

## CERTIFIKÁT EÚ SKÚŠKY TYPU

### *EU – type examination certificate*

Číslo dokumentu: **SK 16-MI001-SMU046** **Revízia 3**  
*Document number:* **SK 16-MI001-SMU046** **Revision 3**  
*Document number:* **SK 16-MI001-SMU046** **Revision 3**  
*Revision 3 replaces the certificate issued by September 4, 2018*

V súlade s: **nariadením vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu, ktorým sa preberá smernica Európskeho parlamentu a Rady 2014/32/EU o harmonizácii právnych predpisov členských štátov týkajúcich sa sprístupnenia meradiel na trhu**  
*In accordance with:* **nariadením vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu, ktorým sa preberá smernica Európskeho parlamentu a Rady 2014/32/EU o harmonizácii právnych predpisov členských štátov týkajúcich sa sprístupnenia meradiel na trhu**  
*Government Ordinance of the Slovak Republic No. 145/2016 Coll. relating to the making available on the market of measuring instruments, which implemented the Directive 2014/32/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments*

Žiadateľ/Výrobca: **INTEGRA METERING**  
*Issued to (Manufacturer):* **INTEGRA METERING**  
**12 Rue Fontgrasse, 31700 Blagnac, France**

Druh meradla: **Vodomer (MI-001)**  
*Type of instrument:* **Vodomer (MI-001)**  
**Water meter (MI-001)**

Označenie typu: **RSO**  
*Type designation:* **RSO**

Základné požiadavky: **príloha č. 1 a príloha č. 3 Vodometry (MI-001) k nariadeniu vlády SR č. 145/2016 Z. z.**  
*Essential requirements:* **príloha č. 1 a príloha č. 3 Vodometry (MI-001) k nariadeniu vlády SR č. 145/2016 Z. z.**  
*Annex No. I and Annex No. III Water meters (MI-001) to Government Ordinance of SR No. 145/2016 Coll.*

Platnosť do: **3. júla 2026**  
*Valid until:* **3. júla 2026**  
**July 3, 2026**

Notifikovaná osoba: **Slovenský metrologický ústav 1781**  
*Notified body:* **Slovak Institute of Metrology 1781**  
**Slovak Institute of Metrology 1781**

Dátum vydania: **2. novembra 2018**  
*Date of issue:* **2. novembra 2018**  
**November 2, 2018**

Základné charakteristiky, popis meradla a podmienky schválenia sú uvedené v prílohe, ktorá je súčasťou tohto certifikátu. Certifikát vrátane prílohy má spolu 13 strán.  
*Essential characteristics, instrument description and approval conditions are set out in the appendix hereto, which forms the part of the certificate. The certificate including the appendix contains 13 pages.*



  
Emanuel Godál  
zástupca notifikovanej osoby  
*representative of notified body*

Poznámka: Tento certifikát EÚ skúšky typu môže byť rozmnožovaný len celý a nezmenený. Bez podpisu a odtlačku pečiatky je neplatný.  
*Note: This EU-type examination certificate shall not be reproduced except in full. Certificates without signature and stamp are not valid.*

## 1 Instructions and standards used within assessment

### 1.1 Generally binding instructions

Meter type was examined in terms of request for given type provisions Government Ordinance of the Slovak Republic No. 145/2016 Coll. relating to the making available on the market of measuring instruments, which implemented the Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments as later amended (next Government Ordinance).

Requirements are set out in Annex No. 1 and Annex No. 3 Water Meters (MI-001) to Government Ordinance of SR No. 145/2016 Coll.

### 1.2 Harmonised standards and normative documents used

OIML R 49-1:2006 - Water meters intended for the metering of cold potable water and hot water. Part 1: Metrological and technical requirements

OIML R 49-2:2004 - Water meters intended for the metering of cold potable water and hot water. Part 2: Test methods

EN 14154-1:2005+A2:2011 - Water meters - Part 1: General requirements

EN 14154-2:2005+A2:2011 - Water meters - Part 2: Installation and conditions of use

EN 14154-3:2005+A2:2011 - Water meters - Part 3: Test methods and equipment

### 1.3 Other instructions used:

OIML R 49-2:2013 Water meters intended for the metering of cold potable water and hot water. Part 2: Test methods

