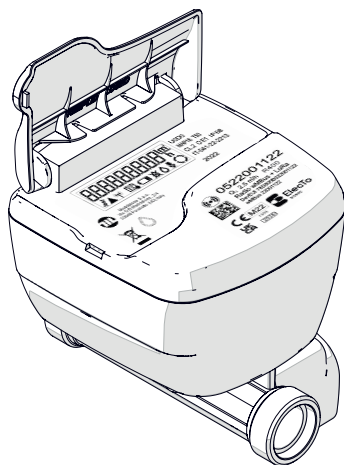**maddalena®**

METERING EXPERTISE

ElecTo SONIC

Ultrasonic meter

INSTRUCTIONS FOR INSTALLATION, USE AND MAINTENANCE

Translation of the original instructions.

Before installing and using the device, carefully read this manual and store it together with the product.

maddalena®

Symbols used in this manual and relative meaning

WARNING!
Indicates particularly important information.

DANGER!
Identifies actions that may lead to injury or damage to the device if not performed correctly.

PROHIBITED
Indicates actions that MUST NOT be performed.

Compliance

Maddalena S.p.A. declares that **ElecTo SONIC** is compliant with the mandatory requirements of the following directives and standards:

– Directive 2014/32 MID (Measurement and adjustment devices)
– Radio Equipment Directive (RED) 2014/53/EU
– Directive 2011/65/UE and subsequent revisions (RoHS)

CE   UKCA

The full text of the Declaration of Conformity can be found on page 18 "**Compliance declaration**".

Images for demonstration purposes only: elements may vary

Warranty

Conditions of sale and warranty
The conditions of sale and warranty are available on the website **www.maddalena.it**.

Warranty limitations
Maddalena S.p.A. declines all responsibility, with immediate invalidation of the warranty in relation to:

– Damage or defects caused by transport or loading/unloading
– Incorrect installation caused by a failure to observe the instructions provided
– Use for purposes other than those indicated in this manual
– Use by unqualified or untrained personnel

Contents

1 General information

1.1 Warnings and safety rules

WARNINGS

– This manual is the property of **Maddalena S.p.A.** and reproduction or transfer to third parties of the contents of this document is prohibited. All rights reserved. This document represents an integral part of the product; ensure that it is always together with the product, even in case of sale/transfer to another owner, allowing its consultation by the user or authorised maintenance or repair personnel.

– Read this manual carefully before using the device to ensure safe operation.

– The device must be used as intended by **Maddalena S.p.A.**, which is not liable for damage caused to persons, animals or property by installation, adjustment or maintenance errors or improper use of the device.

– After unpacking, ensure the delivery is intact and complete. If it does not correspond to what was ordered, contact the local distributor who sold you the device.

– The device must be installed and used in an area protected from freezing.

– The device must always be protected from extreme humidity and heat. Penetration of humidity and intense heat may damage the battery and the device. The maximum allowed operating temperature is 55°C.

– If in doubt about the condition and/or functionality of the device and its parts, please contact your local distributor for further information.

– Once the device has been commissioned, report any faults or malfunctions found to the product supplier.

– In the event of complete destruction of the device, with the electrolyte escaping, avoid skin and eye contact with the electrolyte, do not inhale the vapours produced and ventilate the room adequately.

– This device is not intended for use by persons with reduced mental or motor capacities, or lack of experience and knowledge (including children), unless they are supervised by a person responsible for their safety and given appropriate instruction on how to use the device.

1.2   Restrictions

🚫 **PROHIBITED**

– Modify and/or attempt to repair the product. All repairs must be performed exclusively by authorised personnel.

– Leave the device exposed to atmospheric agents.

– Place the device near to heat sources or expose it to direct sunlight.

– Position the device in proximity of sources of electromagnetic disturbance.

– Open and/or replace the battery.

– Use solvents to clean the device.

– Incorrectly dispose of packaging material and keep it out of children's reach as it may represent a hazard. Disposal must be performed in line with applicable laws.

– Dispose of the device as domestic waste.

1.3   Device description

ElecTo SONIC is a static cold water meter. It measures the flow volume, flow rate and other parameter values using ultrasonic technology. The meter continuously monitors the status of operating and installation parameters. In the event of a fault, it triggers and sends the dedicated alarms.

