

AQUALOG AW

RTU for water mains monitoring



Revision A - Edition 01/2025

**USE, MAINTENANCE
AND WARNING
MANUAL**

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1 - INTRODUCTION

FOREWORD

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The manufacturer is in no way responsible for the consequences of operations carried out in a manner not in accordance with the manual.

GENERAL REMARKS

All operating, maintenance instructions and recommendations described in this manual must be followed to in order to:

- obtain the best possible performance from the equipment;
- keep the equipment in efficient conditions.

Training the personnel in charge is essential in order to:

- use and service the equipment properly;
- correctly apply the safety alerts and procedures recommended.

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1.1 - REVISION HISTORY

Revision index	Date
A	01/2025

Tab. 1.1.

INDEX

1 - INTRODUCTION	3
1.1 - REVISION HISTORY.....	5
2 - GENERAL INFORMATION	11
2.1 - MANUFACTURER IDENTIFICATION	11
2.2 - IDENTIFICATION OF THE PRODUCT	11
2.3 - REGULATORY FRAMEWORK.....	11
2.4 - WARRANTY	11
2.4.1 - REFERENCE OPERATING CONDITIONS	12
2.5 - ADDRESSEES, SUPPLY AND STORAGE OF THE MANUAL	12
2.6 - LANGUAGE	13
2.7 - SYMBOLS USED IN THE MANUAL.....	13
2.8 - APPLIED RATING PLATES	14
2.8.1 - DESCRIPTION OF THE NAMEPLATE.....	15
2.9 - GLOSSARY OF UNITS OF MEASUREMENT	16
2.10 - QUALIFIED PROFESSIONAL FIGURES.....	17
3 - SAFETY	19
3.1 - GENERAL SAFETY WARNINGS.....	19
3.1.1 - SAFETY INSTRUCTIONS FOR INSTALLATION.....	20
3.2 - PERSONAL PROTECTIVE EQUIPMENT.....	21
3.3 - OBLIGATIONS AND PROHIBITIONS	22
3.4 - RESIDUAL RISKS	22
3.5 - SAFETY PICTOGRAMS	23
3.6 - NOISE LEVEL	23

4 - DESCRIPTION AND OPERATION 25

4.1 - GENERAL DESCRIPTION	25
4.2 - POWER SUPPLY DEVICES	26
4.2.1 - BATTERIES	27
4.2.2 - CONNECTORS	28
4.2.3 - CABLE GLAND VERSION	28
4.2.4 - MIL-TYPE CONNECTOR VERSION	30
4.3 - INTENDED USE	31
4.3.1 - ENVISAGED USE	31
4.3.2 - REASONABLY FORESEEABLE MISUSE	31
4.4 - TECHNICAL DATA	32
4.5 - I/O CHANNELS	33
4.6 - DATA COMMUNICATION	33
4.7 - ANTENNAS	33
4.8 - WIRING	34
4.8.1 - ANALOGUE PRESSURE INPUTS	34
4.8.2 - ANALOGUE TEMPERATURE INPUTS	35
4.8.3 - DIGITAL INPUTS	36
4.9 - 4-20 MA TRANSMITTER EXPANSION	38
4.9.1 - OUTPUTS EXPANSION	39

5 - USER INTERFACE 41

5.1 - GENERAL DESCRIPTION	41
5.2 - NAVIGATION PROCEDURE	42
5.2.1 - MENU OF THE DEVICE	43
5.2.2 - DIAGNOSTICS	46
5.3 - LOCAL COMMUNICATION INTERFACES	47
5.3.1 - COMMUNICATION INTERFACE VIA WI-FI	47
5.3.2 - COMMUNICATION INTERFACE VIA BLUETOOTH	48
5.3.3 - COMMUNICATION INTERFACE VIA USB (ON REQUEST)	50

6 - TRANSPORT AND HANDLING 53

6.1 - SPECIFIC WARNINGS FOR TRANSPORT AND HANDLING	53
6.1.1 - PACKAGING AND FASTENERS USED FOR TRANSPORT	53
6.2 - PACKAGING CONTENT.....	54
6.3 - PHYSICAL CHARACTERISTICS OF THE DEVICE	55
6.3.1 - CABLE GLAND VERSION	55
6.3.2 - LOWER SIDE	56
6.3.3 - UPPER SIDE	56
6.3.4 - MIL CONNECTOR VERSION.....	57
6.3.5 - LOWER SIDE	58
6.3.6 - UPPER SIDE	58
6.4 - EQUIPMENT ANCHORING AND LIFTING METHOD.....	59
6.4.1 - FORKLIFT HANDLING METHOD.....	60
6.5 - PACKAGING REMOVAL.....	62
6.5.1 - PACKAGING DISPOSAL	62
6.6 - STORAGE AND ENVIRONMENTAL CONDITIONS	63
6.6.1 - STORAGE OF THE SPARE BATTERIES	63

7 - INSTALLATION 65

7.1 - GENERAL WARNINGS	65
7.2 - INSTALLATION PRE-REQUISITES.....	65
7.2.1 - ALLOWED ENVIRONMENTAL CONDITIONS.....	65
7.3 - CHECKS BEFORE INSTALLATION.....	66
7.4 - INSTALLATION PROCEDURE	67
7.4.1 - EQUIPMENT ASSEMBLY AND SIM INSERTION.....	67

8 - CONFIGURATION 69

8.1 - SAFETY REQUIREMENTS FOR CONFIGURATION	69
8.2 - EQUIPMENT CONFIGURATION	69
8.2.1 - STARTING THE RAINBOW SOFTWARE.....	69
8.2.2 - OPENING THE DATABASE.....	70
8.3 - RTU INTERFACE.....	72
8.3.1 - ANALOGUE INPUTS	73
8.3.2 - DIGITAL INPUTS	73
8.3.2.1 - UPDATING METERS.....	74
8.3.3 - DATALOGGER	75
8.3.4 - ENABLING ALARMS ON INPUTS	76
8.4 - CONFIGURATION OF 2G, 3G, 4G COMMUNICATION PARAMETERS	77
8.5 - CONFIGURATION OF LORA COMMUNICATION PARAMETERS.....	78
8.6 - CONFIGURAZIONE OF NB-IOT COMMUNICATION PARAMETERS.....	79
8.7 - LOCAL COMMUNICATION	80
8.8 - BATTERY UPGRADE	81
8.9 - ALARMS ACTION	81
8.9.1 - ADDING AN ALARM ACTION.....	82
8.10 -2G, 3G, 4G DATA CALL COMMUNICATION TEST	83
8.11 -COMMUNICATION TEST AND LORA DATA SENDING.....	85
8.12 -RESET	86

9 - MAINTENANCE AND FUNCTIONAL CHECKS..... 87

9.1 - GENERAL WARNINGS	87
9.1 - SPECIAL MAINTENANCE	88
9.1.1 - REPLACING THE BATTERIES.....	88

10 - UNINSTALLATION AND DISPOSAL 91

10.1 -GENERAL SAFETY WARNINGS.....	91
10.2 -QUALIFICATION OF THE OPERATORS IN CHARGE.....	91
10.3 -INFORMATION REQUIRED IN CASE OF NEW INSTALLATION.....	91
10.4 -STORAGE OF THE BATTERIES	91
10.5 -INFORMATION REQUIRED IN CASE OF RE-INSTALLATION.....	91
10.6 -DISPOSAL INFORMATION.....	92
10.7 - DISPOSING OF THE BATTERIES.....	93
10.7.1.1 - BATTERY PACKAGING.....	93

11 - RECOMMENDED SPARE PARTS 95

11.1 -GENERAL WARNINGS	95
11.2 -HOW TO REQUEST SPARE PARTS.....	95
11.3 -PUTTING BACK BATTERIES.....	95

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2 - GENERAL INFORMATION

2.1 - MANUFACTURER IDENTIFICATION

Manufacturer	PIETRO FIORENTINI S.P.A.
Address	Via Enrico Fermi, 8/10 36057 Arcugnano (VI) - ITALY Tel. +39 0444 968511 Fax +39 0444 960468 www.fiorentini.com sales@fiorentini.com

Tab. 2.2.

2.2 - IDENTIFICATION OF THE PRODUCT

Equipment	WATER MAINS CONTROL DEVICE
Series	AQUALOG AW
Models	Aqualog AW - version with cable glands Aqualog AW - version with MIL connector

Tab. 2.3.

2.3 - REGULATORY FRAMEWORK

PIETRO FIORENTINI S.P.A. with registered office in Arcugnano (Italy) - Via E. Fermi, 8/10, declares that the equipment of the series described in this manual is designed, manufactured, tested and checked in compliance with:

- the requirements of the Directives:
 - 2014/53/EU “RED”
 - 2011/65/EU “RoHS 2”
 - 2012/19/EU “WEEE”

NOTICE!

For specific type approvals, see the appropriate section on the Manufacturer’s website:
<https://www.fiorentini.com>

NOTICE!

The declaration of conformity in its original version is delivered together with the equipment.

2.4 - WARRANTY

PIETRO FIORENTINI S.P.A. guarantees that the equipment was manufactured using the best materials, with high quality workmanship, and complies with the quality requirements, specifications and performance set out in the order. The warranty shall be considered null and void and PIETRO FIORENTINI S.P.A. shall not be liable for any damage and/or malfunctions:

- due to any acts or omissions of the purchaser or end-user, or any of their carriers, employees, agents, or any third party or entity;
- in the event that the purchaser, or a third party, makes changes to the equipment supplied by PIETRO FIORENTINI S.P.A. without the prior written approval of the latter;
- in the event of failure by the purchaser to comply with the instructions contained in this manual, as provided by PIETRO FIORENTINI S.P.A.

NOTICE!

The warranty conditions are specified in the commercial contract.

2.4.1 - REFERENCE OPERATING CONDITIONS

The reference operating conditions for battery life calculations are described in Tab. 2.4:

Operative condition	Reference indications
User interface	10 minutes per month (local interface).
	10 minutes per month (Display).
Sensor acquisition	<ul style="list-style-type: none"> • 1 piezoresistive sensor • 1 meter • 1 transmission per day
Upgrade firmware code	1 time every 5 years.
Communication	1 data transmission per day.

Tab. 2.4.

Ambient temperature has an effect on battery life. The operating profile used to calculate the battery life expectancy is indicated in Tab. 2.5:

	Reference indications
Temperature environment	0.3% of the time at +25 °C
	0.5% of the time at -20 °C
	2.6% of the time at -10 °C
	41.0% of the time at +5 °C
	43.0% of the time at +20 °C
	11.8% of the time at +35 °C
	0.5% of the time at +50 °C
	0.4% of the time at +60 °C

Tab. 2.5.

2.5 - ADDRESSEES, SUPPLY AND STORAGE OF THE MANUAL

The instruction manual is intended for qualified technicians responsible for operating and managing the equipment throughout its service life.

It contains the necessary information to properly use the equipment and keep its functional and qualitative characteristics unchanged over time. All information and warnings for safe, correct use are also provided.

The manual, as well as the declaration of conformity and/or test certificate, is an integral part of the equipment and must always accompany it whenever it is moved or resold. It is the responsibility of the qualified professionals (see paragraph 2.10) to use and manage the equipment.

WARNING!

Removing, rewriting or editing the pages of the manual and their contents is not allowed.

PIETRO FIORENTINI S.p.A. shall not be held liable for any damage to people, animals and property caused by failure to adhere to the warnings and operating procedures described in this manual.

2.6 - LANGUAGE

The original instruction manual was drawn up in Italian.

Any translations into additional languages are to be made from the original instruction manual.

HAZARD!

The translations into other languages cannot be fully verified. If any inconsistency is found, please refer to the text of the original manual.





If inconsistencies are found or the text does not make sense:

- stop any actions;
- immediately contact PIETRO FIORENTINI S.p.A. at the addresses specified in paragraph 2.1 (“Identification of the manufacturer”).

WARNING!

PIETRO FIORENTINI S.p.A. shall be held liable for the information provided in the original manual only.

2.7 - SYMBOLS USED IN THE MANUAL

Symbol	Definition
	Symbol used to identify important warnings for the health and safety of the operator or safety of the equipment.
	Symbol used to identify an ELECTRICAL HAZARD to the health and safety of the operator.
	Symbol used to identify information of particular importance in the instruction manual. The information may also concern the safety of the personnel involved in using the equipment.
	Obligation to consult the instruction manual/booklet. Indicates a requirement for the personnel to refer to (and understand) the operating and warning instructions of the machine before working with or on it.

Tab. 2.6.

HAZARD!

Alerts to a hazard with a high level of risk, an imminent hazardous situation which, if not prevented, will result in death or severe damage.

WARNING!

Alerts to a hazard with a medium level of risk, a potentially hazardous situation which, if not prevented, may result in death or severe damage.

ATTENTION!

Alerts to a hazard with a low level of risk, a potentially hazardous situation which, if not prevented, could result in minor or moderate damage.


NOTICE!

Alerts to specific warnings, directions or notes of particular concern, that are not related to physical injury, as well as practices for which physical injury is not likely to occur.

2.8 - APPLIED RATING PLATES

The equipment is equipped with nameplates.

The rating plate contains the identification details of the equipment and its accessories to be cited in case of need to PIETRO FIORENTINI S.p.A.

Id.	Type of plate	Image
1	AQUALOG AW	 <p>The image shows a grey rating plate with the following text and symbols:</p> <ul style="list-style-type: none"> FAST logo (stylized 'F' with a globe icon) Pietro Fiorentini S.p.a. Via Enrico Fermi 8/10 36057 Arcugnano (VI) ITALIA / ITALY Mod. AQAW-BT-4G-8AI Rev. 0 S/N:0502540 VIn 3,6Vdc Pin_{avg} <10 mW Ipk <2A Warning triangle symbol CE mark Barcode

Tab. 2.7.

WARNING!

Removing nameplates and/or replacing them with other plates is strictly not allowed.

Should the plates be unintentionally damaged or removed, the customer must notify PIETRO FIORENTINI S.p.A.

2.8.1 - DESCRIPTION OF THE NAMEPLATE

The following information, described in Tab. 2.8, is shown on the nameplate:

Pos.	Description
1	Fast Logo
2	Manufacturer's Address
3	Equipment model
4	Equipment overhaul status
5	Serial Number
6	Power supply voltage
7	Average power consumption
8	Maximum peak current
9	Safety pictogram
10	CE Marking

Tab. 2.8.

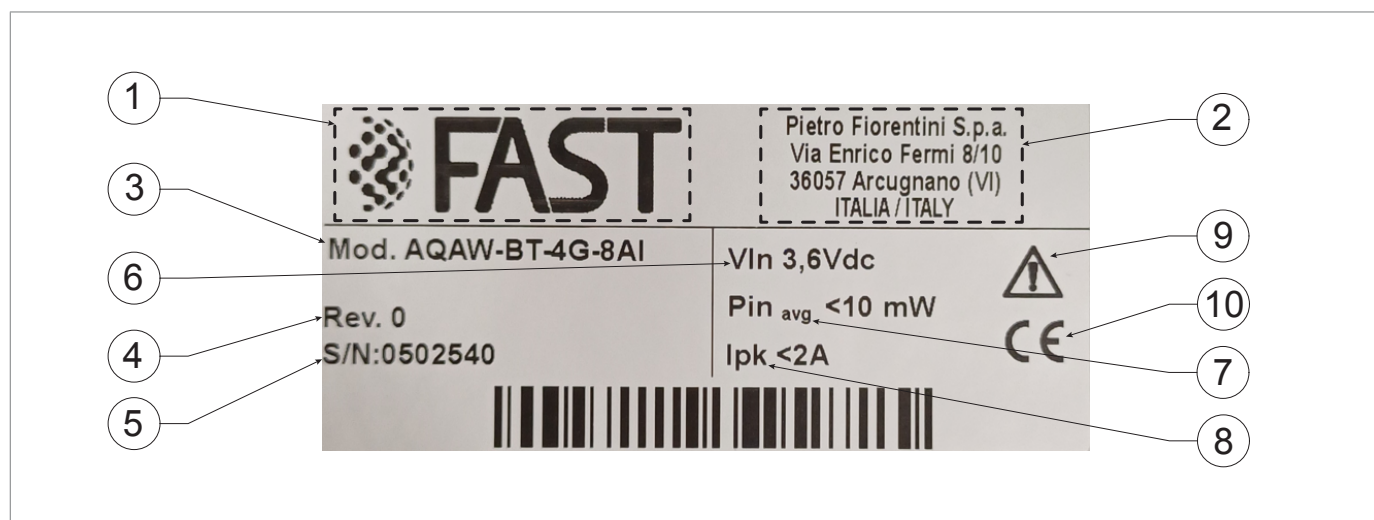


Fig. 2.1. Description of the nameplate

2.9 - GLOSSARY OF UNITS OF MEASUREMENT

Type of measurement	Unit of measurement	Description
Consumption and Volumetric flow rate	Sm ³ /h	Standard cubic metres per hour
	Sm ³	Standard cubic metres
	m ³ /h	Cubic metres per hour
	m ³	Cubic metres
Pressure	bar	Bar
	ˆwc	Water column inch
	Pa	Pascal
Temperature	°C	Degree centigrade
	°F	Fahrenheit degree
	K	Kelvin
Tightening torque	Nm	Newton metre
Sound pressure	dB	Decibel
Other measurements	V	Volt
	W	Watt
	Ω	Ohm

Tab. 2.9.

2.10 - QUALIFIED PROFESSIONAL FIGURES

Qualified operators in charge of using and managing the equipment throughout its technical service life to be used as indicated:

Professional figure	Definition
Installer	Qualified operator able to: <ul style="list-style-type: none"> • handle materials and equipment. • carry out all the operations necessary to properly install the equipment; • perform all the operations necessary to safely operate the equipment and system; • be able to perform all the operations necessary to uninstall and subsequently dispose of the equipment in compliance with the regulations in force in the country of installation.
Specialised technician/ Maintenance technician	Trained and authorised technician on the management and use of the equipment, who must: <ul style="list-style-type: none"> • be able to perform all operations required for the proper functioning of the equipment and the system, and for their safety and that of any third parties present; • perform maintenance on all parts of the equipment subject to maintenance (board and batteries); • access all device parts for visual inspection, checking equipment status, making adjustments and calibrations; • have proven experience in properly using the equipment similar to that described in this manual, and be trained, informed and instructed in this regard.
Electrical maintenance technician	Qualified technician able to: <ul style="list-style-type: none"> • perform preventive/corrective maintenance operations on all electrical parts of the device subject to maintenance or repair; • read wiring diagrams and check the correct functional cycle; • perform adjustments and operate on electrical systems for maintenance, repair and replacement of worn parts. <p>The electrical maintenance technician can operate in the presence of voltage inside electrical panels, junction boxes, control equipment etc. only if he/she is deemed to be suitable (S.P).</p> <p>For general requirements, refer to the IEC EN 50110-1:2014 standard.</p>
Person in charge of transport, handling, unloading and placing on site	Operator qualified to: <ul style="list-style-type: none"> • use lifting equipment; • the safe handling (even manual) of materials and equipment. <p>The equipment must be lifted and handled strictly in accordance with the instructions provided by the manufacturer as well as the regulations in force at the place where the equipment is installed.</p>

Tab. 2.10.

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3 - SAFETY

3.1 - GENERAL SAFETY WARNINGS

WARNING!

- It is strictly forbidden to repair or make any modifications to the equipment.
- For information and warnings regarding replacing batteries, refer to chapter 9 in this manual.

ATTENTION!

Authorised operators must not carry out operations or services on their own initiative that do not fall within their competence.

Never operate the equipment:

- while under the influence of intoxicating substances such as alcohol;
- if you are using drugs that may slow reaction times.

NOTICE!

The employer must train and inform operators on how to behave during operations and on the equipment to be used.

Before installation, commissioning or maintenance, operators must:

- take note of the safety regulations applicable to the place of installation they are working in;
- obtain the necessary permits to operate when required;
- wear the personal protective equipment required by the procedures described in this instruction manual;
- ensure that the required collective protective equipment and safety information are available in the area they are operating in.

3.1.1 - SAFETY INSTRUCTIONS FOR INSTALLATION

The AQUALOG AW series versions must be installed and commissioned in accordance with the applicable regulations and standards.

NOTICE!

PIETRO FIORENTINI S.p.A. shall not be liable for damage resulting from failure to comply with the instructions and from misuse.

Safety warnings

All operations on the equipment must be performed by qualified personnel.

Transformation and spare parts

Any technical changes are forbidden. Use only original spare parts intended by PIETRO FIORENTINI S.p.A.

Transport

As a rule, the equipment must be transported in an upright position and inside the original packaging box provided by PIETRO FIORENTINI S.p.A.

Upon receipt of the device, examine the supplied material.

Immediately report any shipping damage.

Storage

The equipment must be stored horizontally in a dry place at room temperature (see section 6.6.1).

WARNING!







- **Install the equipment in a compartment that meets the provisions in force on safety, away from any possible damage of mechanical origin, away from sources of heat or naked flames, in a dry place and protected from external agents.**
- **During installation, avoid mechanical stress to the inlet and outlet connections.**
- **It is strictly forbidden to repair or make any modifications to the device.**
- **The installation, removal, and any operations must be performed by qualified personnel, in compliance with the provisions in force concerning safety.**

3.2 - PERSONAL PROTECTIVE EQUIPMENT

The following table shows the Personal Protective Equipment (PPE) and its description; an obligation is associated with each symbol.

Personal protective equipment means any equipment intended to be worn by the worker in order to protect them against one or several risks that are likely to threaten their safety or health during work.