OIML R 49-3:2013 Water meters intended for the metering of cold potable water and hot water. Part 3: Test report format

ISO 4064-1: 2017 Water meters for cold potable water and hot water. Part 1: Metrological and technical requirements

ISO 4064-2: 2017 Water meters for cold potable water and hot water. Part 2: Test methods

ISO 4064-5: 2017 Water meters for cold potable water and hot water. Part 5: Installation requirements

## 2 Type marking

Ultrasonic water meter – **RSO**

Meter is made in following subgroups:

Type of meter	Temperature class	Classes	Nominal Diameter
RSO	T30, T50	M1 <sup>1)</sup> O <sup>2)</sup> E2 <sup>1)</sup>	DN50, DN65, DN80, DN100, DN125, DN150 and DN200

<sup>1</sup> according to Government Ordinance of the Slovak Republic, Annex No. 1

<sup>2</sup> according to EN 14154-3:2005+A2 and OIML R 49-2:2004



### 3 Description of measuring instrument

**Meter name:** Ultrasonic water meter

**Type marking:** RSO

#### Description of operating principle instrument design:

The RSO is a family of ultrasonic water meters which has been designed for measuring of flow and delivered water quantity.

Ultrasonic water meter (Picture No. 1) consists of:

- Measurement box (IP 68 electronic module composed with two layers of PCB: one is measurement board, which includes INTEGRA METERING ultrasonic chip; one is for user board, which realizes customized display and advanced communication functions),
- meter body (designed with high hydrodynamic performance, very low pressure loss with no reduction of diameter and excellent resistance to corrosion),
- transducer (four transducers with 4 MHz frequency specially designed by INTEGRA METERING to have better measurement precision).

Ultrasonic water meter is intended for measuring reverse flow.



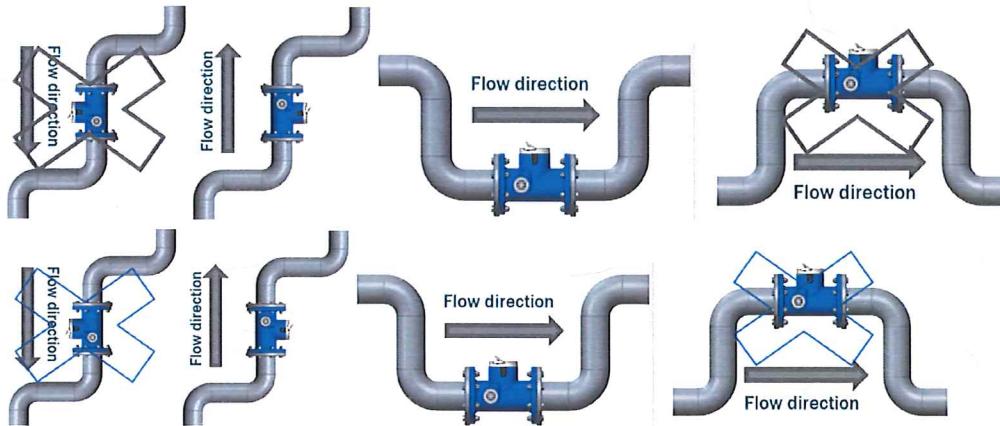
*Picture No.1 Ultrasonic water meter RSO*

Flow meters can operate in horizontal or vertical position without consequences on accuracy. Pipes must always be filled with water when the device is counting. Follow illustrations below for instructions on mounting the sensor (Picture No. 2).





**Mounting instructions**



*Picture No.2 Instructions on mounting the sensor*

Special conditions: Water must always be in the sensor when counting. Respect 5 pipe diameters after the presence of a pump.

**3.1 Description of subgroups**

Marking: RSO

DN: DN50, DN65, DN80, DN100, DN125, DN150 and DN200.

**3.2 Flow sensor**

The structure of flow sensor is shown in the drawings according to item 3.5 of this Annex.

Flow sensor consists of measuring tube with 4 inner sensitive transducers. The tube is of cast iron. Connections of flow sensor are flanges.

**3.3 Measurement box**

The measurement box is the electronic part of the water meter. The main part is the embedded ASIC designed by INTEGRA METERING, which generates 4 MHz excitation on transducers, the response is then processed by the converter which is converted to flow on the display of the water meter. Following data are available: Instantaneous flow rate and index. A pulse output is also available.