ElecTo SONIC is equipped with an integrated radio which uses Wireless M-Bus and LoRaWAN technology allowing remote data transmission. Data can be received using a special mobile reading kit or via concentrators and a fixed network.

The main technical features of **ElecTo SONIC** are:

– **Liquid crystal display**;
– **NFC interface for device configuration**;
– **Protection class IP68**;
– **Accuracy class up to R800**;
– **Fault reporting.** Reporting of abnormal water consumption and error detection (see **Alarms**);
– **Absence of moving parts.** Resistance to wear and constant functioning over time;
– **Datalogging functionality.** Historic values are available relating to: current volume, backflow volume, minimum and maximum flow rate, water temperature;
– **Power supply.** Long-lasting lithium battery (depending on the set configuration);
– **Available with built-in wM-Bus and/or LoRaWAN 868MHz radio communication**.
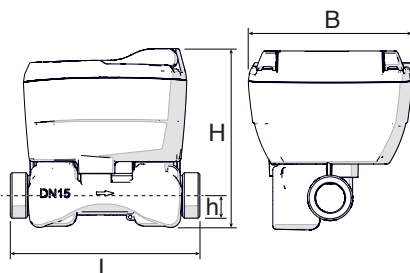
1.4 Usage limits

The product may only be used in accordance with the corresponding limits of use (see "**Technical specifications**").

1.5 Structure
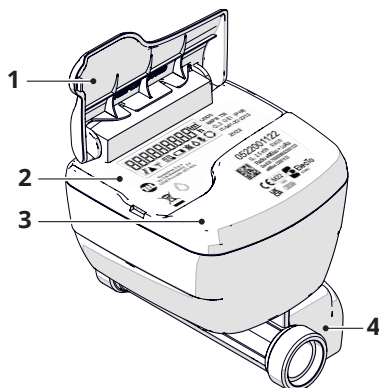
1 Cover;
2 LCD display;
3 NFC area;
4 Meter housing.

1.5.1 Dimensions

| DN		15	20	25	32	40
	inches	1/2"	3/4"	1"	1" 1/4	1" 1/2
L	mm	110 / 165	130 / 190	260	260	300
Thread	inches	3/4"B - 1"B	1"B	1" 1/4B	1" 1/2B	2"B
H	mm	97	101	110	118	127
h	mm	19	21,5	25	29	34
B	mm	94	94	94	94	94

1.6 Identification

The **ElecTo SONIC** meter has its identification data marked on it.
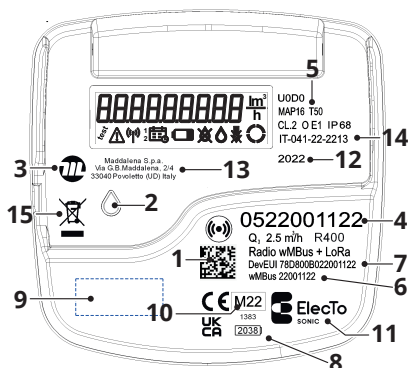
1 QR code
2 LED
3 Manufacturer
4 Meter serial number
5 Measurements
6 Wireless serial number wMBus
7 DevEUI radio LoRaWAN
8 Battery expiration date
9 Space for customer's logo (optional)
10 MID approval
11 Product name
12 Year of manufacture
13 Manufacturer's address
14 Type-approval number
15 WEEE marking

1.7 Display
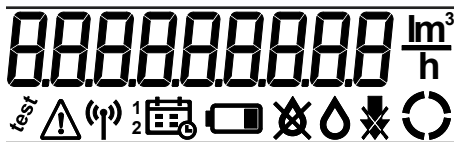
The 9 digit LCD shows the data on volume and flow rate cyclically, as well as any active error codes.
The display is set in fixed mode with the following automatic display cycle:
– for 60 seconds, the **Main view**;
– for 12 seconds, the **Periodic readings**;
– for a further 12 seconds, the **Display Test and firmware version**.