For the operators in charge, depending on the type of work requested, the most appropriate PPE from those reported in Tab. 3.11 must be used:

Symbol	Meaning
	Obligation to use safety or insulated gloves. Indicates a requirement for the personnel to use safety or insulated gloves.
	Obligation to use safety goggles. Indicates a requirement for personnel to use protective goggles for eye protection.
	Obligation to use safety shoes. Indicates a requirement for the personnel to use accident-prevention safety shoes.
	Obligation to use noise protection equipment. Indicates a requirement for the personnel to use ear muffs or ear plugs to protect their hearing.
	Obligation to wear protective clothing. Indicates a requirement for the personnel to wear specific protective clothing.
	Obligation to use a protective mask. Indicates a requirement for the personnel to use respiratory masks in the event of a chemical risk.
	Obligation to use a protective helmet. Indicates a requirement for the personnel to use protective helmets.
	Obligation to wear high visibility vests. Indicates a requirement for the personnel to use high visibility vests.

Tab. 3.11.

 **WARNING!**

Each licensed operator is obliged to:

- **take care of his/her own health and safety and that of other people in the workplace who are affected by his/her actions or omissions, in accordance with the training, instructions and equipment provided by the employer;**
- **appropriately use the PPE made available;**
- **immediately report to the employer, the manager or the person in charge any deficiencies in the equipment and devices, as well as any dangerous conditions they may become aware of.**

3.3 - OBLIGATIONS AND PROHIBITIONS

The following is a list of obligations and prohibitions to be observed for the safety of the operator.

It is mandatory to:

- carefully read and understand the use, maintenance and warning manual;
- before installing the equipment, strictly refer to the details specified on the nameplates and in the manual;
- avoid knocks and violent impact that could damage the equipment.

It is forbidden to:

- operate in various capacities on the equipment without the PPE indicated in the work procedures described in this manual;
- operate in the presence of open flames or bring open flames close to the work area;
- smoke near the equipment or while working on it;
- use the equipment with parameters other than those indicated on the rating plate;
- use the equipment outside the operating temperature range specified in this manual;
- install or use the equipment in environments other than those specified in this manual.

3.4 - RESIDUAL RISKS

The equipment does not present residual risks for the operator related to its normal operation.







If there are any functional faults, do not operate.

Immediately contact PIETRO FIORENTINI S.p.A. for the necessary directions.

3.5 - SAFETY PICTOGRAMS

The equipment and/or packaging PIETRO FIORENTINI S.p.A. good bear the safety pictograms described in Tab. 3.12:

Symbol	Definition
	Symbol used to identify a GENERIC HAZARD.
	Symbol used to identify DANGERS GENERATED BY STATIC ELECTRICITY.
	Symbol applied to the packaging to identify the type of danger and risks related to the transported product, based on the classification of the European ADR agreement. Class 9 (Various dangerous substances). ADR - UN3090 (lithium metal batteries).
	The symbol indicates that the product must not be disposed of as unsorted waste but must be sent to separate collection facilities for recovery and recycling (WEEE Directive 2012/19/EU on waste electrical and electronic equipment - WEEE)

Tab. 3.12.

WARNING!

It is forbidden to remove or alter the safety pictograms on the equipment or the packaging.

3.6 - NOISE LEVEL

The AQUALOG AW series has no moving parts.

For the value of the noise generated by the equipment and further information, contact PIETRO FIORENTINI S.p.A.

ATTENTION!

The obligation to use earmuffs or ear plugs to protect the hearing of qualified professional figures (reference paragraph 2.10) remains in the event that the noise in the installation environment of the equipment (depending on specific operating conditions) exceeds the value of 85 dBA.

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4 - DESCRIPTION AND OPERATION

4.1 - GENERAL DESCRIPTION

AQUALOG AW is a highly connectable RTU (Remote Terminal Unit) for water networks. This device is designed for monitoring and controlling water distribution systems.

AQUALOG AW consists of a motherboard that provides the basic elements (analogue inputs, digital inputs, communication lines) and a series of additional boards that allow the acquisition/control and communication capabilities to be extended.

AQUALOG AW guarantees:

- protection rating IP 68
- local display via a multifunctional display
- connection to the control centre via 2G/3G/4G, LoRaWAN and/or NB-IoT networks, as desired.

The main applications include the control of hydro-valves and pumps for pressure regulation in the districts. In addition, it has extensive monitoring capabilities of the connected sensors (pressure, temperature, level and quality).

The main elements of the equipment are (see Fig. 4.2):

Pos.	Description	Pos.	Description
1	Plastic enclosure	4	Cable glands
2	LCD display	5	Clamping screws
3	Scroll keys		

* METROLOGICAL BATTERY not visible in the picture

Tab. 4.13.

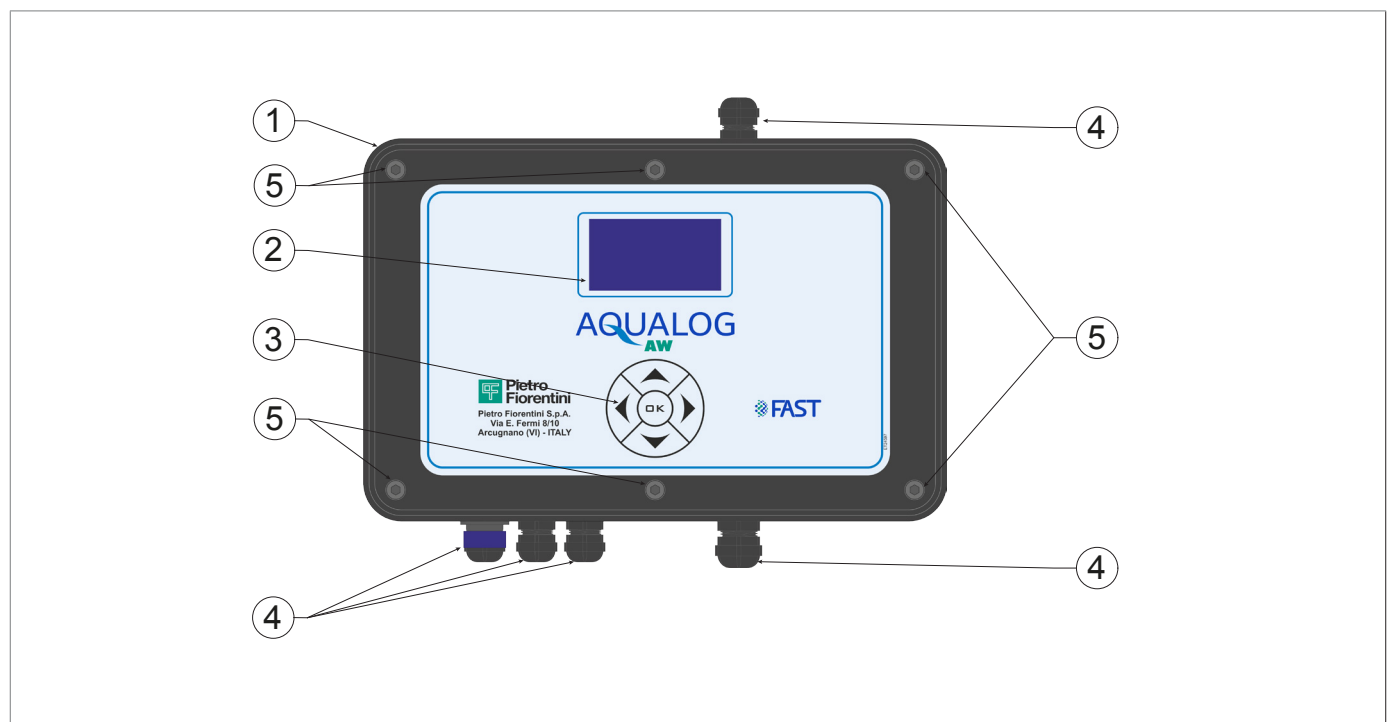


Fig. 4.2. General description AQUALOG AW - cable gland version

The main elements of the equipment are (see Fig. 4.3):

Pos.	Description	Pos.	Description
1	Plastic enclosure	4	Cable glands
2	LCD display	5	Clamping screws
3	Scroll keys		

* METROLOGICAL BATTERY not visible in the picture

Tab. 4.14.

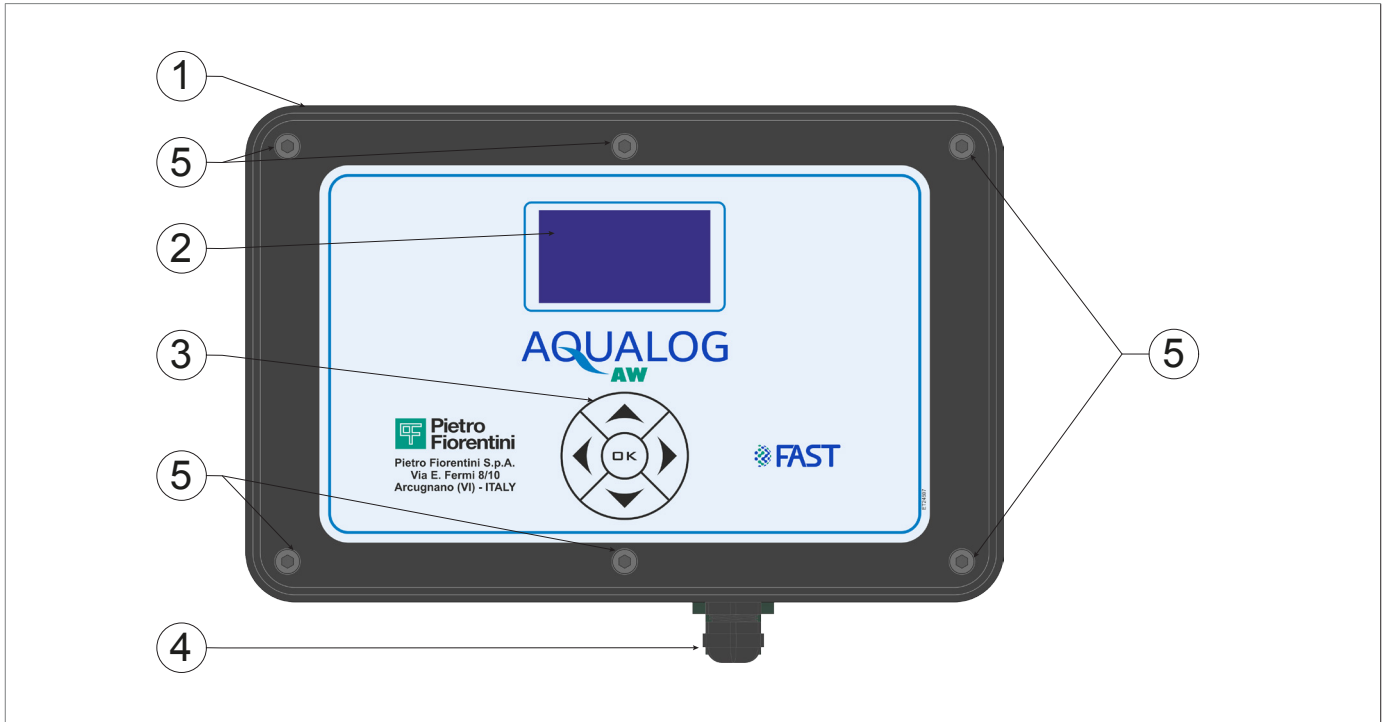


Fig. 4.3. General description AQUALOG AW - MIL connector version

4.2 - POWER SUPPLY DEVICES

The AQUALOG AW equipment is designed to be powered by standard 4-cell lithium batteries or 7-cell lithium batteries.

AQUALOG AW can also be powered from external sources:

- photovoltaic panel
- micro-turbine
- mains power supply (230V).

4.2.1 - BATTERIES

The AQUALOG AW equipment can use the following battery models:

Features	Type	Supply
4-cell battery	Lithium	Standard
7-cell battery	Lithium	Optional

Tab. 4.15.

WARNING!

- Only the battery models described in this manual must be used.
- Do not short-circuit the terminals of the battery pack.
- Do not attempt to open the casing.
- Keep away from heat sources.
- Do not try to recharge.

NOTICE!

For the technical details of the battery packs and the reference operating conditions, refer to paragraph “4.4 - Technical data”.

4.2.2 - CONNECTORS

4.2.3 - CABLE GLAND VERSION

The cable glands used to connect the equipment are plastic, screwed directly onto the pre-drilled box and equipped with a respective ring nut. Each cable gland has an O-ring that guarantees IP68 protection.

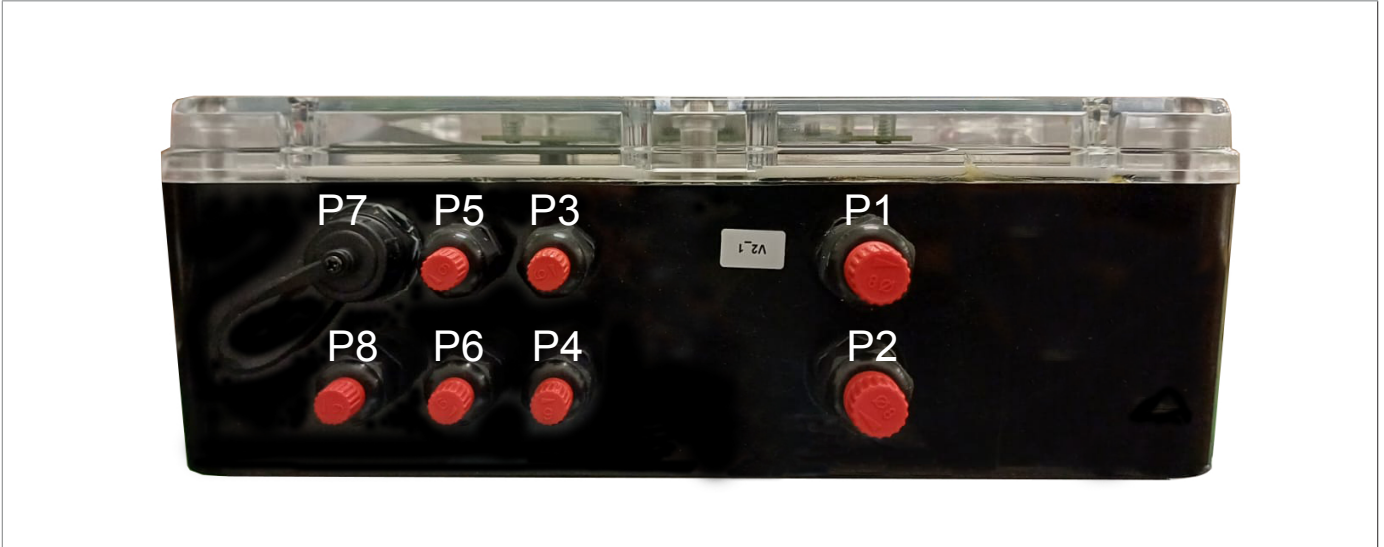


Fig. 4.4. Cable gland, lower view



Fig. 4.5. Cable gland, upper view

Cable gland	Dimensions	Description
P1	M16x1.5	Passage of the antenna or piezoresistive pressure sensor
P2	M16x1.5	Passage of the piezoresistive pressure sensor
P3	M12x1.5	Passing of the 4-20 mA sensors or digital signals/meters
P4	M12x1.5	Passing of the 4-20 mA sensors or digital signals/meters
P5	M12x1.5	Passing of the 4-20 mA sensors or digital signals/meters
P6	M12x1.5	Passing of the 4-20 mA sensors or digital signals/meters
P7	M16x1.5	Piezoresistive pressure sensor or USB port (optional)
P8	M12x1.5	Passing of the 4-20 mA sensors or digital signals/meters
P9	M12x1.5	Passing of the 4-20 mA sensors or digital signals/meters

Tab. 4.16.

4.2.4 - MIL-TYPE CONNECTOR VERSION

The device can be connected via a MIL connector directly on the pre-drilled box.



Fig. 4.6. MIL connector, lower view



Fig. 4.7. MIL connector, upper view

Connector	Description
P1	Connector for passage of the antenna
P2	Female MIL connector for passing digital/analogue signals

Tab. 4.17.

4.3 - INTENDED USE

4.3.1 - ENVISAGED USE

The equipment in question is intended for:

Operation	Permitted	Unpermitted	Work environment
Control of water networks		Any other type of carrier other than permitted.	Application in water network installations and nodes.

Tab. 4.18.

The equipment referred to was designed to be used exclusively within the limits specified on the nameplate and according to the instructions and limits of use specified in this manual.

Safe work conditions are as follows:

- use within the limits stated on the rating plate and in this manual;
- compliance with the user manual procedures;
- routine maintenance to be carried out when and how recommended;
- special maintenance to be carried out if required;
- do not tamper with and/or bypass the safety devices.

4.3.2 - REASONABLY FORESEEABLE MISUSE

Incorrect and reasonably foreseeable misuse means the use of the equipment in a way not foreseen in the phase but which can result from result predictable human behaviour:

- using the equipment in a manner other than that referred to under “**Intended use**”.
- instinctive reaction of an operator in the event of a malfunction, accident or breakdown while using the equipment;
- behaviour resulting from carelessness;
- behaviour resulting from the use of the equipment by unauthorised and unsuitable people (children, disabled).

Any use of the equipment other than the intended use must be previously approved in writing by PIETRO FIORENTINI S.p.A. If no written approval is provided, use shall be considered **improper**.

In the event of “improper use”, PIETRO FIORENTINI S.p.A. shall not be held liable for any damage caused to people or property, and any type of warranty on the equipment shall be deemed void.

4.4 - TECHNICAL DATA

General features	
External Enclosure	Polycarbonate
Casing protection rating	IP68 (immersion for 100 days at a depth of 1 metre)
Connectors	Cable glands with O-ring or single MIL connector (optional)
Antennas	Internal integrated, external optional
Operating ambient temperature range	from -25°C to + 60°C
Storage temperature range	from -25°C to + 70°C
Operating humidity (without condensation)	90%
Mechanical and electrical classes	M2 E2
Power supply voltage	3.6 Vdc
Autonomy	<ul style="list-style-type: none"> • 5 years, standard equipment - 4 Lithium cells • 10 years, optional equipment - 7 Lithium cells
Power supply from external source	12 Vdc/24 Vdc (photovoltaic kit, micro-turbine) and/or 230 Vac
Memory	250,000 - 2 Megabytes, of which 1 MB data

Tab. 4.19.

Communication features	
Interface	<ul style="list-style-type: none"> • USB mini B port • Wi-Fi • Bluetooth
Optical port	Activation via Wi-Fi, Bluetooth magnet
HMI	<ul style="list-style-type: none"> • Integrated local display (H64 x W128 px); • Buttons 5 +1 internal CPU reed for Wi-Fi, Bluetooth activation;
Registration No.	<ul style="list-style-type: none"> • MODBUS RTU • IEC 60870-5-104 • LoRaWAN • OPC UA (via driver) • MQTT
Communication vector	<ul style="list-style-type: none"> • 2G, 3G, 4G • 868 MHz LoRaWAN (optional) • NB-IoT (optional) • 1 radio modem 868 MHz proprietary MODBUS RTU protocol (optional)
Supported SIM cards	Micro SIM
Alarms/Events	Warning and management of alarms and events generated by exceeding thresholds and/or reaching physical and logical states. Using the message service for alarm notification.
Synchronisation	Daily synchronisation via SCADA server
Data connection	Programmable centre call, configuration, missing data download, archive, date/time alignment.
Communication	Periodic, scheduled or event-driven

Tab. 4.20.

4.5 - I/O CHANNELS

AQUALOG AW acquires the following signals*:

- 3 analogue inputs from mV/V cell piezoresistive sensors
- 8 analogue inputs from 4-20 mA sensors (active and passive). The expansion board is optional
- 2 inputs for temperature acquisition from PT100/PT1000
- 10 digital inputs that can be configured as status inputs, 6 of which can be configured as flow rate meters
- 4 digital outputs. The expansion board is optional.
- RS485 port.

**In the version with MIL-type connector, not all signals are available.*



4.6 - DATA COMMUNICATION


AQUALOG AW uses the following methods of communication:

- 2G/3G/4G modem;
- LoRaWAN modem;
- Nb-IoT.

The standard operating firmware uses the MODBUS RTU protocol. Alternatively, other protocols may be requested. The alarms can also be sent by SMS.

4.7 - ANTENNAS

Antenna type	Image
<p>AQUALOG AW internal antenna Suitable for outdoor cabinet installations</p>	
<p>Antenna external to the AQUALOG AW bracketed device Suitable for installation in a thermowell or on stations where external elements could mask the GSM field</p>	

Antenna type	Image
<p>Antenna external to the AQUALOG AW device and drive-over Suitable for installation outside the thermowell with a dedicated external pocket</p>	

The images are for illustrative purposes only

Tab. 4.21.

4.8 - WIRING

AQUALOG AW in its basic version, can acquire the following signals:


- 3 analogue inputs from mV/V cell piezoresistive sensors
- 2 inputs for temperature acquisition from PT100/PT1000
- 10 digital inputs that can be configured as status inputs, 6 of which can be configured as flow rate meters.

AQUALOG AW can be accompanied by some expansion boards. These boards increase the interfacing capacity by allowing the acquisition of:

- 8 analogue inputs from 4-20 mA sensors (active and passive)
- 4 digital outputs (optional board).

4.8.1 - ANALOGUE PRESSURE INPUTS

Each analogue pressure input has four terminals, each with a specific function.