Calibration parameters for conversion of the flow are stored in read-only memory of the electronics and are protected with a seal with a customized logo inspired from INTEGRA METERING logo.



Tab No. 1 LCD V5

Version LCD V5  
AA204007-03A



The water meter is fitted with an in-built LCD Display. 10 digits are available for Index display. Units available in European norm or American norm: m<sup>3</sup>, ft<sup>3</sup>; L, GAL, m<sup>3</sup>, ft<sup>3</sup>, L, per hour, minute or second.

According to EN 14154-1:2005+A1:2007 par. 4.3, the height of digits should be at least 4 mm and the number of digits should reach 999 999 m<sup>3</sup> for 63 < Q<sub>3</sub> ≤ 63 and 99 999 for 6.3 < Q<sub>3</sub> ≤ 63.

For verification purposes the resolution should be able to be equal to 0.5 % of the volume corresponding to 1h30 at the minimum flow rate Q<sub>1</sub>.

Index Resolution	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200
Integer nb of digits	7	8	8	8	8	8	8
Decimal nb of digits	3	2	2	2	2	2	2
V <sub>1</sub> =1h30 @ Q <sub>1</sub>	0.12	0.20	0.20	0.3	0.45	0.75	1.2
0.5%*V <sub>1</sub> (L)	0.6	0.98	0.98	1.5	2.25	3.75	6
Resolution (L)	0.1	0.1 <sup>3</sup>	0.1	1	1	1	1

Example of reading of cumulated index

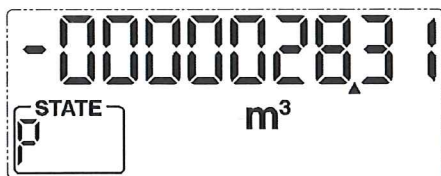


Volume displayed in cubic meters.

Pulse output activated, showed by the presence of



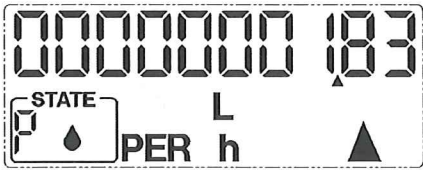



Reverse flow cumulated index



Note: Reverse flow is not available on the pulse output in this software version.

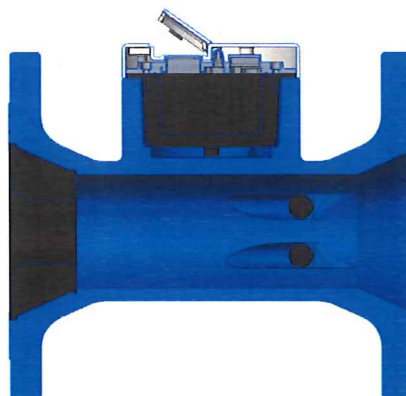
Reverse flow is showed with a minus on the left.



<p>Example of instantaneous flow reading</p> 	<p>Instantaneous flow in L/h</p> <p style="text-align: center;">L PER h</p> <p>Presence of water indicated by drop </p> <p>Direction of water indicated by arrow </p>																				
<p>Alarm codes</p> 	<p><b>Full description of Alarms</b></p> <table border="1"> <thead> <tr> <th>ALARM CODE</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>E1</td> <td>Tamper</td> </tr> <tr> <td>E2</td> <td>Air bubbles</td> </tr> <tr> <td>E3</td> <td>Burst</td> </tr> <tr> <td>E4</td> <td>Leak</td> </tr> <tr> <td>E5</td> <td>Frost</td> </tr> <tr> <td>E6</td> <td>Heat</td> </tr> <tr> <td>E7</td> <td>Over temperature</td> </tr> <tr> <td>E8</td> <td>No consumption</td> </tr> <tr> <td>E9</td> <td>Not assigned</td> </tr> </tbody> </table>	ALARM CODE	Meaning	E1	Tamper	E2	Air bubbles	E3	Burst	E4	Leak	E5	Frost	E6	Heat	E7	Over temperature	E8	No consumption	E9	Not assigned
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### 3.4 Principle of operation

The ultrasonic water meter uses four ultrasonic transducers that can both send and receive sound. There are two channels in parallel and each channel has two transducers face to face. The sound is transmitted between the transducers through the water that goes through the meter. The sound propagation time between the transducers is measured in both directions. If there is no fluid motion, the propagation times in two directions are ideally the same. But there is fluid motion, it will cause the downstream time to decrease and the upstream one to increase. The difference of two propagation time could be used to calculate the flow velocity. Then the flow rate can be calculated thanks to the section of the pipe.