Icon	Description
test	**Test** Activated during test mode
⚠	**Error** Activated when an error is displayed
(•)	**Transmission antenna** Signals radio transmission or radio enabled
📅	**Calendar** Activated when billing dates are displayed
🔋	**Battery** Activated when the calculated service life is coming to an end or when the voltage drops below the minimum value (in which case the error icon also lights up)
⬡	**No flow indicator** Activates when no instrument flow rate is detected
◊	**Leakage** Activated when the leakage alarm is triggered
⬇	**Backflow** Activated when the reverse flow alarm is triggered
◯	**Star indicator** The indicator, consisting of 2 arc segments, follows the flow by rotating clockwise for direct flow and anticlockwise for reverse flow

1.7.1 Main view

– The volume measured is displayed for 12 seconds;
– The flow rate is displayed for 3 seconds;
– The display cycle is automatically repeated 4 times, for a total of 60 seconds (12+3 =15 x 4 =60).

1.7.2 Periodic readings

Following an automatic sequence, billing date references are displayed:
– Date of reading 1 displayed for 3 seconds;
– Periodic reading 1 displayed for 3 seconds;
– Date of reading 2 displayed for 3 seconds;
– Periodic reading 2 displayed for 3 seconds.
The calendar icon is active during the display.

1.7.3 Display test and firmware version

The display is presented as follows:
– all segments active for 3 seconds;
– all segments off for 3 seconds;
– the installed firmware version is displayed for 3 seconds. The displayed format is **MM.mmF**, in which **MM** indicates the number (2 digits) of the main version, **mm** indicates the number (2 digits) of the secondary version and **F** represents the firmware;
– the firmware CRC for 3 seconds. The format displayed, using all 8 digits of the display, is 32-bit hexadecimal using both digits and letters (0-9/A-F);
– any error codes for 3 seconds (e.g. Err XXXX, where XXXX is the hexadecimal code for the error). See table "**Error codes**".

1.7.4 Seals

The meter has a hole (1) at the side of the body, which is designed for inserting a wire seal when installing on site.
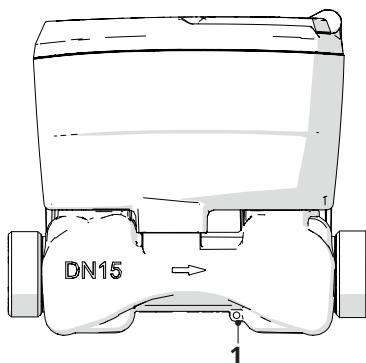
1.8 Alarms

ElecTo SONIC is able to detect, store, and transmit the following alarms via radio:

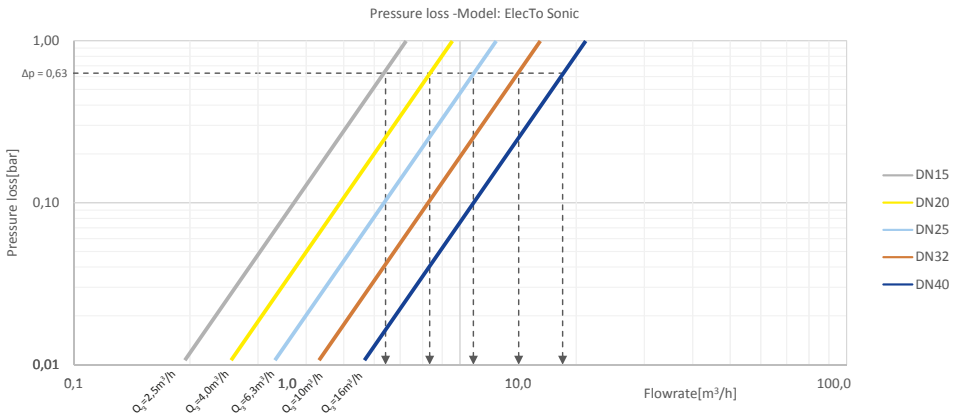| Alarm	Description	Possible status	Default
Suspected leak	Continuous flow rate detected	ON/OFF	ON
Backflow	Reverse flow rate for a preset threshold	ON/OFF	ON
Over-consumption	Flow rate exceeds a threshold for a preset period	ON/OFF	OFF
No consumption	The meter detects no consumption for a preset period	ON/OFF	ON
Reversed meter	Constant negative consumption for more than 10 days	ON/OFF	ON
Ice	The meter receives no ultrasonic signal and the temperature is below the minimum threshold	Always ON	ON
Empty tube/air	The tube is empty or the transducers do not receive the ultrasonic signal (possible damaged transducer)	Always ON	ON
Low/high water temperature	The meter is operating outside envisaged temperature limits	Always ON	ON
Verification period expiry	The meter has exceeded the verification period	ON/OFF	OFF
Low battery voltage	Battery voltage is too low	Always ON	ON
Low battery charge	Battery is flat	ON/OFF	ON
Metrological checksum error	The firmware (flash memory) is corrupted	Always ON	ON