ANALOGUE INPUT - mV/V cell signals					
Terminal block	PIN	Terminal	Description	Connection sensor	
M2	1	VP1+	Positive cell power supply	IN+	
M2	2	V1S-	Negative cell signal	OUT-	
M2	3	V1S+	Positive cell signal	OUT+	
M2	4	PSW	Negative cell power supply	IN-	
M2	5	VP2+	Positive cell power supply	IN+	
M2	6	V2S-	Negative cell signal	OUT-	
M2	7	V2S+	Positive cell signal	OUT+	
M2	8	PSW	Negative cell power supply	IN-	
M2	9	VP3+	Positive cell power supply	IN+	
M2	10	V3S-	Negative cell signal	OUT-	
M2	11	V3S+	Positive cell signal	OUT+	
M2	12	PSW	Negative cell power supply	IN-	

Tab. 4.22.

To use a four-wire connection of a resistance thermometer, the connections must be made according to Tab. 4.24:

ANALOGUE INPUT - PT1000 temperature signals (4-wire)			
Terminal block	PIN	Terminal	Description
M1	1	PTA-	Current output from PTA
M1	2	PTA+	Current input to PTA
M1	3	PTB-	Current output from PTB
M1	4	PTB+	Current input to PTB

Tab. 4.24.

All PTXX terminals are engaged for the connection of the four wires connected to the temperature-sensitive element. In this case, pay attention to the order in which the wires are connected. Compare the order with Tab. 4.24 and Fig. 4.10.

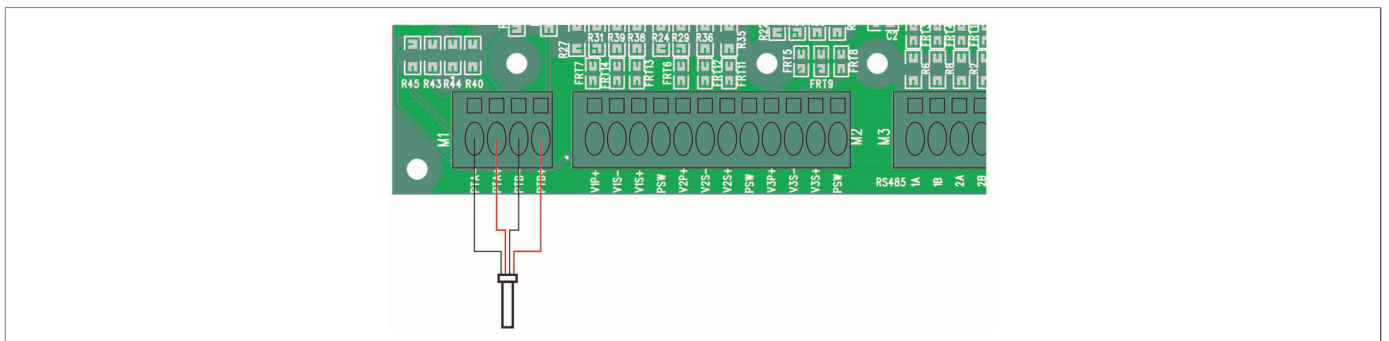


Fig. 4.10. PT1000 input terminal block (4-wire)

4.8.3 - DIGITAL INPUTS

Inputs DI1, DI2, DI3, DI4, DI5, DI6, DI7 and DI8 must be driven via a voltage-free contact (Relay or Open Collector) which closes the input to GND. Fig. 4.11 shows the connection of a switch to the first digital input DI1.

DIGITAL INPUT - voltage-free contact (OpenCollector or Relay)			
Terminal block	PIN	Terminal	Description
M5	1	GND	Mass
M5	2	GND	Mass
M5	3	DI1	Status/pulse input
M5	4	DI2	Status/pulse input
M5	5	DI3	Status/pulse input
M5	6	DI4	Status/pulse input
M5	7	DI5	Status/pulse input
M5	8	DI6	Status/pulse input
M5	9	DI7	Status/pulse input
M5	10	DI8	Status/pulse input



Tab. 4.25.

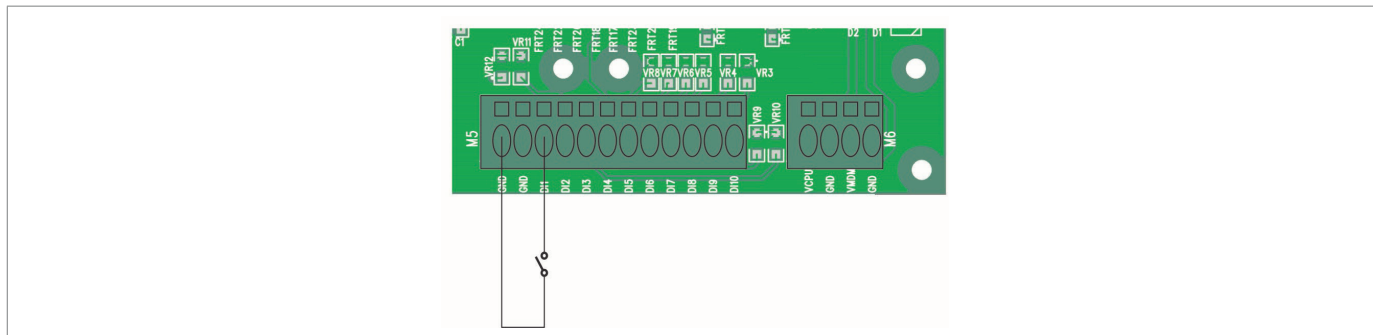


Fig. 4.11. Digital input terminal block

These digital inputs are used to acquire the status of switches present in the system and classified as single elements. Inputs DI9 and DI10, on the other hand, must be driven by a voltage that must not exceed the set maximum limit.

DIGITAL INPUT - DC voltage-driven contact			
Terminal block	PIN	Terminal	Description
M5	11	DI9	Status/pulse input
M5	12	DI10	Status/pulse input



Tab. 4.26.

These inputs need to be driven by a DC voltage. A direct grounding of either of these two terminals has no effect.

Fig. 4.12 shows the connection of a voltage source to digital input DI9, when the switch is:

- closed, the digital signal is active
- open, the circuit returns to its idle state.

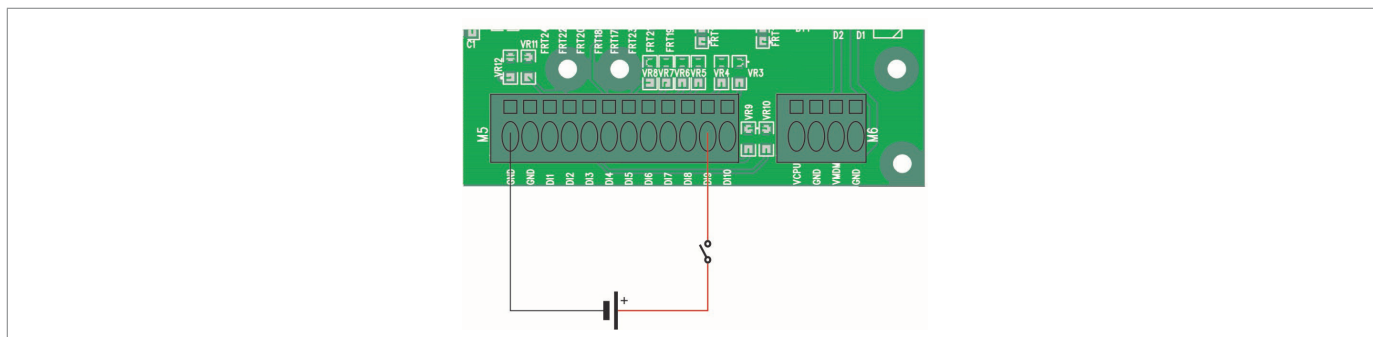


Fig. 4.12. Digital input terminal block DI9/DI10

4.9 - 4-20 MA TRANSMITTER EXPANSION

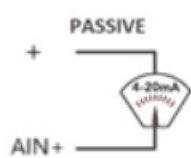
The insertion of an expansion board allows 2 4-20 mA transmitters of any type to be powered in sequence and the current generated to be read.

Inserting a 4-20 mA expansion board into slots J9/J10 allows 4-20 mA signals to be read in the following mode:

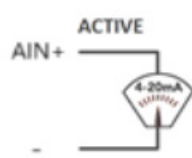
- passive: use the '+' terminals to supply the current loop and 'AINx' to connect the signal.
- active: use terminals 'AINx' to connect the signal and '-' to close the current loop to the ground reference.

ANALOGUE INPUT - 4-20 mA signals			
Terminal block	PIN	Terminal	Description
M1	1	+	4-20 mA transmitter loop power supply
M1	2	AIN1	4-20 mA loop signal input
M1	3	-	4-20 mA transmitter loop ground
M1	4	+	4-20 mA transmitter loop power supply
M1	5	AIN2	4-20 mA loop signal input
M1	6	-	4-20 mA transmitter loop ground
M1	7	+	4-20 mA transmitter loop power supply
M1	8	AIN3	4-20 mA loop signal input
M1	9	-	4-20 mA transmitter loop ground
M1	10	+	4-20 mA transmitter loop power supply
M1	11	AIN4	4-20 mA loop signal input
M1	12	-	4-20 mA transmitter loop ground
M2	1	+	4-20 mA transmitter loop power supply
M2	2	AIN5	4-20 mA loop signal input
M2	3	-	4-20 mA transmitter loop ground
M2	4	+	4-20 mA transmitter loop power supply
M2	5	AIN6	4-20 mA loop signal input
M2	6	-	4-20 mA transmitter loop ground
M2	7	+	4-20 mA transmitter loop power supply
M2	8	AIN7	4-20 mA loop signal input
M2	9	-	4-20 mA transmitter loop ground
M2	10	+	4-20 mA transmitter loop power supply
M2	11	AIN8	4-20 mA loop signal input
M2	12	-	4-20 mA transmitter loop ground

PASSIVE



ACTIVE



Tab. 4.27.

4.9.1 - OUTPUTS EXPANSION

The inclusion of an expansion board allows up to 4 Open Collector digital outputs configurable to drive solenoid valves, linear actuators, DC motors, etc. to be controlled.

ANALOGUE INPUT - temperature signals PT100/PT1000 (2-wire)			
Terminal block	PIN	Terminal	Description
M3	1	OUT1+	NC
M3	2	OUT1-	Open Collector 1 Output
M3	3	OUT2+	NC
M3	4	OUT2-	Open Collector 2 Output
M3	5	OUT3+	NC
M3	6	OUT3-	Open Collector 3 Output
M3	7	OUT4+	NC
M3	8	OUT4-	Open Collector 4 Output
M3	9	VIN	Power supply 12/24 VDC
M3	10	GND	Mass

Tab. 4.28.

For applications where external (battery) power is not available, a dedicated alkaline battery pack must be added inside the device box AQUALOG AW.

The dedicated battery pack can be either 12 VDC or 24 VDC depending on the solenoid used in the application.

Control to the solenoids requires the addition of a dedicated driver kit and wiring diagram depending on the type of application.

‘DAY/NIGHT’ WIRING DIAGRAM

Type of solenoid used: bistable (latch)

Drive kit: electromechanical relay

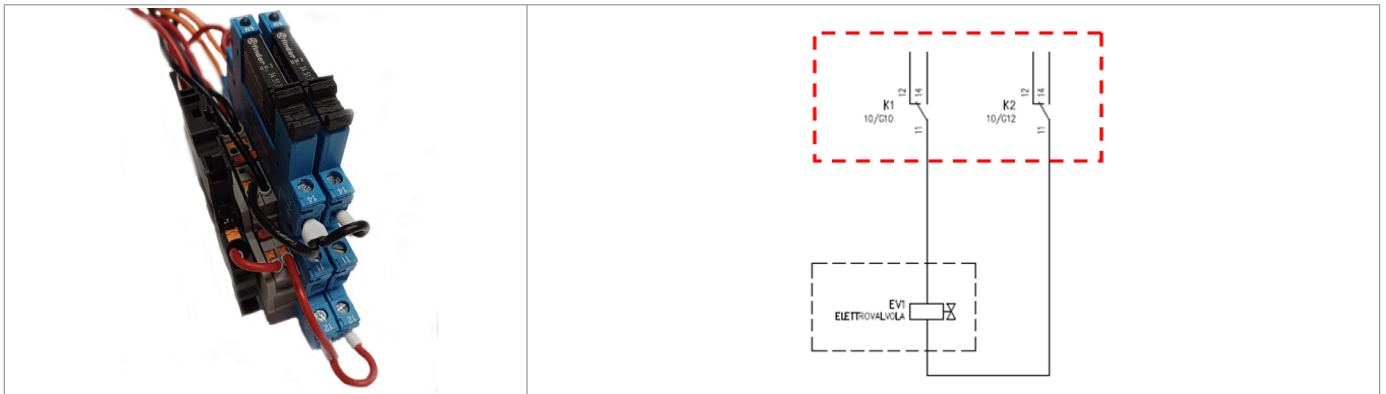


Fig. 4.13. Electromechanical relay, day/night wiring diagram

‘ADJUSTMENT WITH SOLENOIDS’ WIRING DIAGRAM

Type of solenoid used: classic

Drive kit: solid state relay

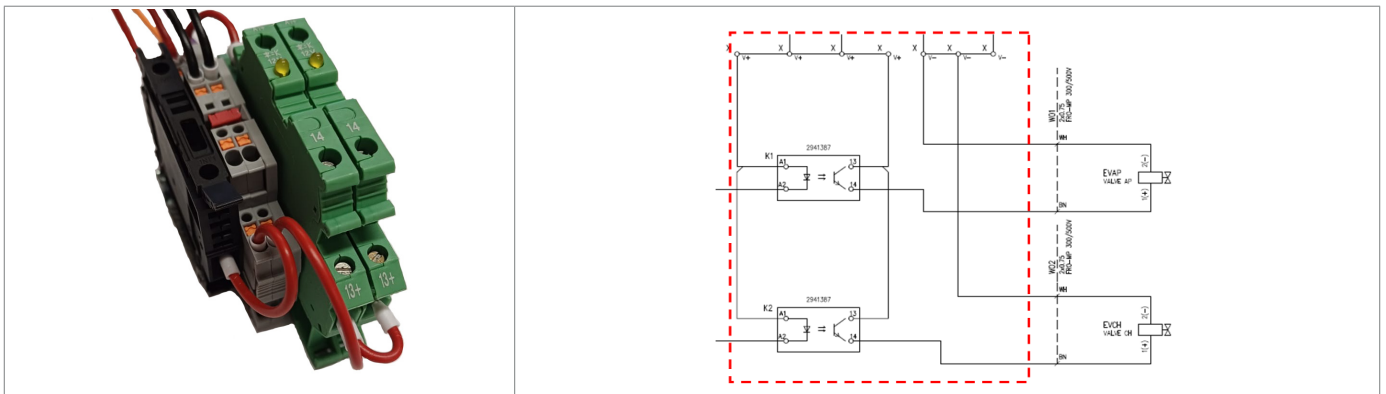


Fig. 4.14. Solid state relay, adjustment wiring diagram

5 - USER INTERFACE

5.1 - GENERAL DESCRIPTION

The following paragraphs describe the interaction methods between operator and user interface, and the meanings of the various fields on the display.

The user interface consists of the following main components, through which it is possible to consult the data provided by the device (Tab. 5.29):

Pos.	Element	Description
1	Graphic LCD display	Allows you to consult the data provided by the equipment.
2	OK button	Allows you to turn on the equipment and confirm the settings from the display.
3	Scroll keys	They allow you to browse through the pages and data menus of the display.

Tab. 5.29.

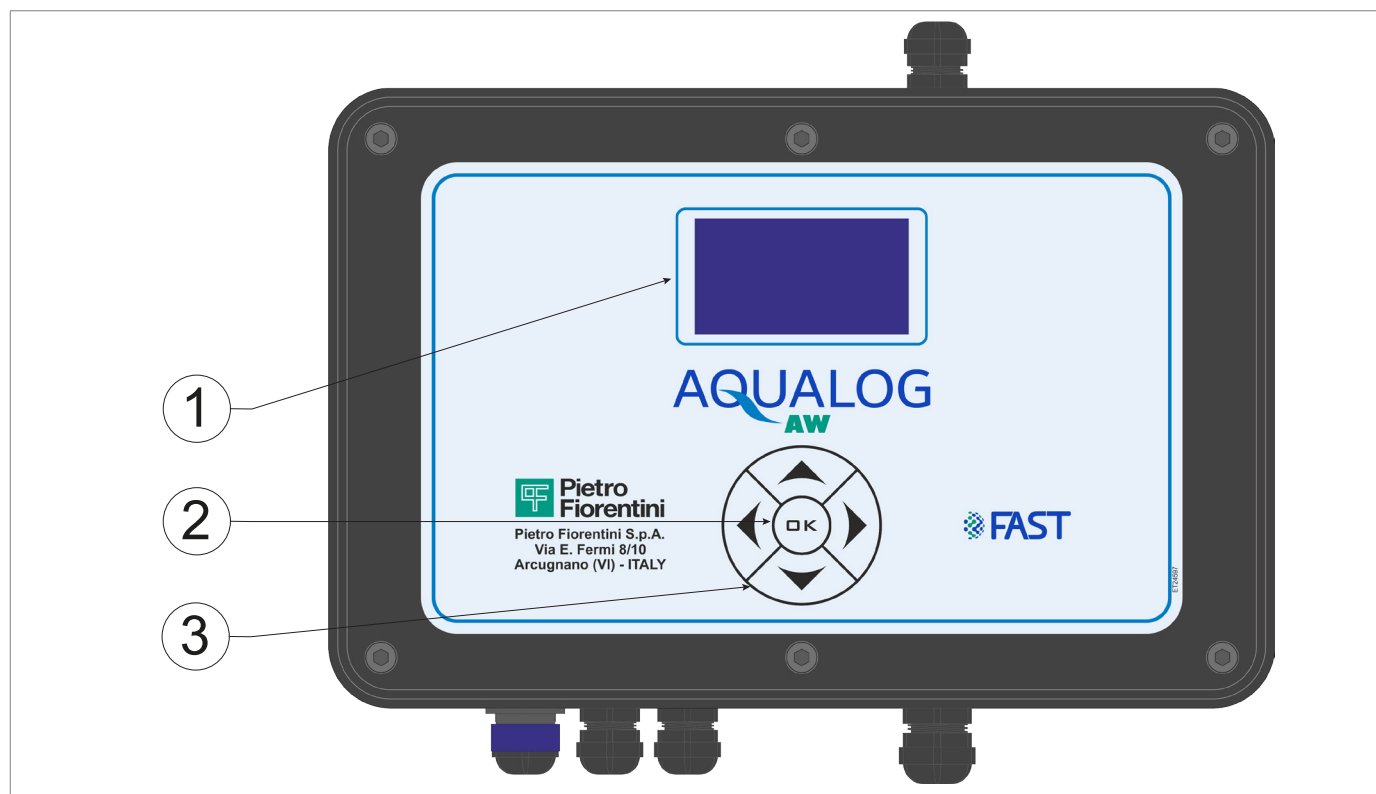


Fig. 5.15. User interface AQUALOG AW

5.2 - NAVIGATION PROCEDURE

NOTICE!

- With the display on, the “OK” key can be pressed in “short” or “long” mode (> 2 sec.)
- The navigation keys are always activated in “short” mode.
- Failure to press any key for more than 2 minutes returns the display to the off state.

Within the interface, information is organised in 'Menus', divided into one or more further sections as appropriate. The table indicates the navigation procedure in the interface:

Step	Action
1	Press “Enter” (at least 1 s.) to turn the display on.
2	Press the navigation buttons ↓ ↑ to browse the menu.
3	Press the → button to access the submenus, if available.
4	Press the ← button to return to the previous menu.

Tab. 5.30.

NOTICE!

Once the last page of a chapter is reached, the navigation sequence grants the ability to resume from the first page of the same chapter.

