	N/A
Durability	7.8	N/A
Damp heat cyclic	7.9.1	N/A
Damp heat steady-state	7.9.2	N/A
Short time reduction in supply voltage	7.10	N/A
Electrical transients - Fast transients - Bursts	7.11.1	A
Electrical transients - Surge transients	7.11.2	A
Electromagnetic field	7.12	A
Electromagnetic field specifically caused by digital radio equipment	7.13	A
Radio frequency amplitude modulated	7.14	A
Electrostatic discharge	7.15	A
Static magnetic field (fraud rotection)	7.16	A
Electromagnetic field at mains frequency	7.17	A
Electromagnetic emission - Conducted on power AC lines	7.20.2	A
Electromagnetic emission - Conducted on power DC and signal lines	7.20.3	A
Electromagnetic emission - Radiated	7.20.4	A
24 hours interruption in the mains power supply voltage	7.21	N/A
Flow disturbances	7.22	N/A
Internal pressure	7.18	N/A
Pressure loss	7.19	N/A
Vibration/mechanical shock	7.23	N/A



## 5.2. Checklist for type approvals of heat meters according to EN 1434

Clause of Part 1	Requirement	+	-	Remarks
6.1.2	The manufacturer of the heat meter shall declare any limitations with regard to installation of the heat meter and its orientation, with respect to the vertical.	X		See technical datasheet rev.0 2017/10/11
6.1.3	IP54 for heating applications and IP65 for cooling applications for equipment that is to be installed into pipework and IP52 for other enclosures.	X		See previous MID certificate CH-MI001-07007-01
6.1.5	The maximum pressure loss at $q_p$ shall not exceed 0,25 bar, except where the heat meter includes a flow controller or also acts as a pressure reducing device.	X		See previous MID certificate CH-MI001-07007-01
6.2	Requirements outside the limiting values of the flow rate.	X		
	When the true value of the flow rate is less than a threshold value declared by the manufacturer, no registration is allowed. According to Part 1 Clause 6.2.			
	For flow rates greater than $q_s$ , the behaviour of the meter, e.g. by producing spurious or zero signals, shall be declared. Flow rates greater than $q_s$ shall not result in a positive error greater than 10 % of the actual flow rate.	X		
6.3.1	The quantity of heat shall be indicated in Joules, Watt- hours or in decimal multiples of those units. The name or symbol of the unit shall be indicated adjacent to the figures of the display.	/		n.a. subassembly
6.3.2	In the event of a failure or interruption of the external power supply (mains or external DC), the meter indication of energy shall remain accessible for a minimum of one year. The manufacturer shall specify how the indication of energy is handled in case of a failure or interruption in the external power supply (mains or external DC).	/		
6.3.3	The reading of the indication shall be sure, easy and unambiguous.	/		
6.3.4	The real or apparent height of the figures on the display for energy shall not be less than 4 mm.	/		
6.3.5	The figures indicating decimal fractions of a unit shall be separated from the others, either by a comma or by a point. In addition, the figures indicating decimal fractions of energy shall be clearly distinguishable from the others.	/		
6.3.6	Where the display is of the roller-type, the advance of a figure of a particular significance shall be completed during the time, when the figure of next lower significance changes from 9 to 0. The roller carrying the figures of lowest significance may have a continuous movement, of which the visible displacement shall then be from bottom to top.	/		
6.3.7	The display indicating the quantity of heat shall be able to register, without overflow, a quantity of heat at least equal to the transfer of energy, which corresponds to a continuous operation for 3 000 h at the upper limit of the thermal power of the heat meter.	/		
	The quantity of heat, measured by a heat meter, operating at the upper limit of the thermal power for 1 h shall correspond to at least one digit of lowest significance of the display.	/		
6.4	Protection against fraud	X		See technical datasheet rev.0 2017/10/11
	Heat meters shall have protective devices which can be sealed in such a way, that after sealing, both before and after the heat meter has been correctly installed, there is no possibility of dismantling, removing, or altering the heat meter or its adjustment devices without evident damage to the device(s) or seal(s).			
	Means shall also be provided for meters with external power supply, either to give protection against the meter being disconnected from the power supply, or to make it evident, that this has taken place. This requirement does not apply to meters with external power supply with automatic switchover to internal battery supply.	X		