Picture No.3 The inner tube showing the transducers





### 3.5 Technical documentation

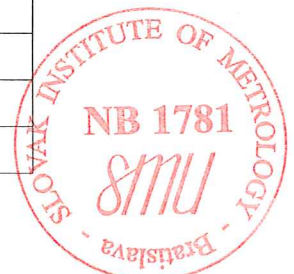
A number of drawings of technical documentations are listed in the following list:

Drawing Number	Title
AM-020633_04 ABA101001-16A ABA101001-18A ABA101001-17A	RSO DN 50 ISO EN (PN 16) RSO DN 50 ANSI (Class 150) RSO DN 50 ANSI Class BS10 (Table D)
AM-020634_04 ABB-101001-13A ABB-101001-13B	RSO DN 65 ISO EN (PN16) RSO DN 65 ANSI (Class 150)
AM-020635_03 ABC101001-16A 1BC101001-17A	RSO DN 80 ISO EN (PN 16) RSO DN 80 ISO
AM-020636_05 ABD101001-16A ABD101001-18A ABD101001-17A	RSO DN 100 ISO EN (PN 16) RSO DN 100 ANSI (Class 150) RSO DN 100 BS10 (Table D)
AM-020637_02 ABG101001-10A ABG10001-10B	RSO DN 125 ISO EN (PN16) RSO DN 125 ANSI (Class 150)
AM-020638_02 ABE101001-14A ABE101001-16A ABE101001-15A	RSO DN 150 ISO EN (PN16) RSO DN 150 ANSI (Class 150) RSO DN 150 BS10 (Table D)
AM-020639_02 ABH101001-06A ABH101001-07A ABH101001-02A ABH101001-03A	RSO DN200 ISO EN (PN16) RSO DN200 ISO EN (PN10) RSO DN200 ANSI (Class 150) RSO DN200 BS10 (Table D)

All drawings, schemes and technical documentations used during the conformity assessment are saved in document No. NO-339/17, NO-319/16, NO-398/18 and NO-399/18.

### 4 Basic technical characteristics

Type marking		RSO
Nominal diameter DN	mm	50, 65, 80, 100, 125, 150, 200
Indicating range	m <sup>3</sup>	999 999 or other (programmable)
Resolution of the reading	m <sup>3</sup>	0,01 or other (programmable)
Maximum admissible pressure	-	MAP16 for DN 50 to DN 150 MAP 10 or MAP 16 for DN 200
Working pressure range	bar	from 0,3 to 16 from 0,3 to 10 or 16 for DN 200
Pressure loss	-	$\Delta p$ 16
Temperature class	-	T30, T50
Flow profile sensitivity classes	-	U0 / D0
Position	-	H, V



Type marking		RSO
Climatic and mechanical environments	-	mech. class M1 Storage -25°C to +70°C (max 4 weeks) Operational 1°C to 55°C
Electromagnetic environments	-	E1, E2