5.2.1 - MENU OF THE DEVICE

Key	Menu	Key	Submenu 1	Key	Submenu 2	Description
OK	Name peripheral					
↓	Date and time	→	Date and time current			Display of current date and time
↓	Status of inputs	→	Analogue	→	AN1	Instantaneous input value analogue 1
				↓	AN2	Instantaneous input value analogue 2
				↓	AN3	Instantaneous input value analogue 3
				↓	AN4	Instantaneous input value analogue 4
				↓	AN5	Instantaneous input value analogue 5
				↓	AN6	Instantaneous input value analogue 6
				↓	AN7	Instantaneous input value analogue 7
				↓	AN8	Instantaneous input value analogue 8
				↓	AN9	Instantaneous input value analogue 9
				↓	AN10	Instantaneous input value analogue 10
				↓	AN11	Instantaneous input value analogue 11
				↓	AN12	Instantaneous input value analogue 12
				↓	AN13	Instantaneous input value analogue 13
		↓	Digital	→	DI1	Digital input 1 status
				↓	DI2	Digital input 2 status
				↓	DI3	Digital input 3 status
				↓	DI4	Digital input 4 status
				↓	DI5	Digital input 5 status
				↓	DI6	Digital input 6 status
				↓	DI7	Digital input 7 status
				↓	DI8	Digital input 8 status
				↓	DI9	Digital input 9 status
				↓	DI10	Digital input 10 status
		↓	Counters	↓	CNT1	Meter 1 status Meter 1 flow value

Key	Menu	Key	Submenu 1	Key	Submenu 2	Description
					→	Meter 1 status
				↓	CNT2	Meter 2 status Meter 2 flow value
					→	Meter 2 status
				↓	CNT3	Meter 3 status Meter 3 flow value
					→	Meter 3 status
				↓	CNT4	Meter 4 status Meter 4 flow value
					→	Meter 4 status
				↓	CNT5	Meter 5 status Meter 5 flow value
					→	Meter 5 status
				↓	CNT6	Meter 6 status Meter 6 flow value
					→	Meter 6 status
				↓	CNT7	Meter 7 status
				↓	CNT8	Meter 8 status
				↓	CNT9	Meter 9 status
				↓	CNT10	Meter 10 status
↓	Alarms					Alarm input list
↓	Battery	→	RTU Battery	→	Remaining hours	Percentage of charge and number of remaining battery hours LE - BP
				↓	Change battery 1 N 1 (13 Ah q.ty 1)	Initialise 13 Ah battery quantity 1
				↓	Change battery 2 N 1 (18.5 Ah q.ty 1)	Initialise 18.5 Ah battery quantity 1
				↓	Change battery 3 N 1 (26 Ah q.ty1)	Initialise 26 Ah battery quantity 1
		→	Battery pilot box	→	Remaining hours	Percentage of charge and number of remaining battery hours
↓	Modem	→	Centre call			Force call to the configured remote management centre
		↓	SMS Test centre			Force SMS test sending
		↓	Switch-on GSM Data			Force modem ON in GSM data mode
		↓	Switch on GPRS			Force modem ON in GPRS data mode

Key	Menu	Key	Submenu 1	Key	Submenu 2	Description
		↓	GPRS DCE IP			Displays the last IP assigned by the network
		↓	GSM field			Displays GSM field strength
		↓	Local Eco Modem			Enable modem eco on local serial port
		↓	Update RTU TSPV (FW version, HW modem)			Force an FTP connection to the configured server and download the new firmware to update
↓	Diagnostics					See Tab. 5.32
↓	Service	→	Reboot			Forces machine restart
		↓	Reset alarms			Cancel alarms
		↓	SMS Reset			Delete SMS queue
		↓	Reset counters			Initialise meters
		↓	Reset diagn.			Initialise diagnostics
		↓	Discovery not CFG.			
		↓	Radio no conf	→	Num Reset	
		↓	Wi-Fi / BT			Shows the status of the local Wi-Fi / Bluetooth wireless communication module
		↓	Unlock pin J5			Enable firmware update from connector J5
↓	SW VER LORA					View firmware and hardware revisions

Tab. 5.31.

5.2.2 - DIAGNOSTICS

The diagnostic information is shown on the display and indicates the error in hexadecimal format.

Error code		Description		
0x00000100	Low Battery			
0x00000200	ADC error			
0x00000400	Uncalibrated analogue channel			
0x00000800	Frequency out of limit			
0x00000300	Low Battery	ADC error		
0x00000500	Low Battery	Uncalibrated analogue channel		
0x00000900	Low Battery	Frequency out of limit		
0x00000600	ADC error	Uncalibrated analogue channel		
0x00000A00	ADC error	Frequency out of limit		
0x00000C00	Uncalibrated analogue channel	Frequency out of limit		
0x00000700	Low Battery	ADC error	Uncalibrated analogue channel	
0x00000B00	Low Battery	ADC error	Frequency out of limit	
0x00000D00	Low Battery	Uncalibrated analogue channel	Frequency out of limit	
0x00000E00	ADC error	Uncalibrated analogue channel	Frequency out of limit	
0x00000F00	Low Battery	ADC error	Uncalibrated analogue channel	Frequency out of limit

Tab. 5.32.

5.3 - LOCAL COMMUNICATION INTERFACES

The main local communication interfaces are:

- Wi-Fi
- Bluetooth
- USB (on demand)

! ATTENTION!

Wireless communication can be Wi-Fi or Bluetooth. The setting is performed on the RTU firmware. To find out which local wireless communication is active, proceed as follows:

- **access the 'Service' section from the display menu**
- **the device will display**
 - **BT if Bluetooth is enabled**
 - **Wi-Fi if Wi-Fi is enabled.**

A label identifying it will be on the outside of the box.

5.3.1 - COMMUNICATION INTERFACE VIA WI-FI

The Wi-Fi interface allows communication with the RTU via the Rainbow software without removing the cover. A magnet and a PC with a Wi-Fi network card are required to turn on Wi-Fi.

To make a Wi-Fi connection to the machine, proceed as follows:

1. Place the magnet next to the 'WAKE UP' label (Fig. 5.16)
2. Check the sound of a short click inside the machine
3. Press OK
4. Press the ↓ arrow until 'Service' is reached
5. Press the → arrow to enter the submenu
6. Press the ↓ arrow until 'Wi-Fi' is reached
7. Check that 'Wait Connection' is present
8. Run the Rainbow programme from the PC
9. Select the desired RTU and double-click the mouse
10. Select 'RTU' in the top left-hand corner
11. Select 'Monitor Diagnostics' from the drop-down menu
12. Select the 'IP Address (IP: 192.168.4.1; Port: 502)' button in the new window
13. Connect from the PC to the Wi-Fi hotspot network created with the TAG name of the device visible on the RTU display
14. Click the 'Connect' button
15. Wait for the connection and interact with the RTU.

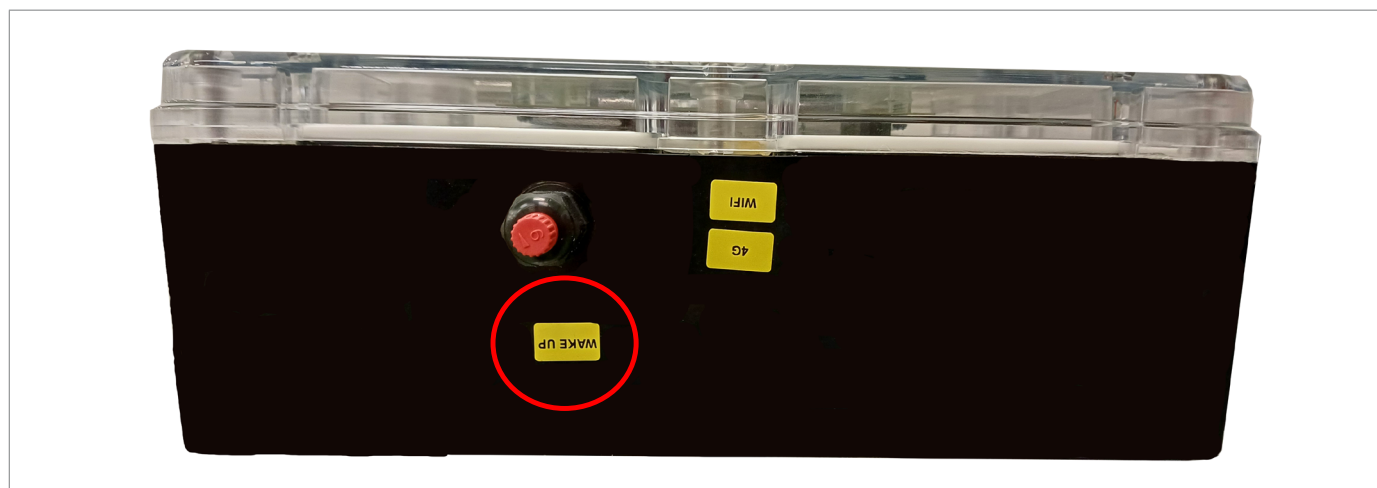


Fig. 5.16. Wi-Fi enabling label

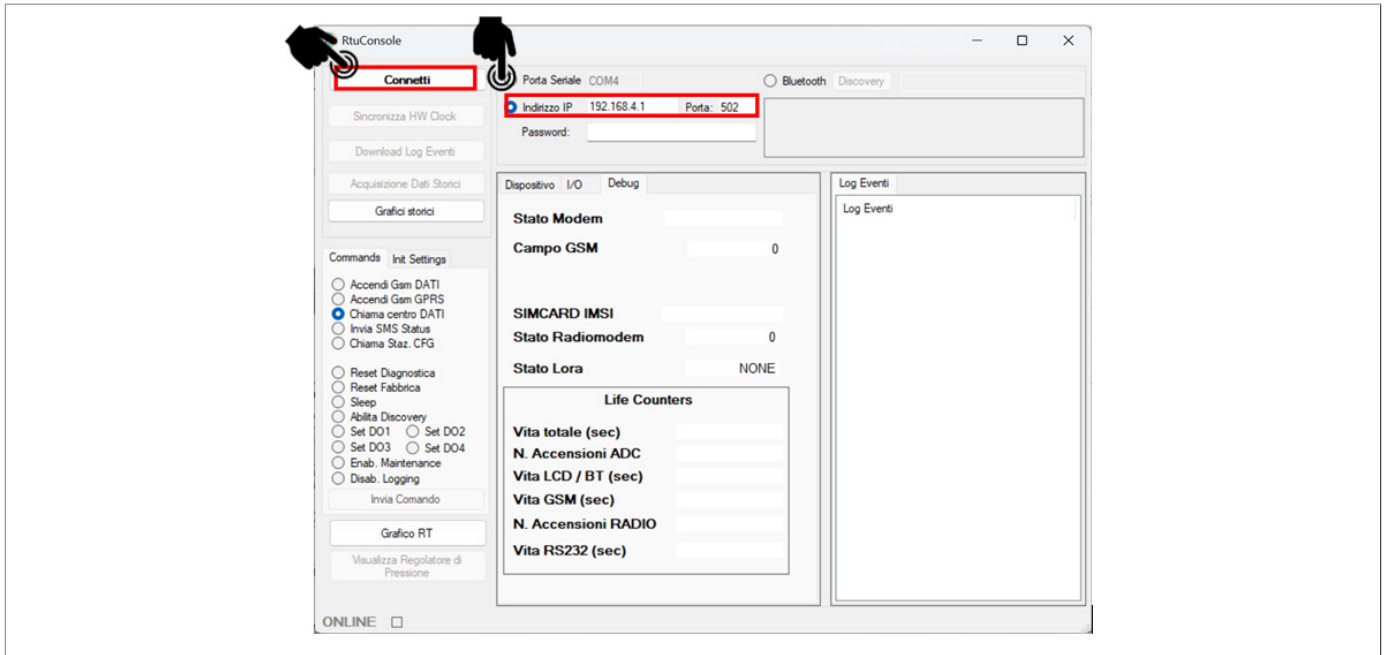


Fig. 5.17. Rainbow interface for Wi-Fi connection

5.3.2 - COMMUNICATION INTERFACE VIA BLUETOOTH

The Bluetooth interface allows communication with the RTU via the Rainbow software without removing the cover. Bluetooth start-up requires a magnet and a PC that supports the standard Bluetooth 4.0.

To make a Bluetooth connection to the machine, proceed as follows:

1. Place the magnet next to the 'WAKE UP' label (Fig. 5.18)
2. Check the sound of a short click inside the machine
3. Press OK
4. Press the ↓ arrow until 'Service' is reached
5. Press the → arrow to enter the submenu
6. Press the ↓ arrow until 'BT' is reached.
7. Verify that the MAC address of the device and the words 'Waiting pkt. 0" appear
8. Run the Rainbow programme from the PC
9. Select the desired RTU and double-click the mouse
10. Select 'RTU' in the top left-hand corner
11. Select 'Monitor Diagnostics' from the drop-down menu
12. Select the 'Bluetooth' button in the new window
13. Click the 'Discovery' button and wait for the text box next to it to display the serial numbers
14. Check that the name 'RTU' is present with the corresponding MAC Address next to it
NOTICE: in future versions of Rainbow, the name of the 'RTU' will replace this digit
15. Select the name "RTU" and click "Connect"
16. Wait for the connection and interact with the RTU.

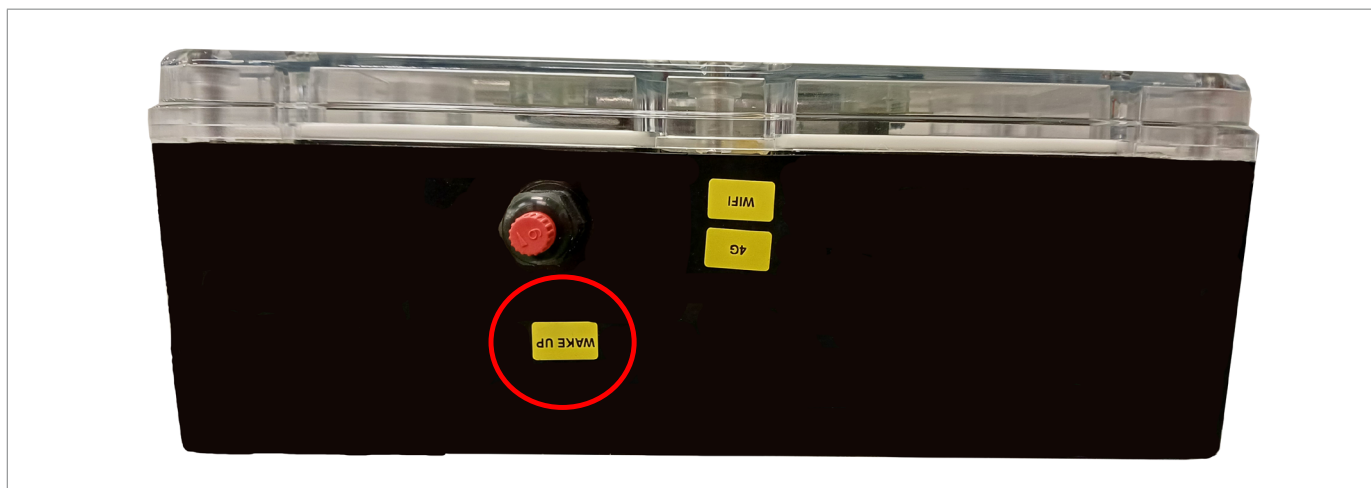


Fig. 5.18. Bluetooth enabling label

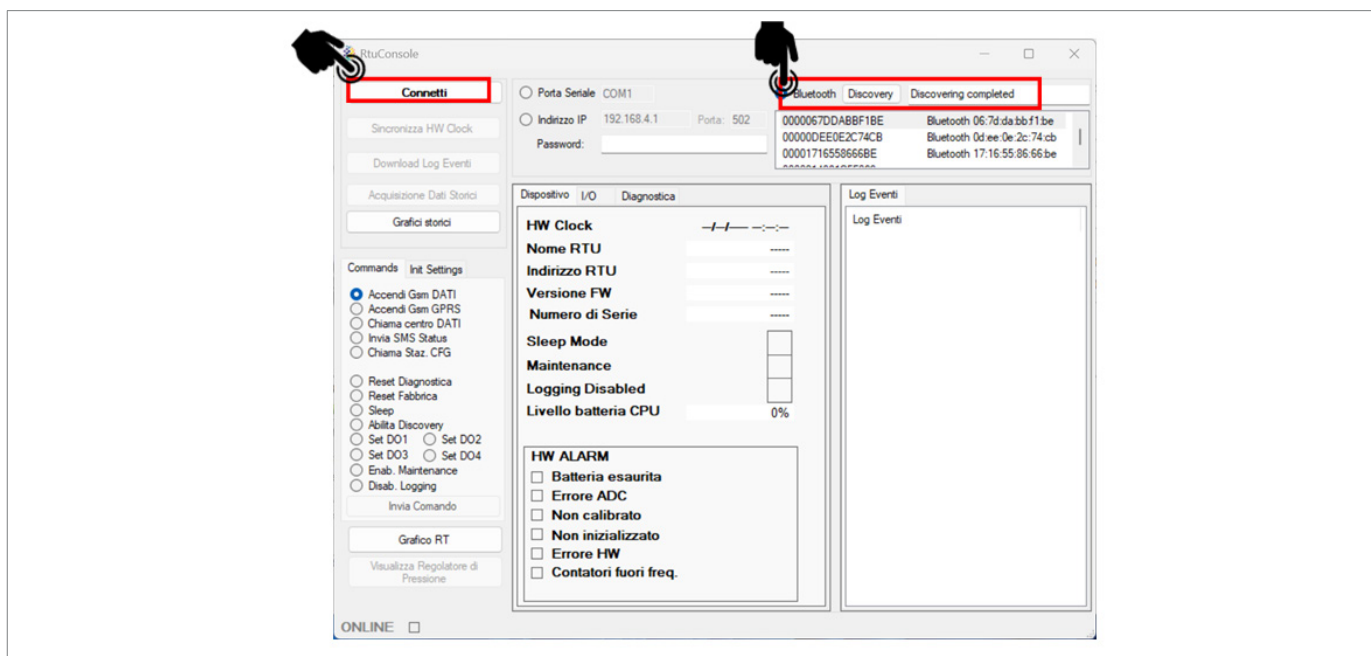


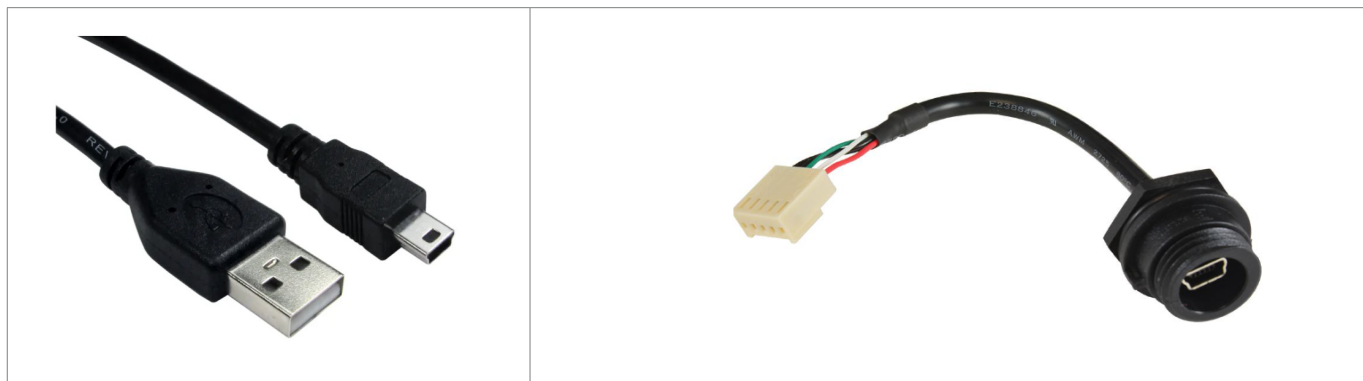
Fig. 5.19. Rainbow interface for Bluetooth connection

5.3.3 - COMMUNICATION INTERFACE VIA USB (ON REQUEST)

The USB interface is located inside the RTU (optional external) and allows a fast data exchange with the PC. The USB connection procedure may require the installation of communication drivers from STMicroelectronics, which are available free of charge on the website.

Connection requires:

- USB A/USB B Mini cable, length approx. 150mm (cod. ICOC MUSB-AA-030)
- USB Mini connector (cod. PX0443)



Tab. 5.33.