1.8.1 Alarm transmission (LoRaWAN mode)

– if an alarm condition occurs and the frame has not yet been sent in the current window, it is sent early;
– if an alarm condition occurs and the frame has already been sent in the current window, an event frame is sent.
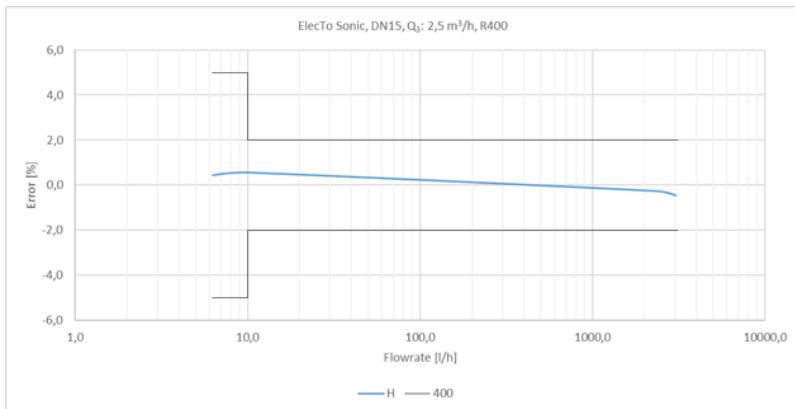
The table header shows maddalena logo top right.

1.9 Technical specifications

Description	DN 15	DN 20	DN 25	DN 32	DN 40	U.M.
Accuracy class	2					
Ratio Q_3/Q_1	400					
Maximum reading	999999,999					m^3
Maximum working pressure	16					MPa
Temperature class	T50: from +0,1 to +50					°C
Sensitivity class for installation conditions	U0 - D0					
Protection class	IP68					
Power supply	LiSoCI2 3.6 V					
Useful battery life	16 (Default)					years
Environmental and mechanical conditions	Class O					
	Storage temperature: -20°C ÷ +60°C Operating temperature: -10°C ÷ +55°C					
Mechanical class	M1					
Electromagnetic class	E1					
Liquid	Water					
Installation position	Any position envisaged by MID					
Indicative starting flow rate	3,0	5,0	7,5	12,5	20,0	l/h
Pressure drop	63					KPa
Available certifications	DM174					

1.10 Additional technical specifications

1.10.1 Pressure drop

Pressure loss -Model: ElecTo Sonic

1.10.2 Typical error curve

ElecTo Sonic, DN15, Q₃: 2,5 m³/h, R400

# 1.11 Radio technical specifications

Features	Description
Status radio	Activation by passage of water (10L)
Configuration	Using Android app via NFC (ISO 15693) interface
Standard	Wireless M-Bus, OMS
	LoRaWAN™ v. 1.03 class A
Modes	wMBus T1, C1
	LoRa SF7-12, BW125-500, CR=4/5
Operating frequency range	863 to 870 MHz
Radiated power	14dBm max
Transmission distance*	Up to 15Km in LoRaWAN™
	Up to 500mt in wM-Bus
Device class	Radio class 1
Data sent	**LoRaWAN** (OTAA) - measurement data transmission (alarms, hourly/daily consumption) twice a day - supervision data transmission (alarms, device status information) once a week
	wM-Bus - Tiny frame (default): current volume, date and time, volume on billing date, billing date, errors - Short frame: current volume, volume on billing date, meter serial number, alarms - Long frame (n C1 mode only): same as short frame with the addition of values from the last 12 months

* in line of sight

Factory radio configuration	Single mode	Dual mode	
	wM-Bus	**wM-Bus**	**LoRaWAN**
Data sent	Tiny Frame C1: current volume, date and time, volume on billing date, billing date, errors	Tiny Frame C1: current volume, date and time, volume on billing date, billing date, errors	Current volume, date and time, volume on billing date, billing date, errors, daily consumption up to 7 previous days, alarms
Transmission time	08:00 - 18:00	08:00 - 18:00	00:00 - 24:00
Transmission frequency	30secs	30secs	2per day
Encryption	active	active	native
Alarms (default)	backflow (100 litres), suspected leak (observation frequency 15 min / observation period 48 hours), max flow rate (disabled)		
Battery Duration	18 years	16 years	