**4.1 Additional technical characteristics**

Weight	from 10 kg to 36 kg
Environmental protection (IP Code)	IP68
Power source	Lithium Battery, 3.6 V, 10 years life time No external AC/DC connection Max voltage
Outputs	Pulse output, with pulse coefficient to be programmed at order Direction output
Connection	Flanges ISO EN 1092-1, ANSI or BSI
Display	LCD, 9 digits
Software	Type P (Weltec Guide 7.2, Issue 5)
Software version and checksum	<p>SW 2.3.1 PSG (checksum – CRC16: 0x242E) Pulse output Sigfox GPS</p> <p>SW 2.3.2 PSG LCDv3 (checksum – CRC16: 0x9776)</p> <p>SW 2.3.2 PSG LCDv4 (checksum – CRC16: 0xB40E)</p> <p>Pulse Output + Sigfox output+GPS+Evolution to LCD Y52019A-01-CD-3</p> <p>SW 2.3.2 PR LCDv3 (checksum – CRC16: 0x3858) Pulse output+ RS485+LCD v3</p> <p>SW 2.3.2 PR LCDv4 (checksum – CRC16: 0x1F28) Pulse+ RS 485+ LCD Y52019A-01-CD-3</p> <p>SW 2.3.3 LCD v5 (checksum CRC16: 0x57AD)→ modification of LCD</p> <p>SW 1.03.03 CRC 0FE9 (juin 2018) New Software with only one ASIC</p> <p>SW 1.04.03 49D8 (november 2018): New modes</p> <ul style="list-style-type: none"> <li>- Sleep mode,</li> <li>- Calibration mode,</li> <li>- Testing mode</li> <li>- Automatic signal detection</li> </ul> <p>All these version correspond to the same Legal Software 49D8. The above CRC is a global CRC for the program (containing display and legal )</p>





**5 Basic metrological characteristics**

The maximum permissible error (accuracy class):

$$\pm 5 \% (Q_1 \leq Q < Q_2)$$

$$\pm 2 \% (Q_2 \leq Q \leq Q_4) \text{ for water temperature (from 0,1 to 30) } ^\circ\text{C}$$

$$\pm 3 \% (Q_2 \leq Q \leq Q_4) \text{ for water temperature greater than 30 } ^\circ\text{C}$$

Temperature class	T	-	30, 50			
Connection	-	mm	50	65	80	100
Minimum flow rate	$Q_1$	m <sup>3</sup> /h	≥ 0,08	≥ 0,126	≥ 0,126	≥ 0,2
Transitional flow rate	$Q_2$	m <sup>3</sup> /h	≥ 0,128	≥ 0,202	≥ 0,202	≥ 0,32
Permanent flow rate	$Q_3$	m <sup>3</sup> /h	<b>40</b>	<b>63</b>	<b>63</b>	<b>100</b>
Overload flow rate	$Q_4$	m <sup>3</sup> /h	50	80	80	125
Measuring range R	$Q_3/Q_1$	-	≤ 500 <sup>3</sup>			
Ratio	$Q_2/Q_1$	-	1,6			

Temperature class	T	-	30, 50		
Connection	-	mm	125	150	200
Minimum flow rate	$Q_1$	m <sup>3</sup> /h	≥ 0,32	≥ 0,5	≥ 0,8
Transitional flow rate	$Q_2$	m <sup>3</sup> /h	≥ 0,512	≥ 0,8	≥ 1,28
Permanent flow rate	$Q_3$	m <sup>3</sup> /h	<b>160</b>	<b>250</b>	<b>400</b>
Overload flow rate	$Q_4$	m <sup>3</sup> /h	200	313	500
Measuring range R	$Q_3/Q_1$	-	≤ 500 <sup>3</sup>		
Ratio	$Q_2/Q_1$	-	1,6		

**6 Results of conformity assessment**

The results of tests, assessments and evaluations given in the evaluation report No. NO-399/18/B/ER dated November 1, 2018 give sufficient evidence, that the technical design of the measuring instrument – Ultrasonic water meter type RSO is in compliance with the technical requirements of the Slovak Republic Governmental Ordinance No. 145/2016 Coll. relating to the making available on the market of measuring instruments, Annex No. 1 and Annex No. 3 Water Meters (MI-001) and the STN EN 14154-1:2005+A2 and OIML R 49-1:2006 standards (harmonised standards and normative documents) and other instructions ISO 4064-1:2017, ISO 4064-2:2017 and ISO 4064-3:2015 standards, which are relevant for this type of meter.