To connect via USB to the machine, proceed as follows:

1. Remove the RTU cover closure screws
2. If not present, insert the converter for the USB interface on connector J12
3. Insert the USB A / USB B Mini cable into the converter
4. Open the control panel from PC
5. Select the 'Device Management' item
6. Search for the 'STMicroelectronics Virtual COM Port'
7. Run the Rainbow programme from the PC
8. Select the desired RTU and double-click the mouse
9. Select 'RTU' in the top left-hand corner
10. Select 'Monitor Diagnostics' from the drop-down menu
11. Enter the COM port under 'Serial Port' paired with the USB connection
12. Click the 'Connect' button
13. Wait for connection and interact with the RTU

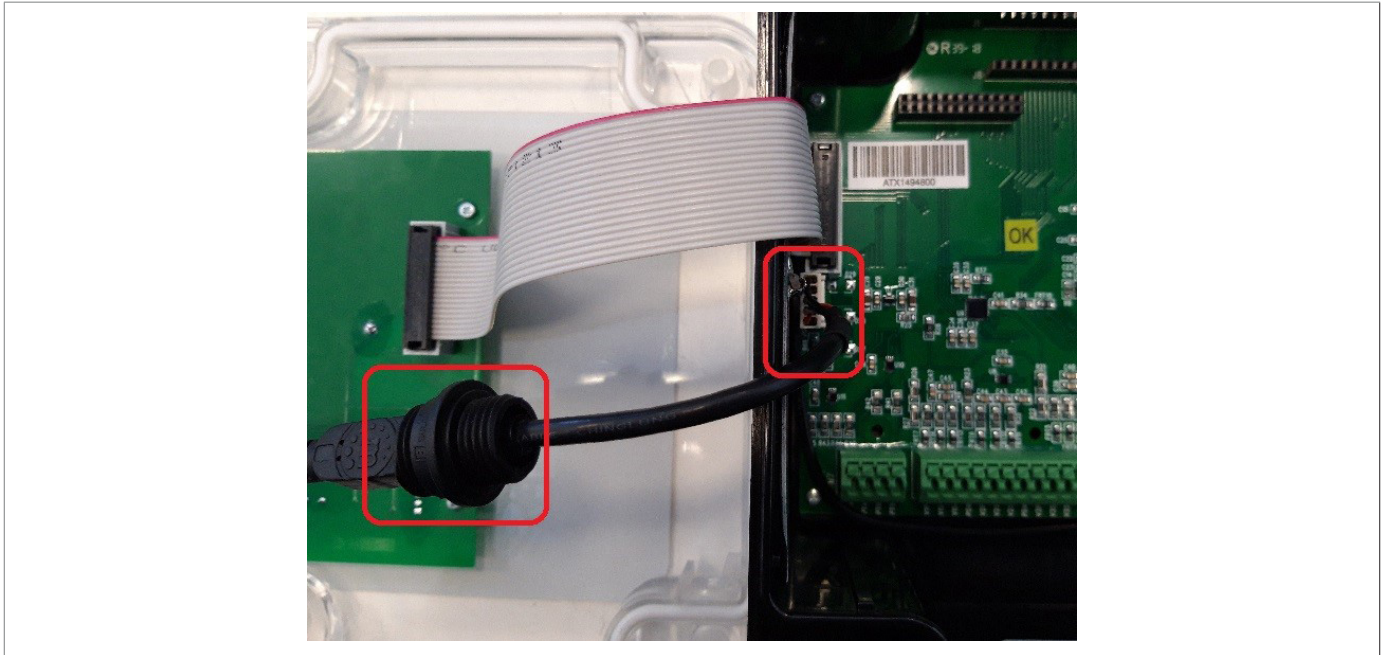


Fig. 5.20. Interface for USB connection

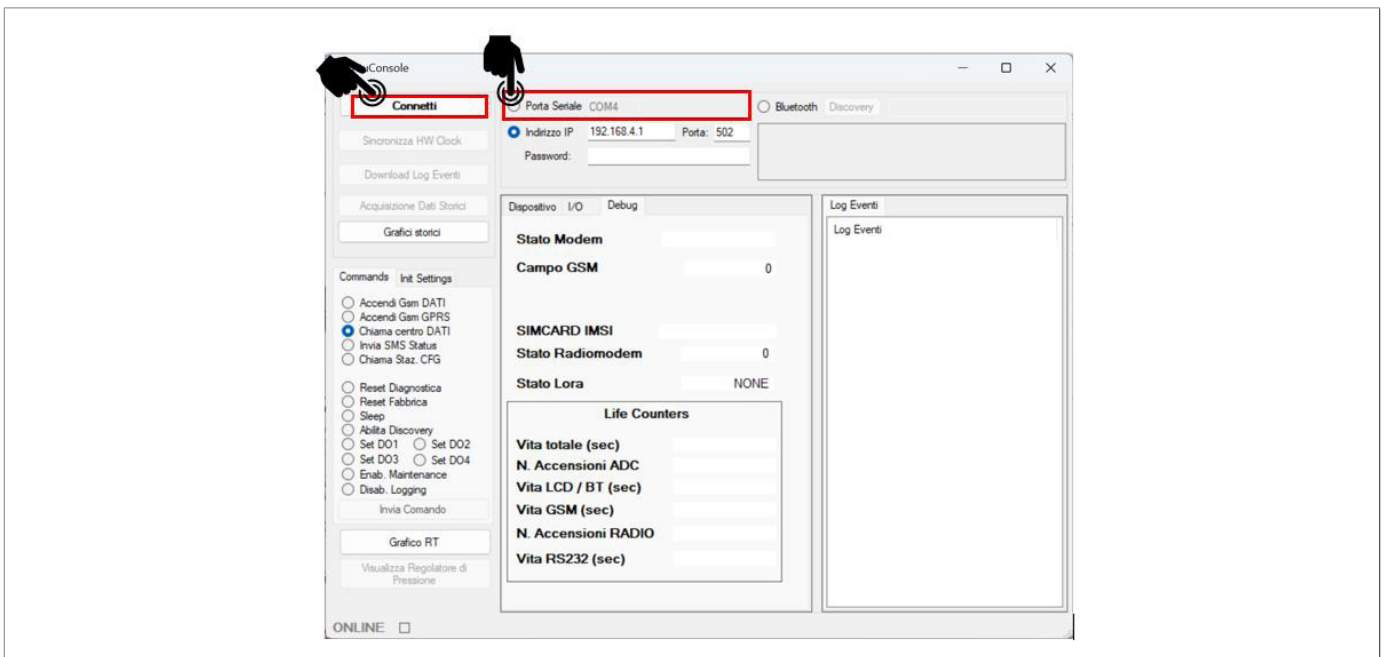


Fig. 5.21. COM port connection

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6 - TRANSPORT AND HANDLING


6.1 - SPECIFIC WARNINGS FOR TRANSPORT AND HANDLING

NOTICE!

Transport and handling must be carried out in compliance with the regulations in force in the country of installation by personnel who are:

- qualified (specially trained);
- who are familiar with accident prevention and workplace safety regulations;
- authorised to use lifting equipment.

Transport and handling

Operator qualification	<ul style="list-style-type: none"> • Installer.
PPE required	 <p>WARNING!</p> <p>The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u>
Weights and dimensions of the equipment	For dimensions and weights please refer to “6.3 - Physical characteristics of the device”.

Tab. 6.34.

6.1.1 - PACKAGING AND FASTENERS USED FOR TRANSPORT

The transport packaging is designed and manufactured to avoid damage during normal transport, storage and handling. The equipment must be kept in the packaging until installation.


Upon receiving the equipment, please:

- make sure that no part has been damaged during transport and/or handling;
- immediately report any damage found to PIETRO FIORENTINI S.p.A..

NOTICE!

PIETRO FIORENTINI S.p.A. shall not be liable for any damage to people or property caused by accidents due to failure to comply with the instructions provided in this manual.

Tab. 6.35 describes the types of packaging used:

Ref.	Type of packaging	Image
A	Single box	

Tab. 6.35.

6.2 - PACKAGING CONTENT

AQUALOG AW is shipped with:

- battery inside, to be connected
- internal antenna
- expansion board (on request)
- wall-mounting bracket (on request)

6.3 - PHYSICAL CHARACTERISTICS OF THE DEVICE

6.3.1 - CABLE GLAND VERSION

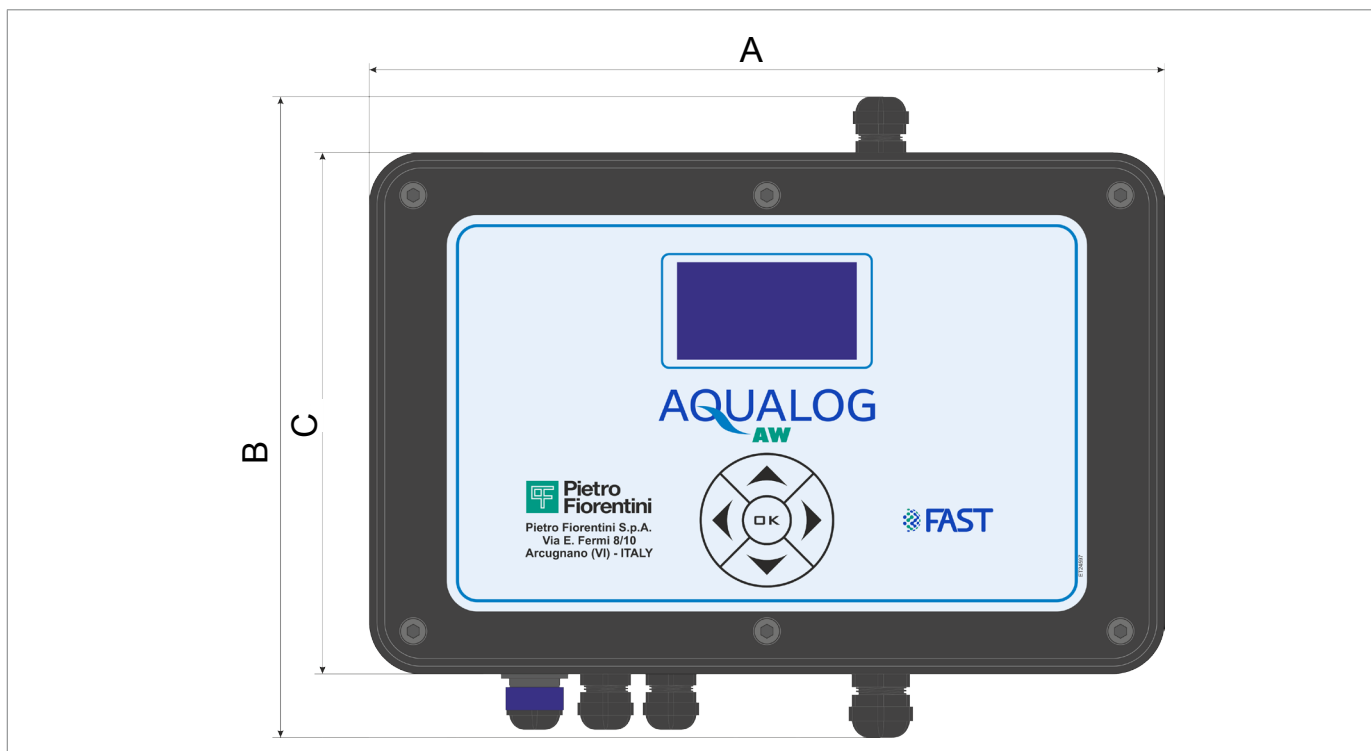


Fig. 6.17. Dimensions AQUALOG AW cable version, front view

Weights and dimensions	
A	260 mm
B	~210 mm
C	171 mm
Weight	2 kg

Tab. 6.36.

6.3.2 - LOWER SIDE

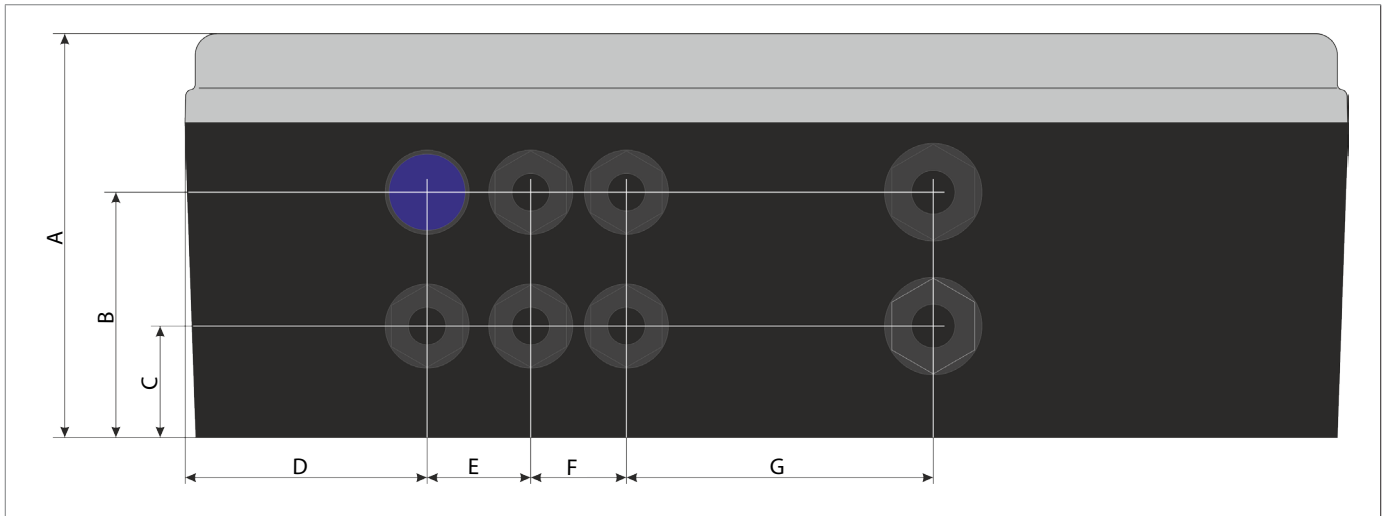


Fig. 6.18. Cable glands lower side external view

Dimensions [mm]	
A	91
B	55
C	25
D	54
E	23
F	21
G	69

Tab. 6.37.

6.3.3 - UPPER SIDE

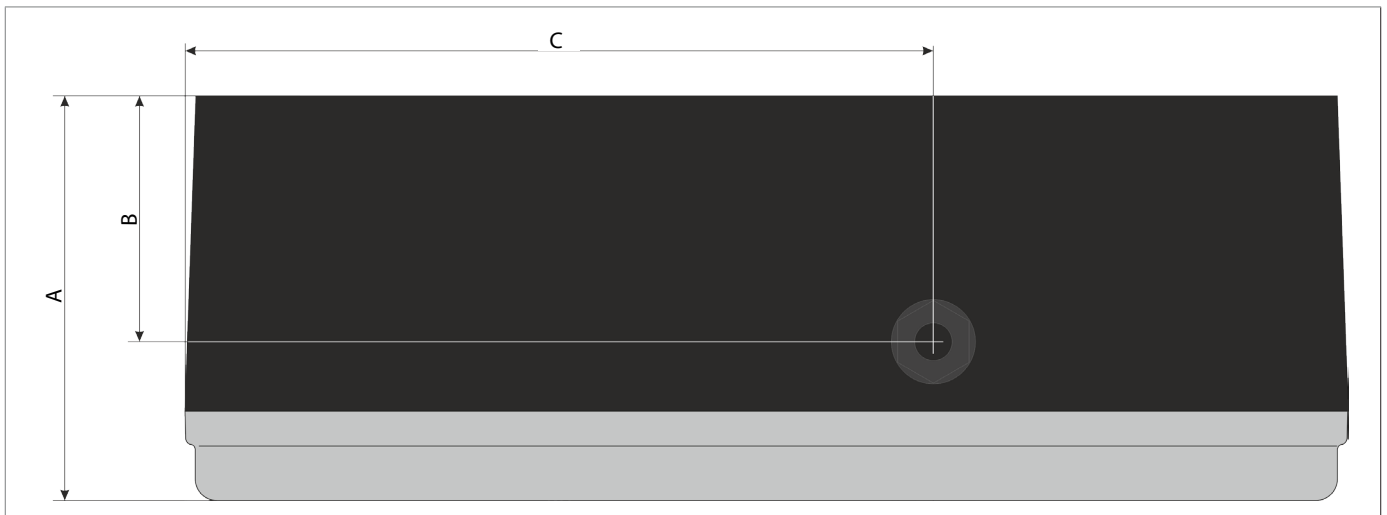


Fig. 6.19. Cable glands lower side external view

Dimensions [mm]	
A	91
B	55
C	167

Tab. 6.38.

6.3.4 - MIL CONNECTOR VERSION

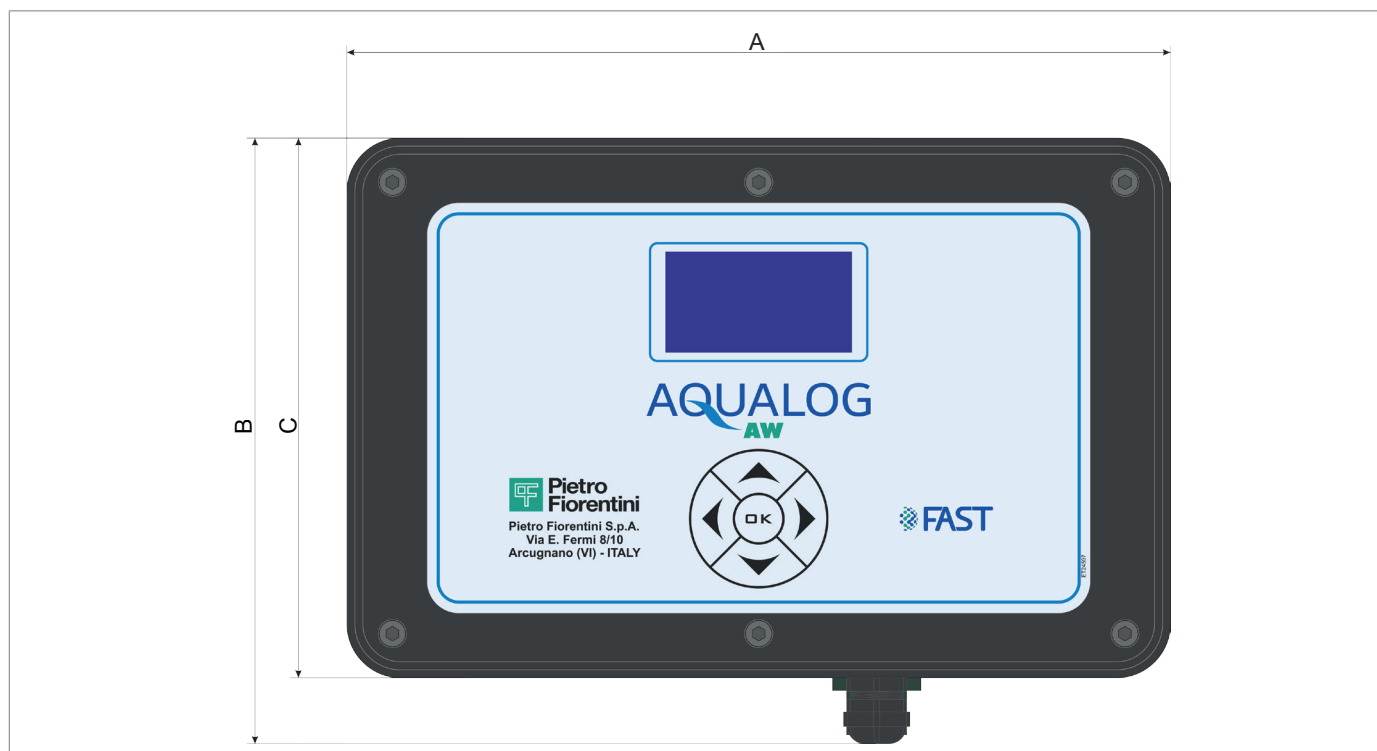


Fig. 6.20. Dimensions AQUALOG AW MIL connector version, front view

Weights and dimensions	
A	260 mm
B	~192 mm
C	171 mm
Weight	2 kg

Tab. 6.39.

6.3.5 - LOWER SIDE

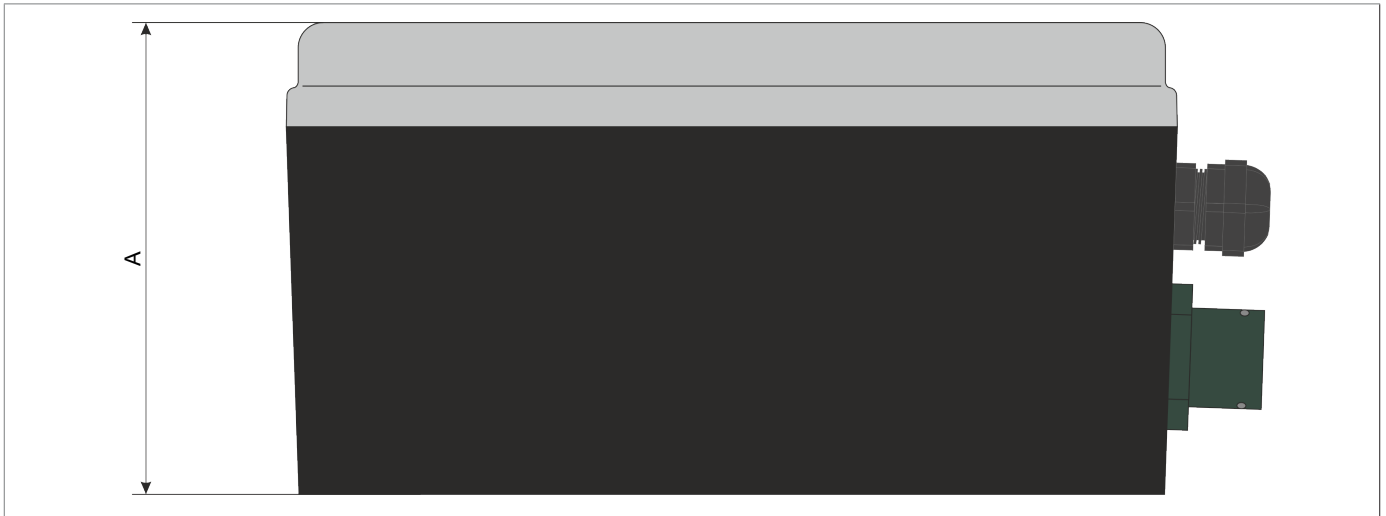


Fig. 6.21. MIL connector version lower side external view

Dimensions [mm]	
A	91

Tab. 6.40.

6.3.6 - UPPER SIDE

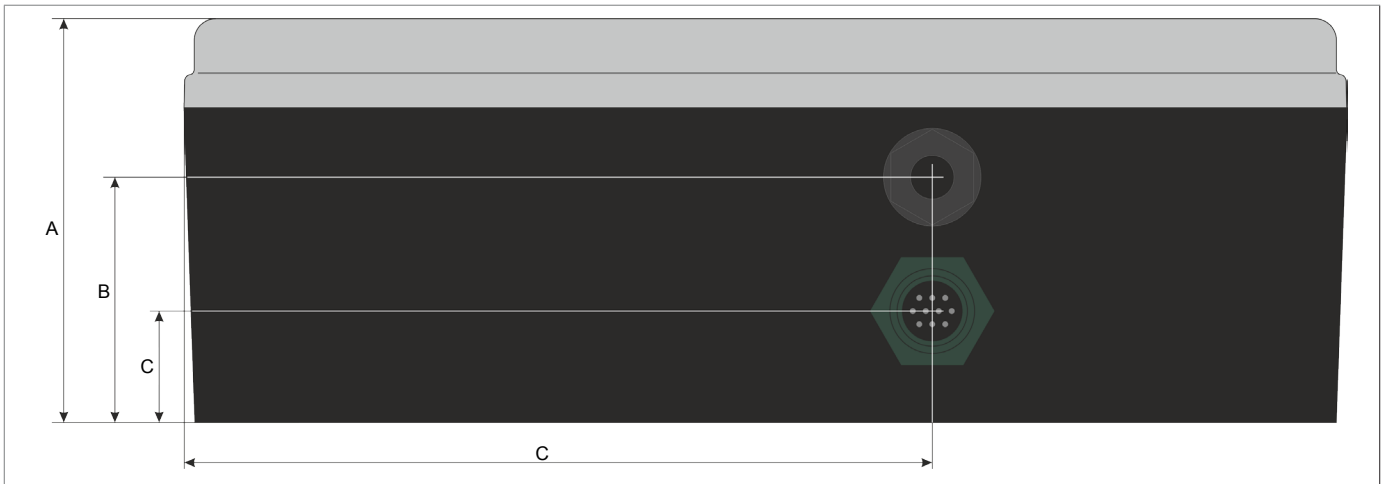


Fig. 6.22. MIL connector version lower side external view

Dimensions [mm]	
A	91
B	55
C	25
D	168

Tab. 6.41.