6.5.1	AC mains operated heat meters or subassemblies shall have a rated voltage, $U_n$ , of 230 V (+10% -15%).	X		See technical datasheet rev.0 2017/10/11
6.5.2	Remote DC or AC operated heat meters or subassemblies shall have a rated voltage $U_n$ of 24 V. The tolerance for DC shall be 12 V to 42 V and for AC 12 V to 36 V.	X		
	If the remote supply lines are also used for data transmission these values shall be maintained during any data transmission.	/		
6.5.3	Local external DC operated meters or subassemblies shall preferably have a rated voltage $U_n$ of 6 V, 3,6 V or 3 V.	/		
7.2	Temperature difference The ratio of the upper and lower limits of the temperature difference shall not be less than 10, with the exception of heat meters intended for cooling circuits. The lower limit shall be stated by the manufacturer to be either 1, 2, 3, 5 or 10 K. The preferred lower limit is 3 K for heating applications.	/		
7.3	<i>Flow rate</i>			
	The ratio of the permanent flow rate to the lower limit of the flow rate ( $q_p/q_i$ ) shall be 10, 25, 50, 100 or 250.	X		
11.1	Heat meter specification			
	The manufacturer shall make available data sheets containing at least the following information:	/		
11.2	<i>Flow sensor:</i>			
	<ul style="list-style-type: none"> <li>• Manufacturer</li> <li>• Type identification</li> <li>• Accuracy class; may differ depending on mounting orientation and on type of liquid</li> <li>• Environmental classification</li> <li>• Limits of flow rate (<math>q_i</math>, <math>q_p</math> and <math>q_s</math>). Different sets of <math>q_i</math> and <math>q_s</math> may be given depending on mounting orientation and type of liquid</li> <li>• Maximum admissible working pressure (PS in bar)</li> <li>• Nominal pressure (PN)</li> <li>• Maximum pressure loss (pressure loss at <math>q_p</math>)</li> <li>• Maximum admissible temperature</li> <li>• Limits of temperature (min and max). An additional set of limits for the cooling range may be specified for heating/cooling meters.</li> <li>• Nominal meter factor (litres/pulse or corresponding factor for normal and test output)</li> <li>• Installation requirements including installation pipe lengths, etc.</li> <li>• Basic mounting orientation and other specified orientations.</li> <li>• Physical dimensions (length, height, width, weight, thread/flange specification)</li> <li>• Pulse output device class (see EN 1434-2:2015, 7.1.3)</li> <li>• Output signal for testing (type/levels) Performance at flow rates greater than <math>q_s</math> Low flow threshold value</li> <li>• Liquid if other than water</li> <li>• Response time - for fast response meters</li> <li>• Mains power supply requirements - voltage, frequency</li> <li>• Battery power supply requirements - battery voltage, type, life-time</li> <li>• Nominal voltage level for external power supply Current used (average and peak) at external power supply</li> <li>• Energy used per year at external power supply Cabling requirement at external power supply (max. cable length and possible requirement for shielded or twisted cable)</li> <li>• Voltage limit at which the meter switches automatically from external power supply to internal battery</li> <li>• Time limit at which the meter switches automatically from external power supply to internal battery</li> <li>• <math>P_{min}</math></li> </ul>	X		See technical datasheet rev.0 2017/10/11
12	Information to be delivered with the meter or sub- assemblies. Installation instructions under the following headings shall include at least the following information:	X		