2 Installation

2.1 Receipt of the product

1x
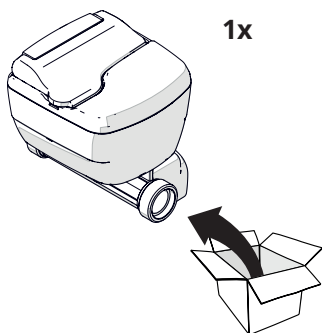
Optional accessories:
– Fittings kit
– Gasket kit
– Gasket
– Non-return valve

> 📖 **WARNING!**
> The instruction manual is an integral part of the device and should therefore be read and stored carefully.

> 🚫 **PROHIBITED**
> Packaging material must be properly disposed of and kept out of children's reach as it may represent a hazard. Disposal must be performed in line with applicable laws.

2.2 Assembly

Authorised personnel: specialised installer or plumber, assigned by the metering operator.

> 📖 **WARNING!**
> Only authorised and suitably trained personnel with sufficient technical experience may install and operate the device.

Before installing the device, make sure that the two sections of tube are even to prevent mechanical stress, clean them with care (especially in the case of empty tubes) and let water run for a while, using a stub pipe on the tube instead of the meter.

If there is no water in the pipeline, open the valve upstream of the device before installing it. This is necessary because opening the valve after installation is complete may cause air suction that could damage the device.

Before using the meter, first fully remove air from the pipe and the device itself. The interception/adjustment valves must be fully open when doing this. Open the valve at the start first and then the valve at the end.

When replacing the meter, it is recommended to replace the gasket on the fitting. Recommended gasket hardness: minimum 80 Shore A.

Tighten the nut with a torque wrench and use a counter wrench to hold the meter in position. Maximum tightening torque: 40 Nm.

Install the meter:
– protected from frost (insulate it if necessary with insulation material) and in the lower part of the system to prevent air accumulation;
– protected from blows and tampering, where readings are easy to make;
– so that the direction of the arrow on the device coincides with the flow direction.

Install proper interception valves upstream and downstream of the meter to permit maintenance operations and inspections on the device, as well as to check the system.

The installation of a non-return valve inside or outside the meter is also recommended (see dedicated data sheet).

WARNING!
Before positioning the seal, make sure that it is not damaged.
Make sure that the seal is not damaged during installation.
Make sure that the level of the seal matches that of the tubing.
Check that the seal does not protrude from the tube.
Make sure that the surfaces of the flange are clean and undamaged.
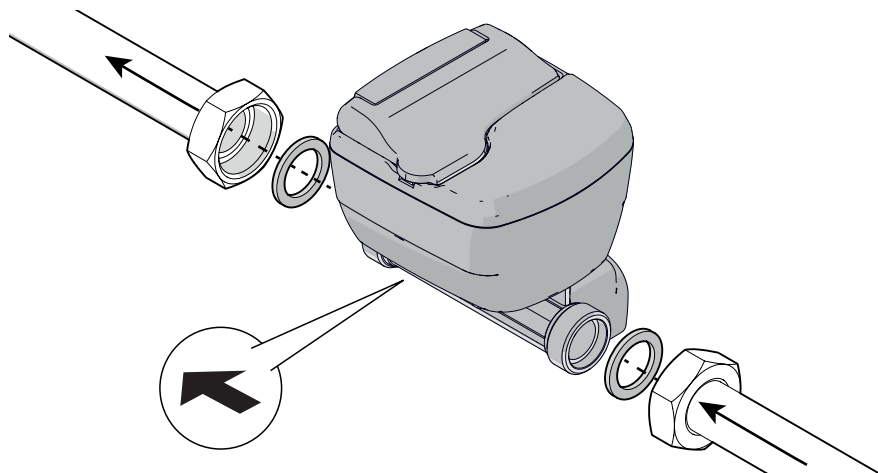
WARNING!
Check the seal hold to prevent leakage.

Installation position

Observe the indications on the dial (letters H and V):

– H: the meter must be installed with the dial in a horizontal position;

– V: the meter must be installed with the dial in a vertical position;

– H and V: the meter may be installed with the dial in either a horizontal or vertical position;

– If not shown, avoid vertical installations with downward flow, or with the dial facing downwards.