6.4 - EQUIPMENT ANCHORING AND LIFTING METHOD

HAZARD!

Using lifting equipment (if necessary) for unloading, carrying and handling packages is reserved only for skilled operators who have been properly trained (and are appropriately qualified if required by the regulations in force in the country of installation) and are familiar with:

- accident prevention rules;
- workplace safety provisions;
- lifting equipment features and limits.

HAZARD!

Before handling a load, make sure that its weight does not exceed the load capacity of the lifting equipment (and any other lifting tools) specified on the specific plate.

ATTENTION!

Before moving the equipment:

- remove any movable or hanging component or firmly secure it to the load;
- protect fragile equipment;
- check that the load is stable;
- make sure to have perfect visibility along the route.

6.4.1 - FORKLIFT HANDLING METHOD

HAZARD!

It is forbidden to:

- Do not transit under suspended loads;
- Do not move the load over the personnel operating in the site/plant area.

WARNING!

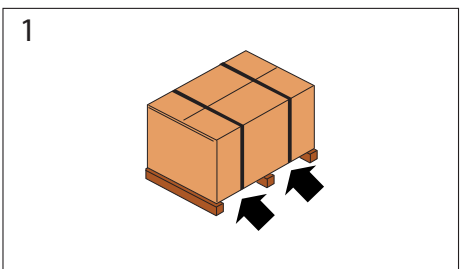
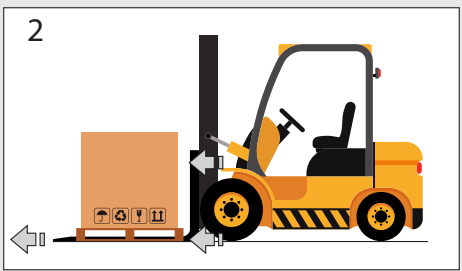

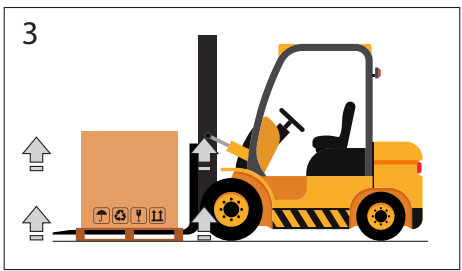
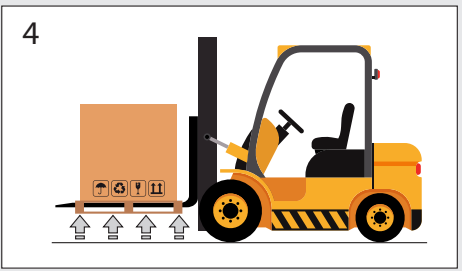
The following is not allowed on forklifts:

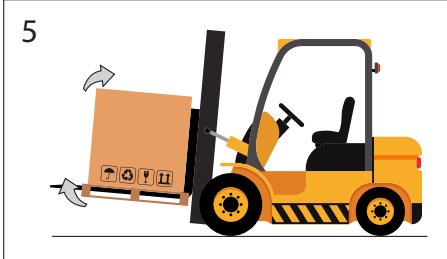
- carrying passengers;
- lifting people.

WARNING!

During all handling operations, pay close attention to avoid impact or vibrations of the equipment batteries.





If cardboard boxes (single or multiple) are carried on a pallet, proceed as indicated in Tab. 6.42:

Step	Action	Image
1	Place the forks of the forklift under the load surface.	
2	Make sure that the forks protrude from the front of the load (by at least 5 cm), far enough to eliminate any risk of the transported load tipping.	
3	Raise the forks until they are touching the load. <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;">  NOTICE! Fasten the load to the forks with clamps or similar devices if required. </div>	
4	Slowly lift the load by a few dozen centimetres and check its stability, making sure that the centre of gravity of the load is at the centre of the lifting forks.	

Step	Action	Image
5	Tilt the mast backwards (towards the driver's seat) to help the over-turning moment and to ensure greater load stability during transport.	
6	Adjust transport speed according to the type of floor and load, avoiding sudden manoeuvres. ⚠ WARNING! In case of: <ul style="list-style-type: none"> • obstacles along the path; • particular operating situations; hinder operator visibility, the assistance of a ground operator is required, standing outside the range of action of the lifting equipment, with the task of signalling.	-
7	Place the load in the chosen installation area.	-

Tab. 6.42.

6.5 - PACKAGING REMOVAL

Packaging removal	
Operator qualification	<ul style="list-style-type: none"> Installer.
PPE required	<div style="display: flex; align-items: center;">     </div> <div style="background-color: #f4a460; padding: 5px; margin-top: 10px;"> <p>⚠ WARNING!</p> </div> <p>The PPE listed in this table is related to the risk associated with the equipment. For the PPE necessary to protect against risks associated with the workplace or operating conditions, please refer to:</p> <ul style="list-style-type: none"> the regulations in force in the country of installation; <u>any information provided by the Safety Manager at the installation facility.</u>

Tab. 6.43.

To unpack the cardboard boxes (single or multiple) supported by a pallet, proceed as described in Tab. 6.44:

Step	Action
1	Remove the stretch film around the pallet.
2	Remove the 4 support corners.
3	Move the boxes of the equipment from the pallet to their intended place. <div style="border: 1px solid #0070c0; padding: 5px; margin-top: 10px;"> <p>! NOTICE!</p> <p>Have at least 2 operators manually move the packages if required due to their dimensions/weight.</p> </div>

Tab. 6.44.

! NOTICE!

After removing all packaging materials, check for any anomalies.

If there are anomalies:

- do not install the equipment;
- contact PIETRO FIORENTINI S.p.A. and specify the details provided on the equipment rating plate.

⚠ WARNING!

The single piece of equipment is contained in a specifically created cardboard box.

Avoid taking the equipment out of the box before its installation.

6.5.1 - PACKAGING DISPOSAL

! NOTICE!

Sort the various materials making up the packaging and dispose of them in compliance with the regulations in force in the country of installation.

6.6 - STORAGE AND ENVIRONMENTAL CONDITIONS

WARNING!

Protect the equipment from blows and impacts, even accidental, until it is installed.

NOTICE!

The meters must be stored in an upright position.

If the equipment needs to be stored for an extended period, the minimum environmental conditions for the intended storage are provided in Tab. 6.45. Compliance with these conditions will guarantee the declared performance:

Conditions	Data
Maximum storage period	A maximum storage period is not defined as it is only limited by the life span of the product.
Storage temperature	from -25°C to +60°C
Relative humidity	95%

Tab. 6.45.

6.6.1 - STORAGE OF THE SPARE BATTERIES

Any spare battery packs ordered must be stored:

- in their original packaging or alternatively in ADR compliant packaging, by placing the containers at ground level (do not stack above 1.2 m);
- in a place with a temperature $\leq 25^{\circ}\text{C}$ in order to preserve its electrical characteristics;
- away from flammable material, water and rain, corrosive agents, heat sources;
- in the absence of direct sunlight;
- away from metal objects;
- so as to prevent any accidental movement;
- so as to prevent their terminals from bearing the weight of other elements stacked on them.

Battery packs must not be stored:

- with damaged batteries;
- with exhausted batteries.

NOTICE!

The packages must be labelled in accordance with ADR, i.e. with a diamond shape on the side and code UN3090.



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7 - INSTALLATION

7.1 - GENERAL WARNINGS

 **WARNING!**

The installation must be performed by qualified personnel, in compliance with the provisions in force concerning safety.

 **WARNING!**

For the safe use of the equipment, respect the permitted environmental conditions and comply with the data shown on the nameplate.

 **WARNING!**

It is forbidden to make modifications to the equipment.

 **WARNING!**

PIETRO FIORENTINI S.p.A. is not liable for damage caused by incorrect installation of the equipment and/or otherwise different from that indicated in this manual.

7.2 - INSTALLATION PRE-REQUISITES

7.2.1 - ALLOWED ENVIRONMENTAL CONDITIONS

 **NOTICE!**

For details on the allowed environmental conditions (temperature range and classification) refer to paragraph “4.4 - Technical data”.

 **WARNING!**

PIETRO FIORENTINI S.p.A. is not liable for damage and/or malfunctions caused by installation in environments other than those permitted.







7.3 - CHECKS BEFORE INSTALLATION

The installation site must be suitable for the safe use of the equipment.

The equipment installation area must have lighting that guarantees the operator good visibility during the installation phases.

Before installation, it must be ensured that:

- the installation space meets current safety requirements
- there are no impediments that could hinder the installer's installation operations;
- the equipment connections are clean and undamaged.

Installation	
Operator qualification	<ul style="list-style-type: none"> • Installer.
PPE required	<div style="display: flex; align-items: center;">      </div> <div style="background-color: #f4a460; padding: 5px; margin-top: 5px;">  WARNING! </div> <p>The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u>
Equipment required	Keys to fix inlet and outlet connections fittings/equipment.

Tab. 7.46.

7.4 - INSTALLATION PROCEDURE

The cables supplied with the pressure sensors have a mechanically non-compact internal structure due to the presence of the compensation tube and any shielding.

This structure causes deformations to the cable and changes the circular shape when tightening the cable gland. This phenomenon weakens the tightness in long-term immersions.

For the connection of sensors and/or external equipment via digital exchange signals, use cables suitable for the installation site, with a compact internal structure.

Neoprene cables are preferred over others due to their compactness and elasticity. They ensure that tightness is maintained in the coupling with the cable gland even as it ages.

NOTICE!

Prevent weakening of the cables, or when using PVC cables or cables with compact internal structures:


- use a tube of medium-gauge heat shrink tubing to the cable
- apply an adhesive such as RayTech MTR 10/3 to coat the cable in the section inside the cable gland. The adhesive stiffens the structure.

7.4.1 - EQUIPMENT ASSEMBLY AND SIM INSERTION


To ensure that the system is sealed against the penetration of liquids in the event of temporary immersion, take care to insert the cables correctly into the box.

Only connect sensors to the equipment with the same degree of immersion resistance.

Any junction boxes or equipment connected to the controller by cables must guarantee the same degree of immersion tightness.

Step	Action
1	Secure the Aqualog AW device with the brackets.
2	Unscrew and remove the cover screws.
3	Remove the cover.
4	Disconnect the battery pack.
5	Connect the signal cables from the field (refer to section "4.8 - Wiring").  NOTICE! The terminals used for connection are 'spring-loaded'. To perform this step: <ol style="list-style-type: none"> a. fully press the unlock button with the relative tool b. insert the wire into the terminal c. release the unlock button
6	Tighten the cable glands.
7	If you have an external antenna, connect the antenna to the appropriate connector on the external tail.

To insert the SIM card:

Step	Action
8	Insert the SIM into the modem slot (Fig. 7.23).
9	Connect the battery pack.
10	Connect via USB or Wireless interface.
11	Configure the equipment (refer to chapter “8 - Configuration”).
12	Check with the Rainbow instruments or on the display that the measurements are correct.
13	Make a connection test and check that communication is stable (see “8.10 - 2G, 3G, 4G Data call communication test” and “8.12 - Reset”).
14	Place the cover on the box.
15	Insert and fasten the screws. <div style="background-color: #f4a460; padding: 5px; border: 1px solid #f4a460;">  WARNING! Check the correct positioning of the cover and fastening of the screws so as not to lose the IP68 degree of protection. </div>

Tab. 7.47.

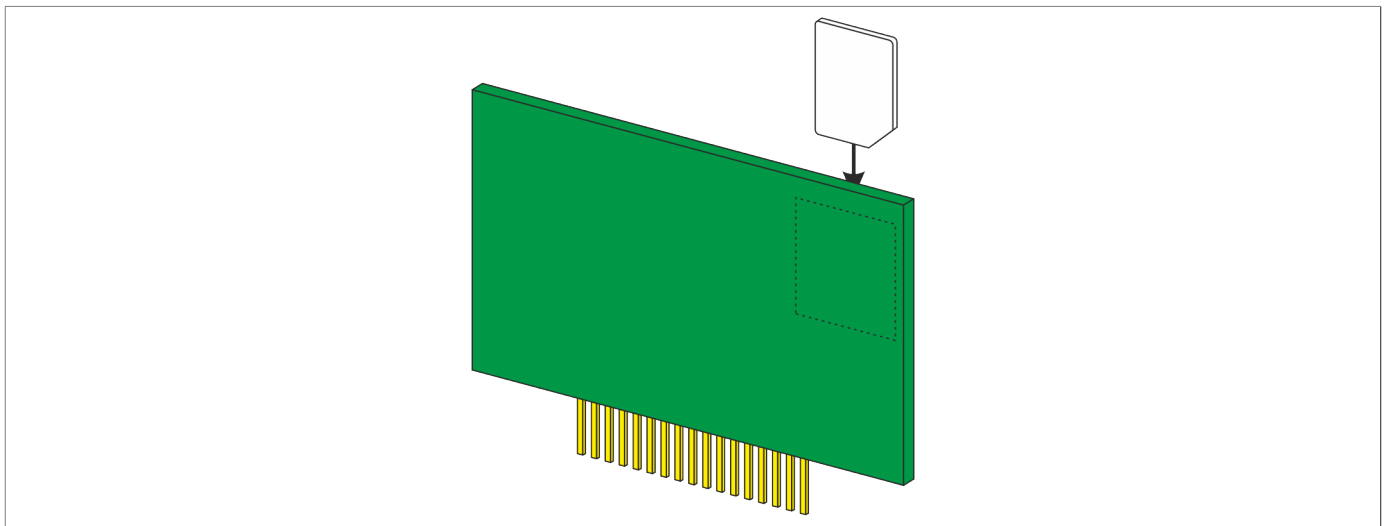



Fig. 7.23. Installation procedure

8 - CONFIGURATION

8.1 - SAFETY REQUIREMENTS FOR CONFIGURATION

Configuration	
Operator qualification	<ul style="list-style-type: none"> Specialised technician. Installer.
PPE required	 <p>WARNING!</p> <p>The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:</p> <ul style="list-style-type: none"> the regulations in force in the country of installation; <u>any information provided by the Safety Manager at the installation facility.</u>

Tab. 8.48.

8.2 - EQUIPMENT CONFIGURATION

NOTICE!

Equipment configuration must be carried out by authorised and qualified personnel.

Configuration of the Aqualog-AW RTUs can be done via the **Rainbow software**. Please refer to the software manual for detailed operating instructions.

The tool's main features and advanced firmware functionality will be described below.

8.2.1 - STARTING THE RAINBOW SOFTWARE

To start the software:

1. Launch the Rainbow programme
2. Select the desired language (Fig. 8.20)
3. Select the desired RTU (Fig. 8.21)

NOTICE!

If the desired RTU is not present, follow the procedure outlined in section 8.2.2.

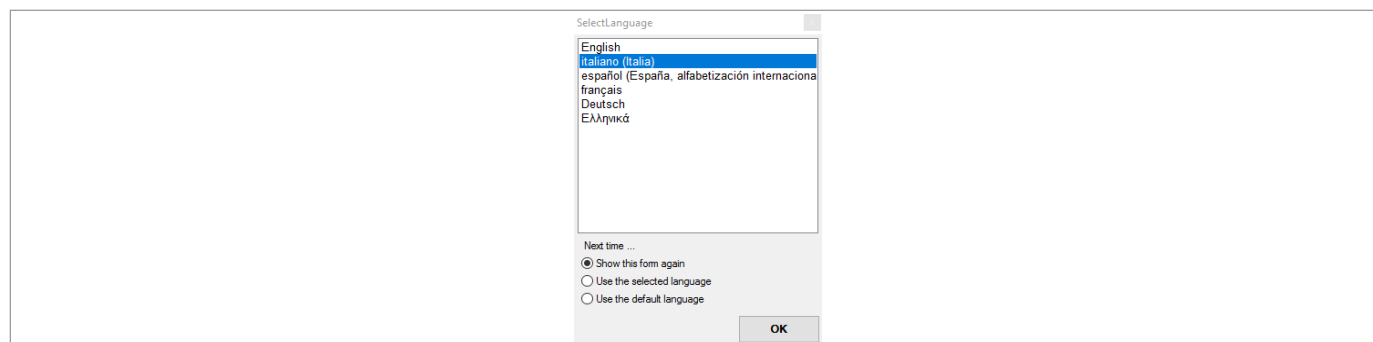


Fig. 8.20. Select language

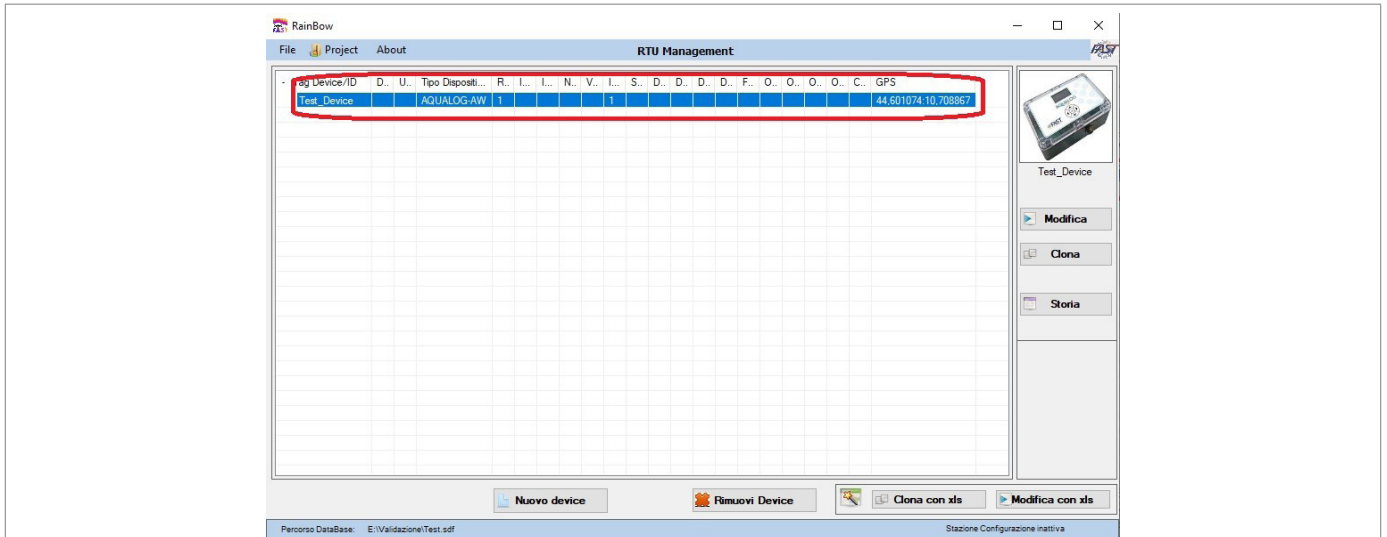


Fig. 8.21. Select RTU

8.2.2 - OPENING THE DATABASE

The list of RTUs is paired with a database saved in a file with the extension .sdf.