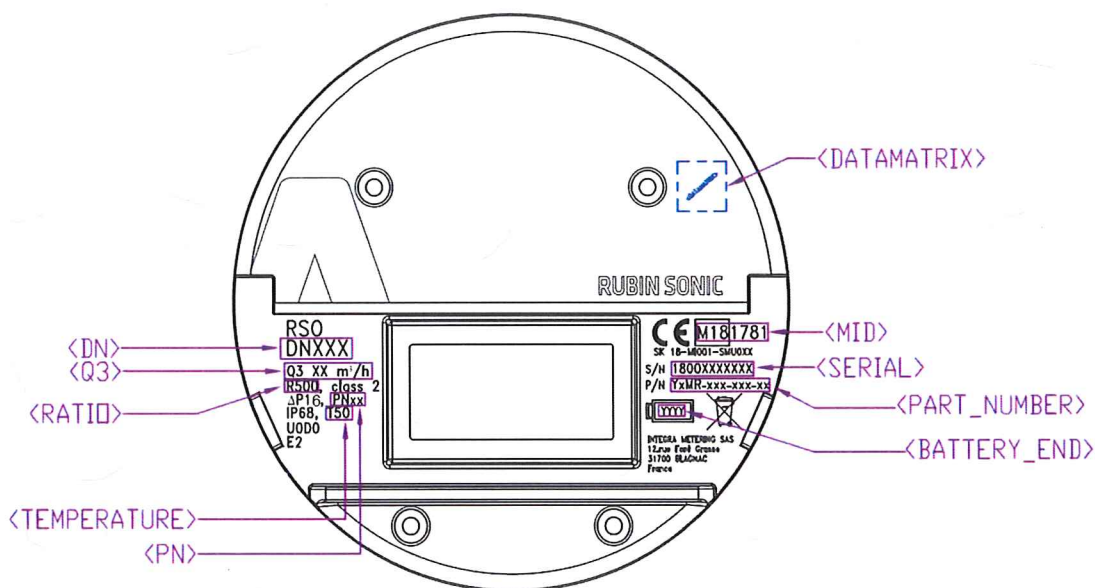


<sup>3</sup> according to EN 14154-1-2005+A2:2011, 7.2 Measuring range

**7 Data placed on the measuring instrument**

On the shroud, the dial of the indicating device or on an identification plate of every water meter or in the product documentation minimum the following data should be marked:

- a) producer's name, registered trade name or registered trade mark and contact postal address at which they can be contacted
- b) type of the Ultrasonic water meter
- c) measuring unit  $m^3$
- d) numerical value of  $Q_3$  and ratio  $Q_3/Q_1$
- e) production number and the year of production
- f) number of EU-type examination certificate and conformity mark
- g) the highest admissible pressure if it differs from 1 MPa
- h) flow direction
- i) the temperature class where it differs from T30
- j) class of pressure loss if it differs from  $\Delta p_{63}$
- k) class of climatic and mechanical environment
- l) flow profile sensitivity classes
- m) class of electromagnetic environment
- n) for a replaceable battery: the latest date by which the battery shall be replaced



Picture No.4: Meter Dial

**8 Conditions of conformity assessment of measuring instruments produced with type approval**

Ultrasonic water meter put onto the market in line with the procedure of conformity assessment according to the Annex No.2 (Module D or F) of the Governmental ordinance should be in compliance with the technical description by the item 3 of this report and at test should be in compliance with the requirements determined in OIML R 49-1:2006 and ISO4064-1:2017. Metrological test is performed by testing equipment which should be in compliance with the requirements determined in STN EN 14154-3:2005+A2 and ISO4064-2:2017 and water at temperature  $20\text{ °C} \pm 5\text{ °C}$  in following point of flowrate:

- a) Minimum flowrate  $Q_1 \leq Q \leq 1,1Q_1$
- b) Transitional flowrate  $Q_2 \leq Q \leq 1,1Q_2$
- c) Permanent flowrate  $0,9Q_3 \leq Q \leq Q_3$

A metrological test may only be performed by a producer, or a notified body respectively in line with the conformity assessment procedure according to the D or F Modules of the Governmental ordinance respectively.

## 9 Measures asked for providing measuring instrument integrity

### 9.1 Identification

Ultrasonic water meter should be in compliance with the description provided on item 3 of this Annex and should be in compliance with the marking specified the item 7 of this Annex. The number given to the EU-type examination certificate is put at each piece of the measuring instrument.

Emplacement of the conformity mark is determined by § 15 of the Governmental ordinance.

### 9.2 Sealing of the measuring instrument

Ultrasonic water meter shall be sealed before the conformity assessment according to the Annex No.2 (Module D or F) of the Governmental ordinance sealed by following sealing marks (Picture No. 5).

- 4 seals are located on the screws of the upper hood, that way the hood cannot be dismantled without breaking it, or drilling the seals. This protects the electronics for measurement and communication and the display.
- 2 plastic seals are located on the transducer location: 1 on each side of the water meter, this prevents access to the sensitive part.