Straight sections and flow straighteners

When using straight sections upstream and/or downstream of the meter, refer to letters U and D on the dial. If the letters U and/or D are followed by the letter S, install a flow straightener.

Allowable water pressure (ISO 4064-1)

The maximum allowable pressure (MAP) is 16 bar, and is displayed on the meter dial. If not indicated on the dial, it must be 10 bar. These values must never be exceeded.

The maximum allowable pressure (MAP) downstream of the meter must be greater than or equal to 0.03 Mpa (0,3 bar).

Commissioning

Before putting the meter into operation, completely vent the air from both the pipe and the meter itself (rotate it if necessary). The interception/adjustment valves must be fully open when doing this. Open the valve at the start first and then the valve at the end.

3 Use

ElecTo SONIC is ideal for domestic and industrial usage and, thanks to the absence of moving parts, it is resistant to wear and ensures constant functioning over time.
The measurements taken by the meter are shown cyclically on the display and are also available on other communication interfaces.

The water meter is not suitable for installations where the water is particularly heavy, sandy, rich in algae, sludge and debris, or contains air.

The normal operating phase is remote meter reading through radio modules. In AMR (fixed) mode, each radio module (wMBus and/or LoRaWAN) transmits the reading at a programmable frequency.
In mobile mode (Walk-By/Drive-By), the radio module wMBus emits a data frame with the measurements. To receive the radio module signal, hold a suitable receiver near the meter. The fixed (AMR) system reads data automatically.

> 📖 **WARNING!**
> Data can be read using a variety of software. Please refer to the accounting manager for specific usage information on the reading software.

> 📖 **WARNING!**
> It is recommended to keep the lid closed once the installation steps are completed.

4 Configuration

ElecTo SONIC is supplied with a default configuration.

The radio is activated after the passage of 10 litres of water.

The NFC programming interface is available at all times by positioning the special settings kit above the designated area. The total available cumulative programming time is 18 hours.

NFC Area
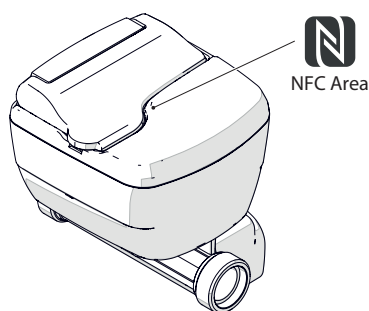
The radio settings, such as the type of radio frame and data transmission frequency, have a default factory setting. However, they can be changed, if necessary, after making the device programmable, via the appropriate kit:
– App ElecTo SONIC (Android, downloadable from Google Play Store);
– Smartphone with NFC or UniCo Tool interface.
For further information, contact the manufacturer.

The app allows the following parameters to be read and programmed:
– Radio settings
– Radio AES key
– Periodic reading
– Alarms setting
– Alarms reset
– Date/time synchronization
– Delivery point

5 Error codes

The error code is displayed in hexadecimal format.
The instrument identifies 6 errors which may also occur simultaneously.

Hexadecimal format	Description
0080	Out Of Operating Temperature
0100	ICE
0400	Low Battery Voltage
1000	Metrological verification period expired
4000	Metrological Wrong Checksum
8000	General Fault

Example of simultaneous errors
Low battery voltage + Metrological verification period expired: Err 1400

6 Test mode

ElecTo SONIC can be temporarily set to a high resolution in order to carry out measurement tests.
Contact the manufacturer for further information.

7 Maintenance

7.1 Battery (default)

The meter is fitted with a lithium battery 3.6V that cannot be recharged or replaced.
The estimated lifespan of the battery is calculated using factory set-up and with the following operating conditions:
– from -10°C to +0°C for 10% of the lifespan
– from 1°C to +30°C for 80% of the lifespan
– from +31°C to +55°C for 10% of the lifespan

> 📖 **WARNING!**
> Humidity and intense heat may damage the battery and reduce its lifespan.

The device calculates the useful remaining life of the battery based on memorized parameters, for example, estimated consumption of the electronic board in standby, consumption in transmission and the number of transmissions made.
Battery life depends on the data transmission frequency you choose to set.