12 a)	<i>Flow sensor:</i>	X		See technical datasheet rev.0 2017/10/11
	<ul style="list-style-type: none"> <li>Flushing the system before installation</li> <li>Install in inlet or outlet as stated on calculator</li> <li>Minimum installation pipe length upstream and downstream</li> <li>Orientation limitations</li> <li>Need for flow straightener</li> <li>Requirement for protection from risk of damage by shock and vibration</li> <li>Requirement to avoid installation stresses from pipes and fittings</li> </ul>			
12 c)	Calculator (and flow meter electronics) <ul style="list-style-type: none"> <li>Free distance around the meter</li> <li>Distance between meter and other equipment               <ul style="list-style-type: none"> <li>Need for adaptor plate to fit standardized holes</li> </ul> </li> </ul>	X		
12 d)	<i>Wiring:</i>	X		See technical datasheet rev.0 2017/10/11
	<ul style="list-style-type: none"> <li>Need for earth connection</li> <li>Maximum cable lengths</li> <li>Required separation between signal and power cables</li> <li>Requirements for mechanical support</li> <li>Requirements for electrical screening</li> </ul>			
12 e)	<i>Other:</i>	X		See technical datasheet rev.0 2017/10/11
	<ul style="list-style-type: none"> <li>Initial function check and operating instructions</li> <li>Installation security sealing</li> </ul>			
<b>Clause of Part 2</b>	<b>Requirement</b>	+	-	<b>Remarks</b>
5	<i>Flow sensor:</i>			
5.2	<i>Sizes and dimensions</i> <ul style="list-style-type: none"> <li>For each flow sensor size there is a corresponding value of the permanent flow rate <math>q_p</math> and a set of lengths as given in Tables 3 and 4.</li> <li>Dimensions for the threaded end connections are specified in Table 4. Threads shall comply with EN ISO 228-1.</li> <li>Flanged end connections shall comply with ISO 7005-1, ISO 7005-2 and ISO 7005-3 (as appropriate) for a nominal pressure corresponding to that of the flow sensor.</li> </ul>	X		
		X		
		X		
5.3	Test signal output <ul style="list-style-type: none"> <li>For test purposes, it is required that either high resolution pulses using an adaptor according to Annex B shall be provided, or data from a serial interface, as described in EN 1434-3, using an adapter (if necessary) shall be employed. The discrimination of these test outputs shall be such, that in a test at <math>q_i</math>, the measurement error resulting from the number of pulses is not greater than 0,8 %, and the test period of 1 h for sizes <math>q_p &lt; 10</math> m<sup>3</sup>/h or 1,5 h for <math>q_p</math> m<sup>3</sup>/h, is not exceeded.</li> <li>The nominal relationship between the signal emitted and the quantity measured shall be declared by the manufacturer.</li> </ul>	X		See technical datasheet rev.0 2017/10/11
8	Interfaces between sub-assemblies The component values used verifies that the parameters in Tables 7 and 8 are fulfilled.	X		
9	<i>Marking and security seals</i>			
9.1.4	Flow sensor	X		



	<p>The following information shall appear in legible and indelible characters on the sensor or a security sealed plate:</p> <ul style="list-style-type: none"> <li>a) name of the manufacturer, or his trade mark;</li> <li>b) type, year of manufacture, serial number;</li> <li>c) meter factor;</li> <li>d) limits of temperature ( min and max);</li> </ul> <p>An additional set of limits for the cooling range may be specified for heating/cooling meters;</p> <ul style="list-style-type: none"> <li>e) limits of flow rate (<math>q_i</math>, <math>q_p</math> and <math>q_s</math>) Different sets of <math>q_i</math> and <math>q_s</math> may be given depending on mounting orientation and type of liquid;</li> <li>f) one or two arrows to indicate the direction of the flow;</li> <li>g) the maximum admissible working pressure, PS in bar;</li> <li>h) nominal pressure, PN;</li> <li>i) the accuracy class; may differ depending on mounting orientation and on type of liquid;</li> <li>j) environmental class;</li> <li>k) heat conveying liquid if other than water;</li> <li>l) voltage level for external power supply.</li> </ul>			See technical datasheet rev.0 2017/10/11
9.2	<p>Sites for marking Sites shall be provided for marks (e.g. legal status marks)</p>	X		See technical datasheet rev.0 2017/10/11
9.3	<p>Security seals see Part 1, 6.4</p>	X		See technical datasheet rev.0 2017/10/11

## 6. Certificate revisions

Revision No	Issued on	Revision description
1	14/09/2018	First issue
2	26/03/2019	new CRC version
3	05/07/2019	New software version
4	10/10/2019	Change of water temperature range