If you need to select an RTU from another list, you must:

1. Select '**File**' at the top left, then '**Open Database**' and left-click.

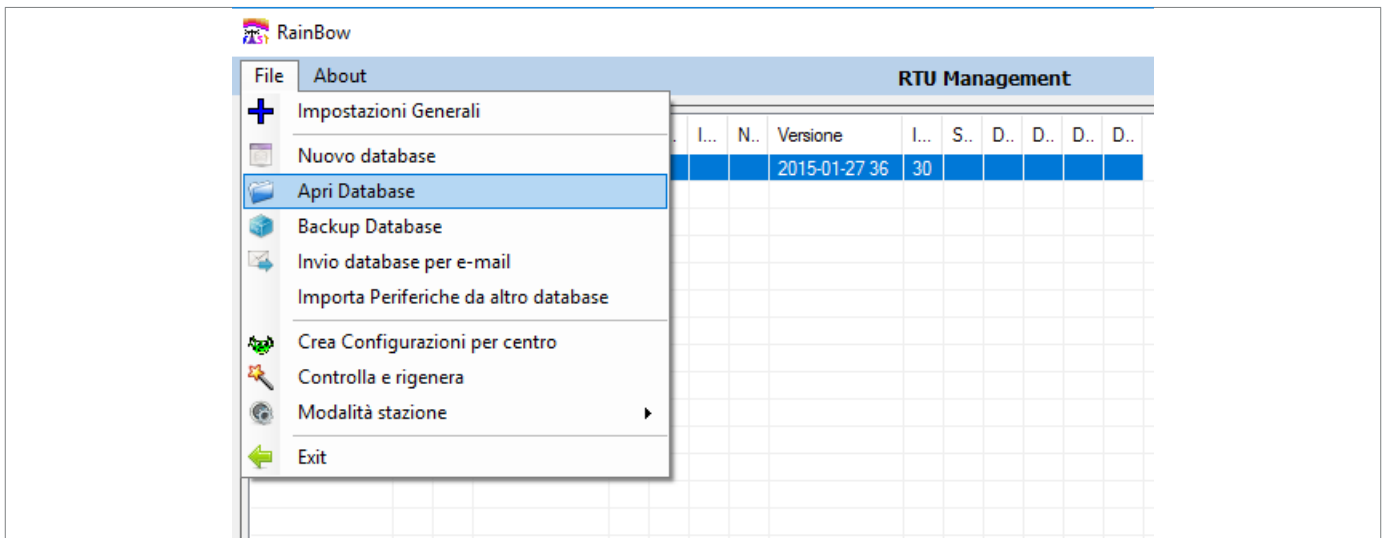


Fig. 8.22. Opening database

2. Search the PC's network drive for the file with the extension **.sdf**, click on **'Open'**

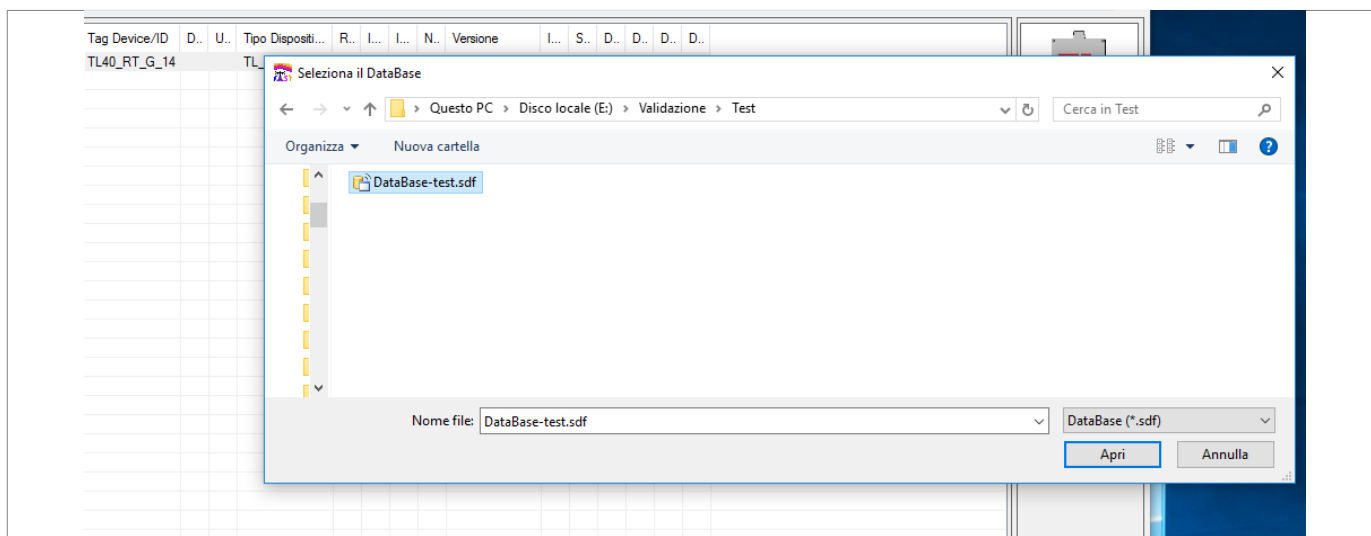


Fig. 8.23. .sdf file

3. Check the programme screen for the correct file extension

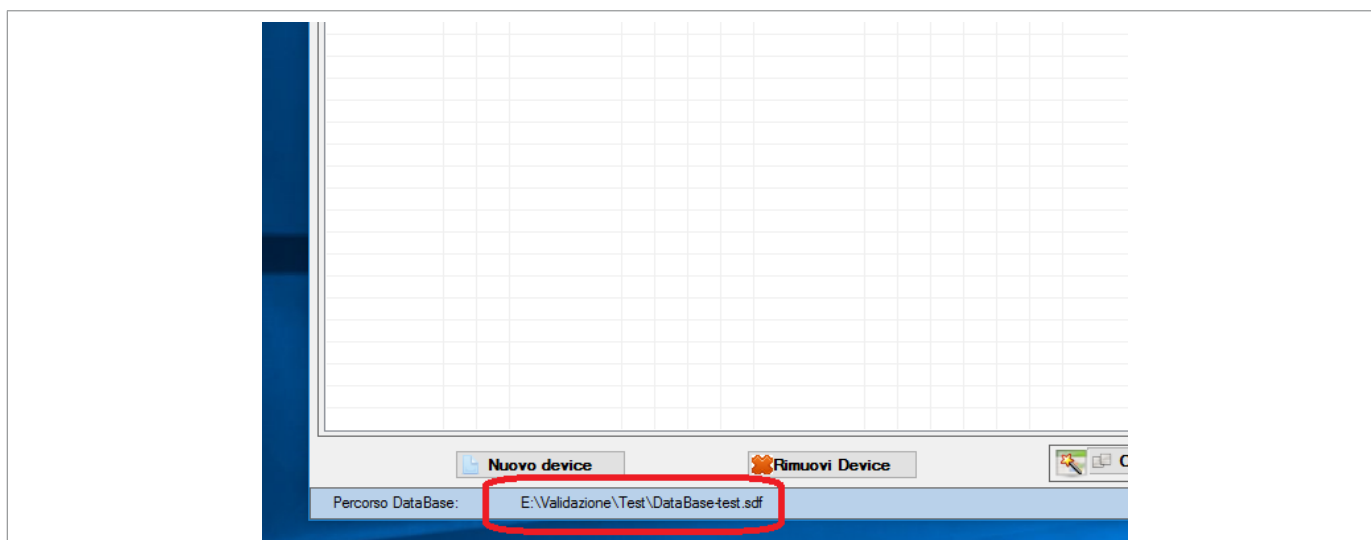


Fig. 8.24. Check database

8.3 - RTU INTERFACE

After selecting the RTU from the initial list, the system will display the following screen:

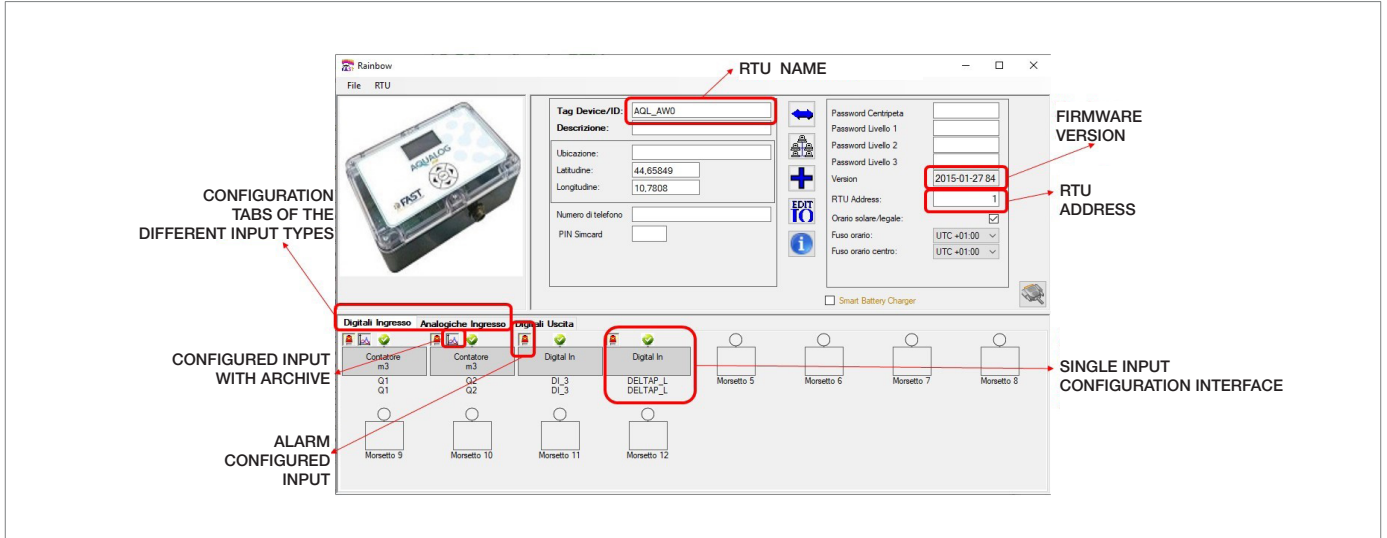


Fig. 8.25. RTU configuration

The following parameters can be configured on this page:

- Digital/analogue inputs.** By clicking on the individual boxes associated with the inputs, it is possible to configure and enable the chosen analogue/digital input.
- RTU address.** In the 'RTU Address' field, the address paired with the RTU can be changed. *Default Values:* 1.
- RTU Name.** The RTU can be given a name so that it can be easily paired with the device on the RAINBOW database. In the example, the name is 'AQL_AW0'.

Once this is done, the configuration can be sent to the RTU by clicking on 'RTU: read/send RTU configuration'.

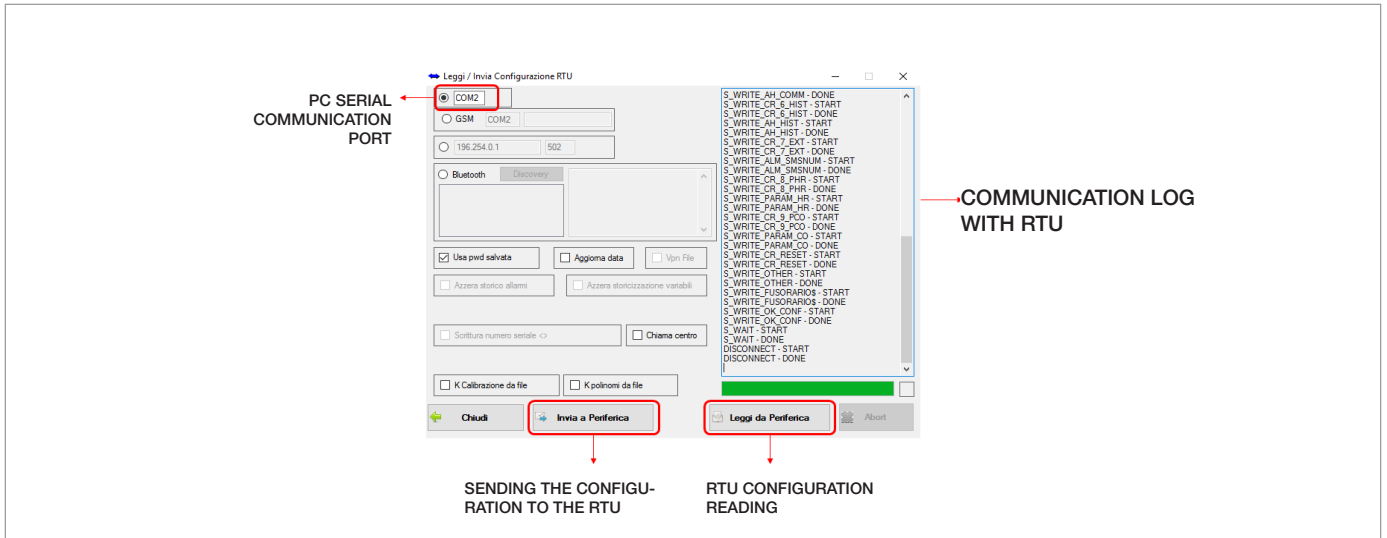


Fig. 8.26. Read/send RTU configuration

To send the configuration, refer to the USB, Wi-Fi or Bluetooth connection procedure in “5.3 - Local communication interfaces”.

8.3.1 - ANALOGUE INPUTS

The analogue input configuration page allows the input channel parameters to be set.

On this page, the engineering value of the measurement can be displayed either on the Aqualog-AW display or via local communication panel. Individual channels can be customised by setting a TAG and a photo.

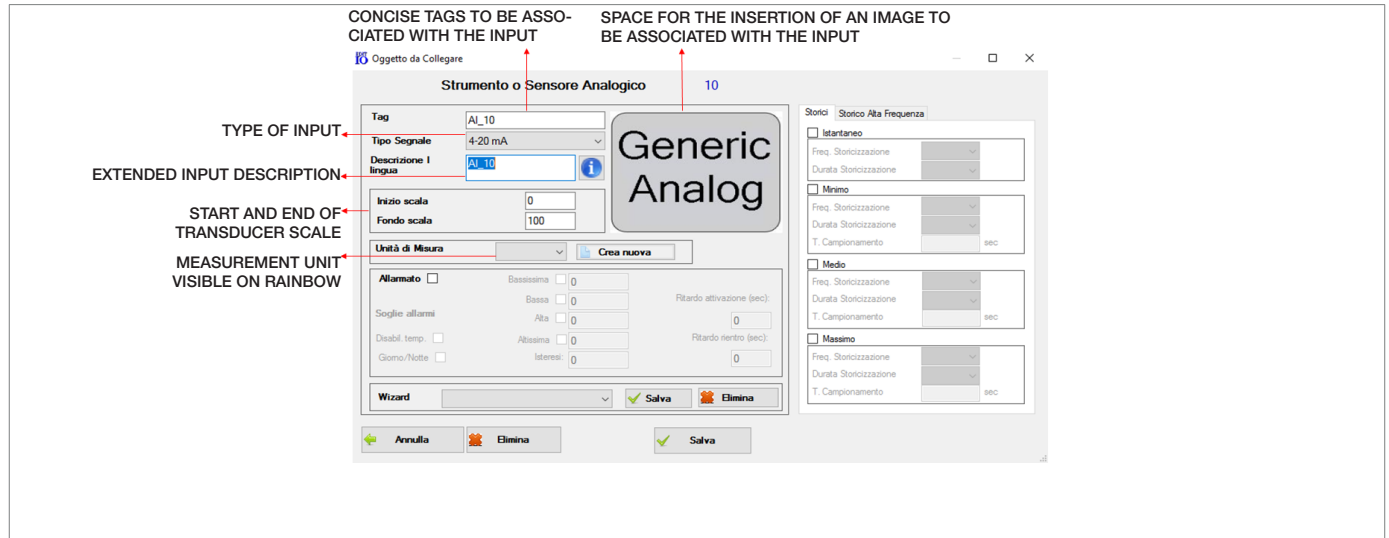


Fig. 8.27. Analogue input configuration

8.3.2 - DIGITAL INPUTS

The digital input configuration page allows you to set an alarm on the chosen input, defining polarity and delay. Individual channels can be customised by setting a TAG and a photo.

The ten digital inputs can be configured as meters. These types of variables count the number of state changes on the selected input. Flow calculation is only enabled for the first six inputs configured as meters.

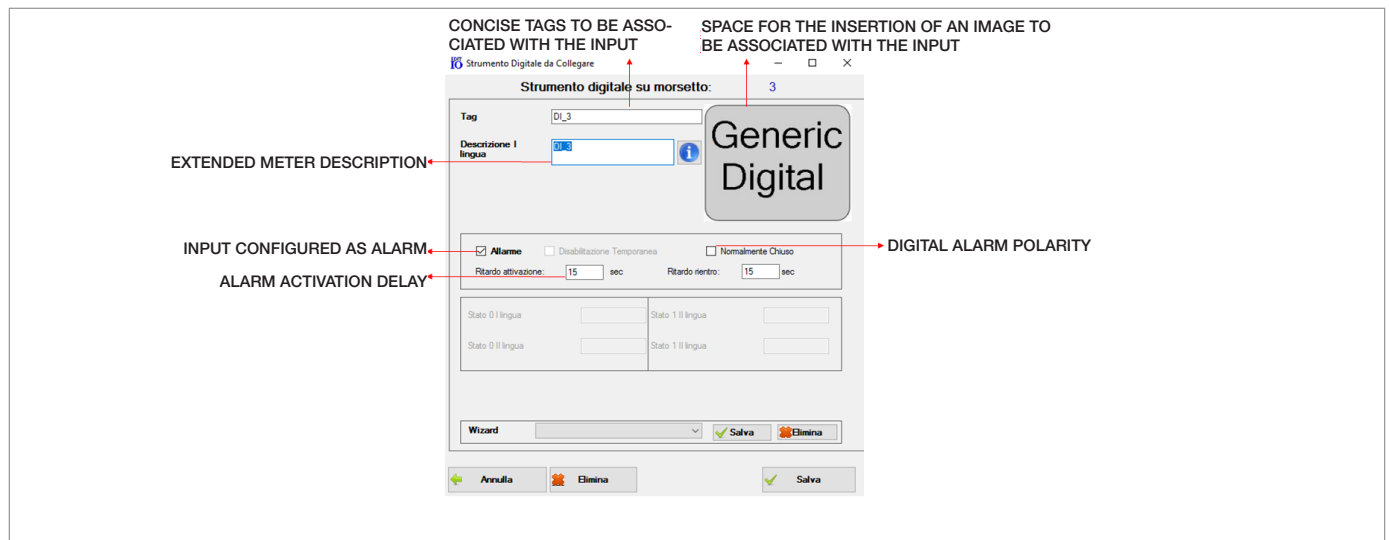


Fig. 8.28. Digital input configuration

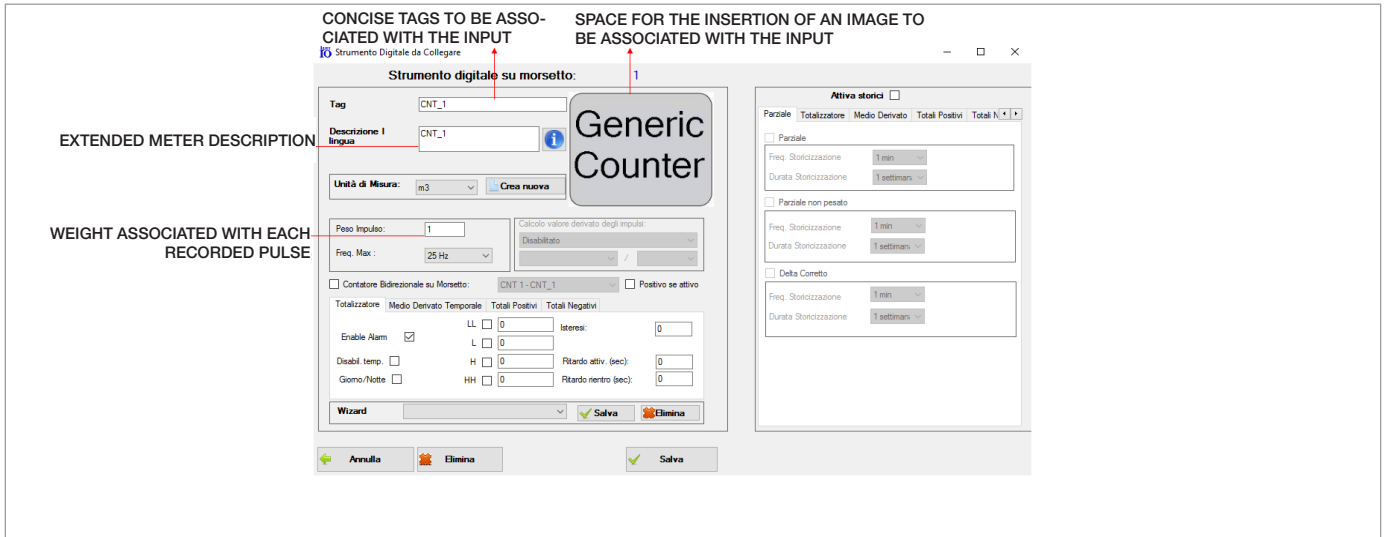


Fig. 8.29. Meter configuration

8.3.2.1 - UPDATING METERS

The value of the machine's meters can be updated in the 'Init Settings' tab:

1. Select the relative meter
2. Change the meter value
3. Click the 'Meter Preset' button
4. Wait for the pop-up message confirming the completion of the operation.

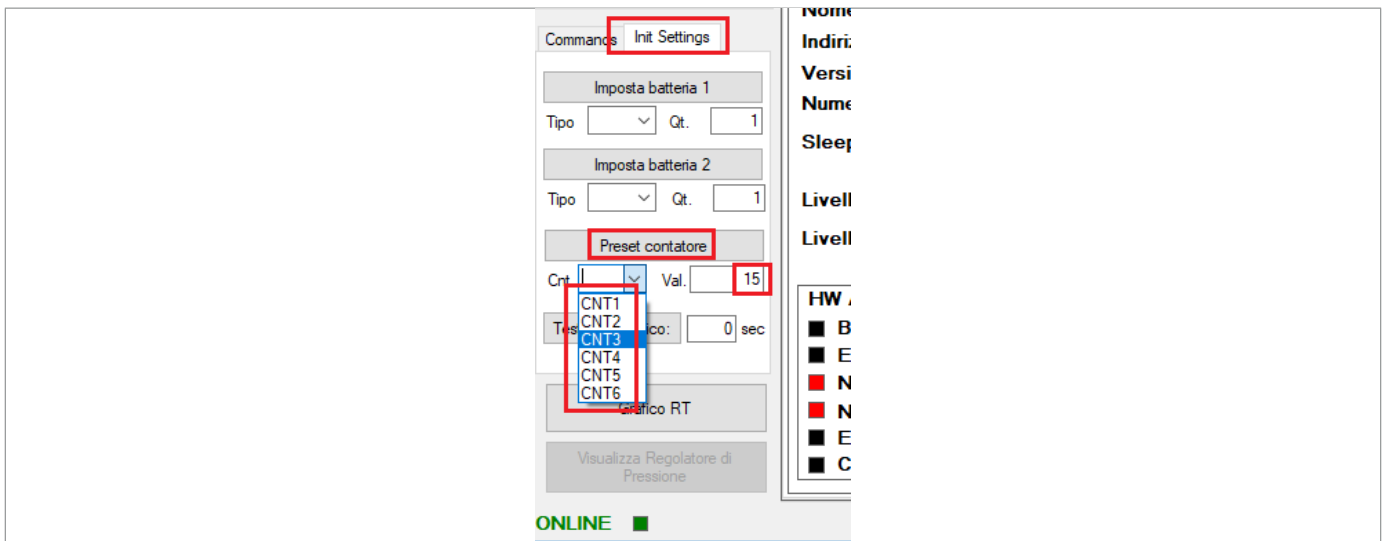


Fig. 8.30. Meter preset

8.3.3 - DATALOGGER

The input variables, both hardwired analogue and derived impulse, can be stored according to four different strategies:

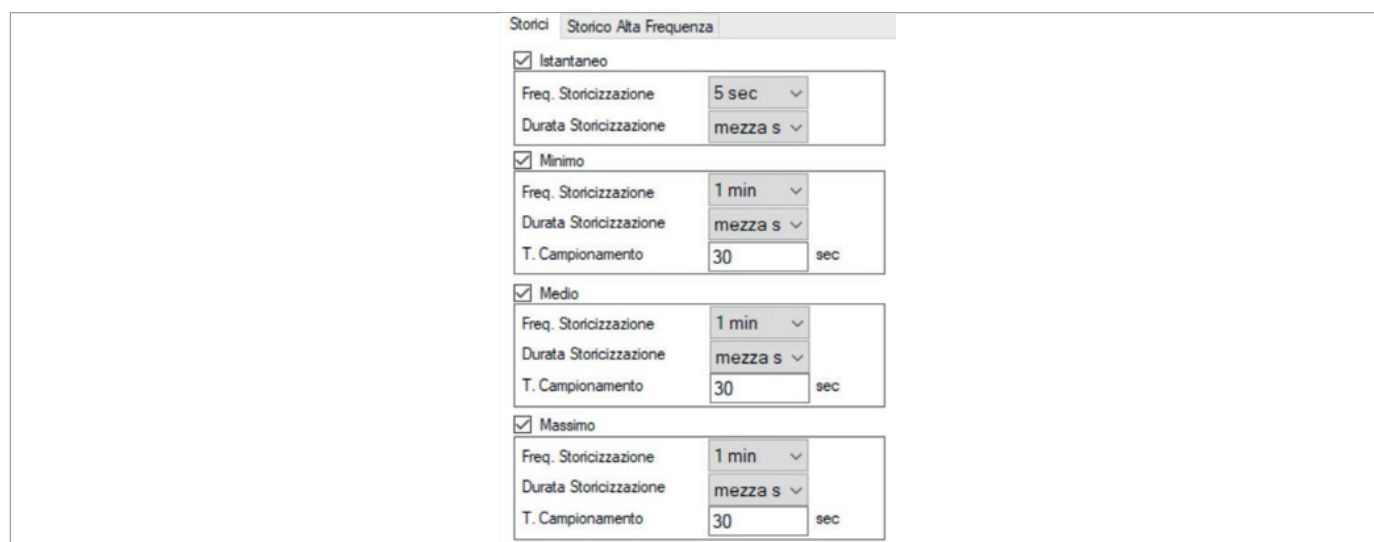
- current value
- minimum value
- medium value
- maximum value.