> ⚠️ **DANGER!**
> If the battery is empty, it is necessary to contact the metering operator for the correct replacement procedure.
> The battery must be disposed of in compliance with applicable laws on waste disposal in the country of installation.

7.2 Cleaning

No particular cleaning procedures are required. However, the installation area should be kept clean and periodic checks should be performed to ensure the required environmental conditions are met.

> 🚫 **PROHIBITED**
> It is forbidden to use abrasive products, methyl alcohol, hydrochloric acid (35%), sodium bicarbonate (10%), tricresyl phosphate, benzol, concentrated ethanol, toluol, industrial petrol, methylisobutylketone, acrylonitrile, cosmetic solvents, sodium hydrate (10%), ammonium hydrate (10%), nitric acid (40%), potassium dichromate, acetone, diesel naphtha, petrol.

7.3 Disposal

The device is made from various materials such as: metal and plastic materials, electrical and electronic components. It must be disposed of in accordance with current local regulations on industrial and special waste. It must not be disposed of with household waste.

The device does not contain any toxic/hazardous substances or elements, including lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl.

At the end of the product's life, ensure safe removal and responsible disposal of components, including recycling of batteries, in compliance with applicable environmental laws in the country of installation.

8 Compliance declaration

maddalena®
METERING EXPERTISE

DICHIARAZIONE DI CONFORMITÀ UE / UKCA
EU / UKCA DECLARATION OF CONFORMITY

Modello / *Model*	ELECTO SONIC (DN 15÷40 mm)
Nome e indirizzo del fabbricante / *Name and address of the manufacturer*	Maddalena S.p.A. Via G.B. Maddalena 2/4 – 33040 Povoletto (UD), Italy

La presente dichiarazione di conformità è emessa sotto la responsabilità esclusiva del fabbricante.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Oggetto / *Object*	**Contatore ultrasonico** ***Ultrasonic water meter***

L'oggetto della dichiarazione di cui sopra è conforme alla pertinente normativa di armonizzazione dell'Unione:
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Direttiva concernente l'armonizzazione delle legislazioni degli Stati membri relative alla messa a disposizione sul mercato di strumenti di misura *Directive on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments*	2014/32/EU
Direttiva apparecchiature radio (RED) *Radio equipment directive (RED)*	2014/53/EU
Restrizione dell'uso di determinate sostanze pericolose (RoHS) e successivi aggiornamenti *Restriction of the use of certain hazardous substances (RoHS) and subsequent updates*	(EU) 2017/2102

La conformità è stata verificata in accordo alle seguenti norme armonizzate e specifiche tecniche:
The conformity was checked in according to the following harmonized standards and technical specification:

EN ISO 4064 :2017	EN 62479:2010
EN 301 489-3 V2.1.1	EN61000-6-3:2007+A1:2011
EN 301 489-1 V2.2.3	EN61000-6-2:2005+AC:2005
EN 300 220-1 V3.1.1	EN 62368-1:2014 + A11:2017 + AC:2017
EN 300 220-2 V3.2.1	EN 50581

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Capitale sociale - Share capital 2.080.000 € | C.F. e reg. impr. - Tax id. and business reg. no. UD 80008170302 | P.IVA - VAT no. IT00617140306 |
N. REA - REA no. UD128629 | Export reg. UD007790 | PEC: amministrazione@maddalena.legalmail.it

Nome e numero dell'organismo notificato *Name and number of the notified body*	Attività *Activity*	Certificato nr. *Certificate no.*
Pa.L.Mer. , NB 2213 Via Casilina 246 03013 Ferentino (FR) Italy	Certificato di esame UE del tipo in accordo al Modulo B della Direttiva 2014/32/UE *EU-type certification in accordance with Module B of Directive 2014/32/EU*	IT-041-22-2213
Czech Metrology Institute, NB 1383 Okruzni 31 638 00 Brno Czech Republic	Certificazione di prodotti, collaudo e controlli finali in accordo al Modulo D della Direttiva 2014/32/UE *Certification of production, final product inspection and testing in accordance with Module D of Directive 2014/32/EU*	0119-SJ-A010-08

Povoletto, 28/03/2023

Maddalena S.p.A.

MADDALENA S.p.A.
IL PRESIDENTE
Legale Rappresentante
Dott. Ing. Franco Maddalena
Amministratore Delegato
Chief Executive Officer