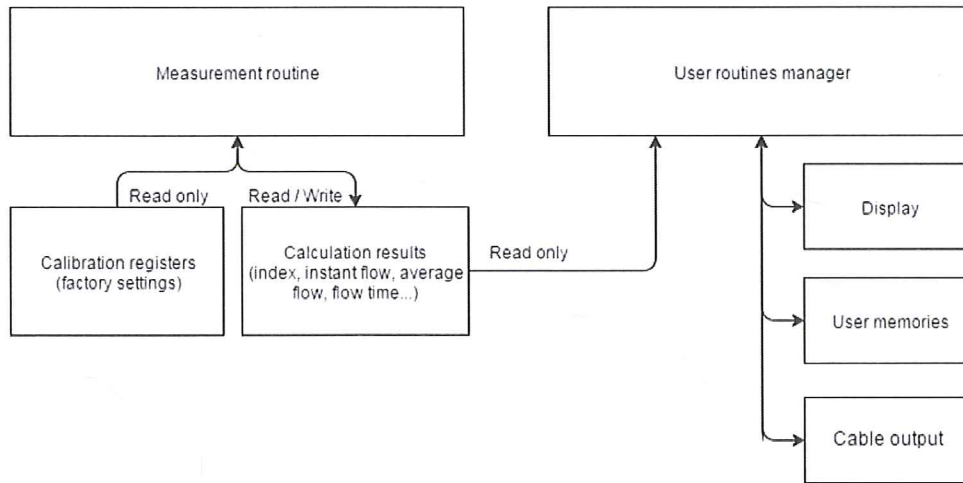
*Picture No.5 Emplacement of seal used for security measures*

The software is sealed by a password different for each water meter produced. The legal parameters are stored on a read-only memory. The software is identified by a CRC-16. There is a CRC for the measurement routine (legal software) and a CRC for the user routines manager (Picture No.6).





**Global software overview**

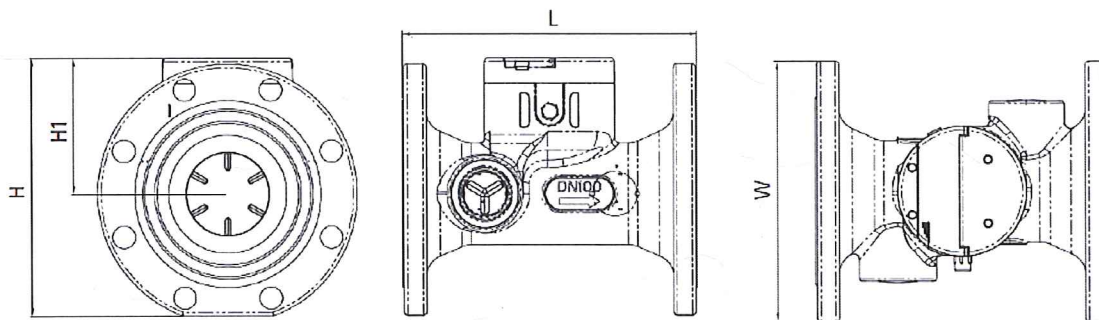


Picture No.6 Global software overview

**10 Requirements for installation, especially conditions of usage**

**10.1 Installation data**

Nominal Diameter	50	65	80	100	125	150	200
L (mm)	200	200	225	250	250	300	350
W (mm)	165	185	200	220	250	285	340
H (mm)	182,5	198,5	215,5	233,5	250	275,5	312
H1 (mm)	97	103	108	115	127	134	152
Weight (kg)	10	12	13	15	18	26	36



Picture No. 7 Installation dimensions



**10.2 Installation requirements**

The Ultrasonic water meter water meter is introduced into the operation by a worker having a certificate for this activity performance. The Ultrasonic water meter is possible to be put into use after a construction in line with this report and in line with the producer instruction by “Instruction of installation and conditions of use of ultrasonic water meters”. A measuring instrument should be installed in direction of water flow arrow marked on the meter body.

**10.3 Conditions of use**

The measuring instrument should be used within the recommendations of a producer.

Assessment done by: Ing. Viliam Mazúr

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