Per ognuna è configurabile l'intervallo temporale di memorizzazione. Per le modalità minimo, medio, massimo, è inoltre possibile configurare il periodo di calcolo (tempo di campionamento). For each, the storage time interval is configurable. For the minimum, average, maximum modes, it is also possible to configure the calculation period (sampling time). The digital input variables are stored on state change.

The archive depth is configurable and is generally set to 2 weeks.

Daily volume and minimum flow rate over 24 hours are also available.

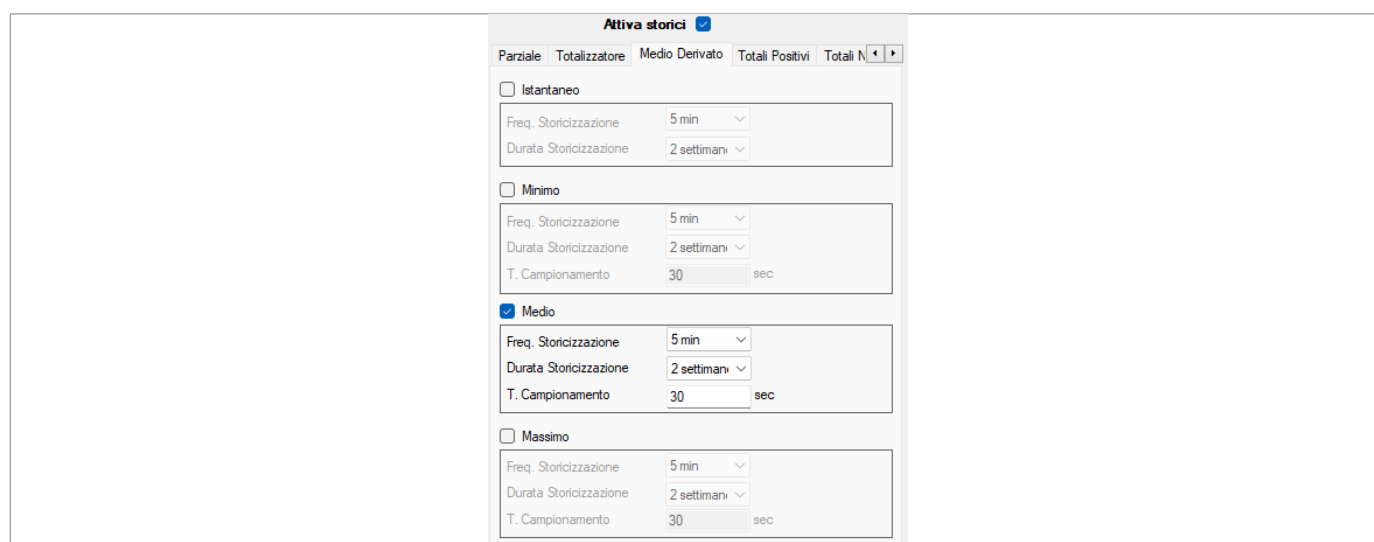
The historisation capacity of the device depends on the frequency and duration of the historisation.



The screenshot shows the 'Storici' configuration page for 'Storico Alta Frequenza' mode. It features four checked options: Istantaneo, Minimo, Medio, and Massimo. Each option has fields for 'Freq. Storizzazione', 'Durata Storizzazione', and 'T. Campionamento'.

Modalità	Freq. Storizzazione	Durata Storizzazione	T. Campionamento
Istantaneo	5 sec	mezza s	
Minimo	1 min	mezza s	30 sec
Medio	1 min	mezza s	30 sec
Massimo	1 min	mezza s	30 sec

Fig. 8.31. Hardwired analogue variable historian mode



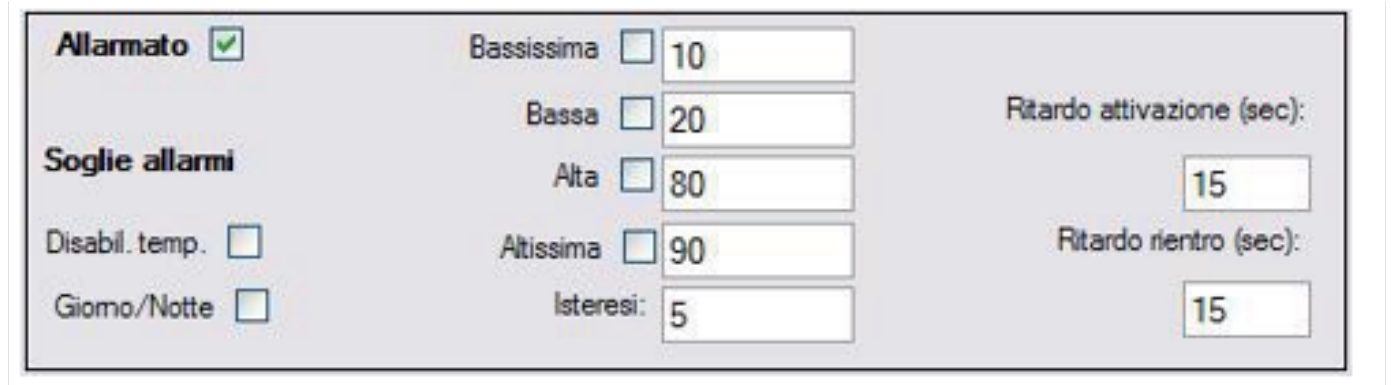
The screenshot shows the 'Attiva storici' configuration page. It features four unchecked options: Istantaneo, Minimo, Medio, and Massimo. The 'Medio' option is selected with a blue checkmark. Each option has fields for 'Freq. Storizzazione', 'Durata Storizzazione', and 'T. Campionamento'.

Modalità	Freq. Storizzazione	Durata Storizzazione	T. Campionamento
Istantaneo	5 min	2 settiman	
Minimo	5 min	2 settiman	30 sec
Medio	5 min	2 settiman	30 sec
Massimo	5 min	2 settiman	30 sec

Fig. 8.32. Derived variables historicisation mode

8.3.4 - ENABLING ALARMS ON INPUTS

The input variables, both hardwired analogue and derived impulsive, can be alarmed and thus configured for alarm generation. For the analogue variables, 2 minimum thresholds (very low, low) and 2 maximum thresholds (high, very high) are available, with possible activation and re-entry delays.



Allarmato <input checked="" type="checkbox"/>	Bassissima <input type="checkbox"/> 10	Ritardo attivazione (sec):
Soglie allarmi	Bassa <input type="checkbox"/> 20	
Disabil. temp. <input type="checkbox"/>	Alta <input type="checkbox"/> 80	<input type="text" value="15"/>
Giorno/Notte <input type="checkbox"/>	Altissima <input type="checkbox"/> 90	Ritardo rientro (sec):
	Isteresi: 5	<input type="text" value="15"/>

Fig. 8.33. Alarm configuration on analogue measure

By enabling the Day/Night mode it is possible to have different threshold sets for day and night. The day/night threshold changeover time can be set in the RTU menu under 'Alarm Configuration'. Hysteresis is expressed in engineering units and defines the deviation of the signal value from the threshold for alarm return.



Allarmato <input checked="" type="checkbox"/>	Bassa Notte <input type="checkbox"/> 15	Ritardo attivazione (sec):
Soglie allarmi	Bassa Giorno <input type="checkbox"/> 25	
Disabil. temp. <input type="checkbox"/>	Alta Notte <input type="checkbox"/> 85	<input type="text" value="15"/>
Giorno/Notte <input checked="" type="checkbox"/>	Alta Giorno <input type="checkbox"/> 95	Ritardo rientro (sec):
	Isteresi: 5	<input type="text" value="15"/>

Fig. 8.34. Day/night mode alarm configuration on analogue measure

Alarms can also be configured on digital signals. The alarm status (NO or NC) and the activation and re-entry delays are definable by the operator.

The RTU records the activation and re-entry from each alarm in a specific log in its internal memory. This information can be downloaded locally via the RAINBOW software or remotely via the SCADA centre.



<input checked="" type="checkbox"/> Alarme	<input type="checkbox"/> Disabilitazione Temporanea	<input type="checkbox"/> Normalmente Chiuso
Ritardo attivazione: <input type="text" value="10"/> sec	Ritardo rientro: <input type="text" value="10"/> sec	

Fig. 8.35. Alarm configuration on digital signals

Alarms can also be configured on derived input variables such as pulse-derived flow rate.

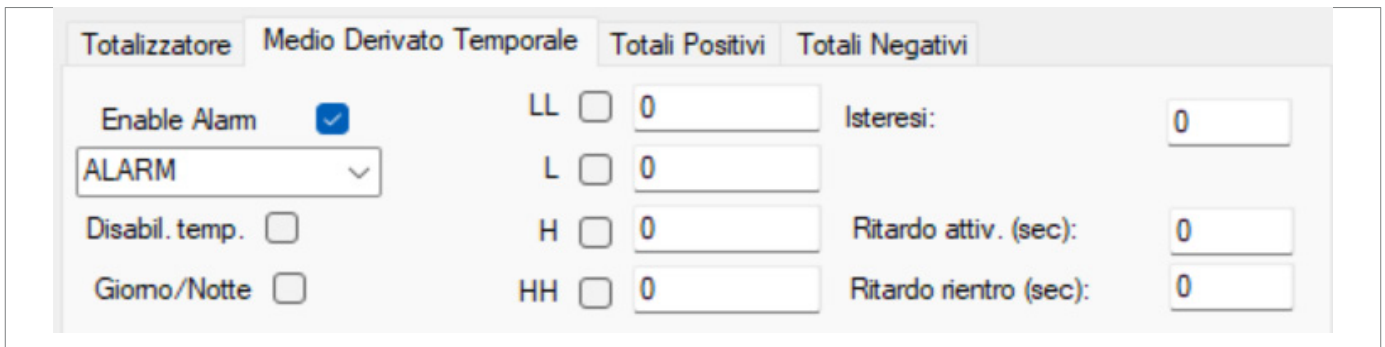


Fig. 8.36. Configuration on pulse-derived flow rate alarms

8.4 - CONFIGURATION OF 2G, 3G, 4G COMMUNICATION PARAMETERS

By browsing to **'RTU → Communication'** it is possible to connect the RTU with the SCADA via the 2G/3G/4G modem by setting the following connection parameters:

1. Set the mode **'GPRS always off'** in the **'Outbound'** section
2. Set the IP and port of the centre of interest in the **'Inbound'** section
3. Set the number of attempt greater than 0
4. Set on **'GPRS settings'** the APN parameters, network username and password
5. Set the communication protocol and its parameters
6. Click the **'OK'** button and confirm the change of data.

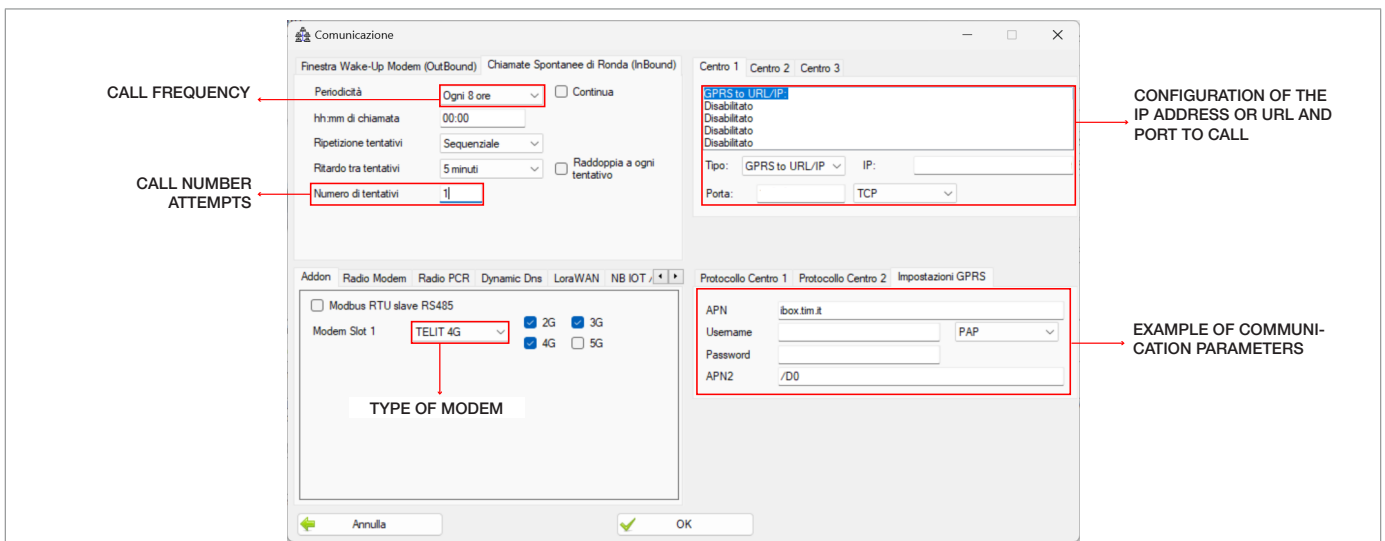


Fig. 8.37. Configurazione of 2G, 3G, 4G parameters

The 2G/3G/4G modem is inserted into slot J1 of the motherboard as shown in Fig. 8.38:

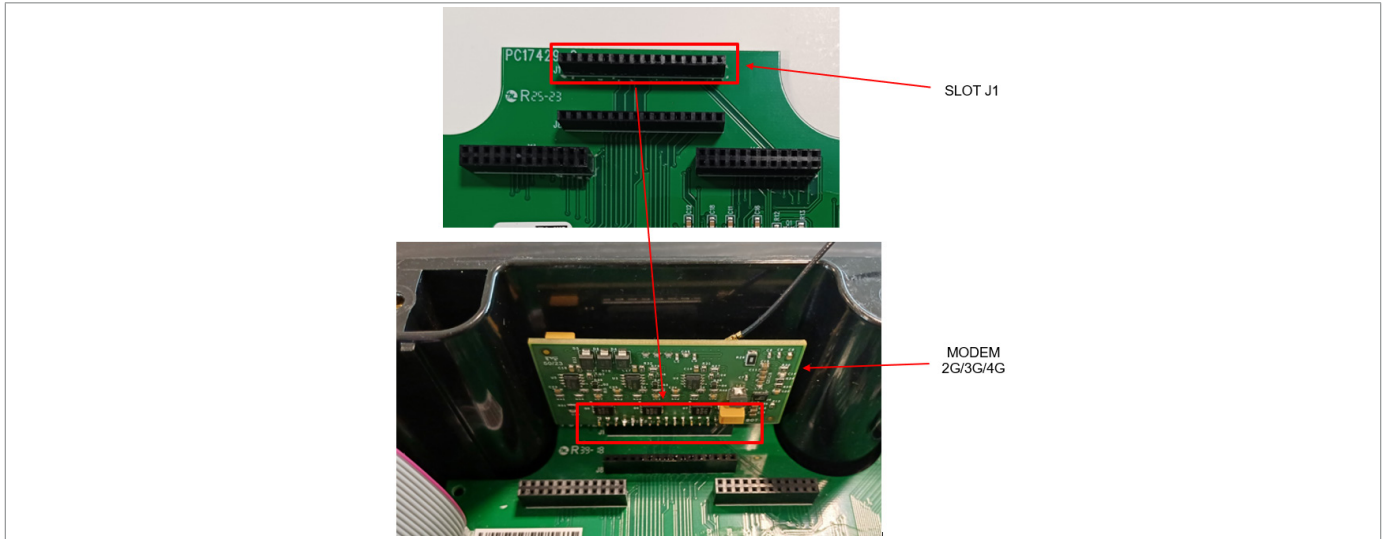


Fig. 8.38. Modem 2G/3G/4G – slot J1

8.5 - CONFIGURATION OF LORA COMMUNICATION PARAMETERS

By browsing on 'RTU → Communication' it is possible to connect the RTU with the SCADA via the LoRa modem by setting the following connection parameters:

1. Enable the LoRaWAN Enabling flag
2. Set the device's own Application Key under the AppKey item
3. Set the Join EUI (also called Application EUI) specific to the application under the heading AppEUI
4. Set the DevEUI entry by entering the device's own Device EUI
5. Set the communication frequency in seconds under the heading TX Frequency
6. Set the Uplink format on the Uplink Format item according to the type of data to be transmitted:
 - HIST: packet which sends the historicised value of a maximum of 5 quantities together with the Timestamp of the last data acquisition;
 - HIST_1: packet which sends the historicised value of a maximum of 8 values together with the timestamp of the last data acquisition; the head of the packet contains information on which channels are configured

For communication via LoRa, it is sufficient to set the parameters shown in the box in Fig. 8.39:

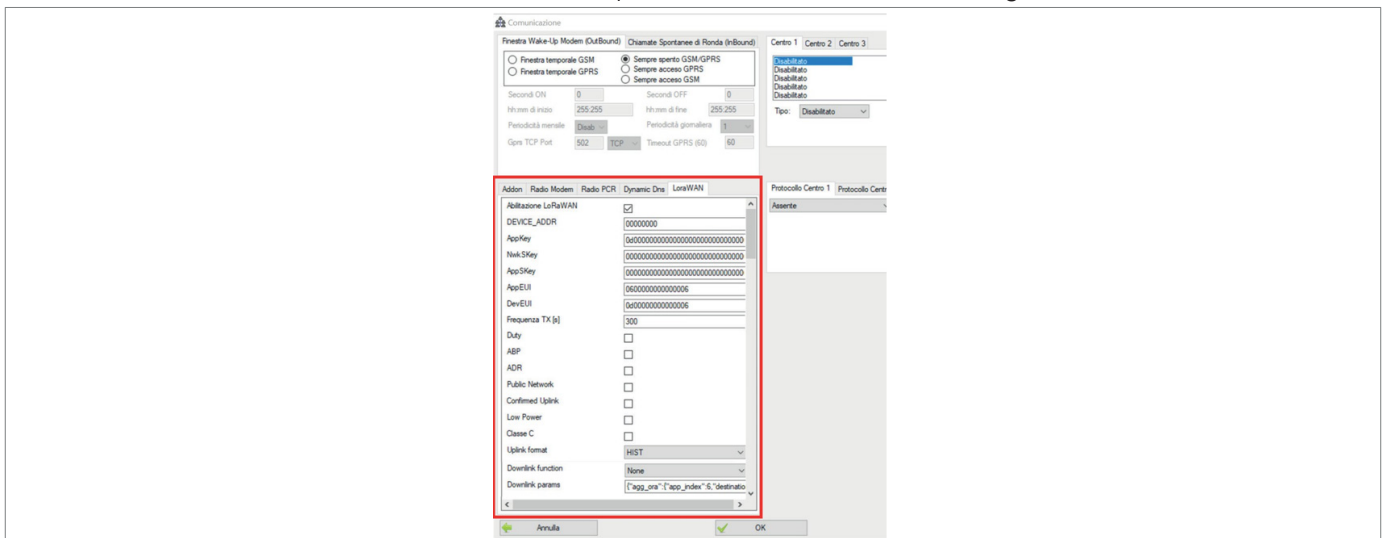


Fig. 8.39. Configuration of LoRa communication parameters

The LoRa modem is inserted into slot J8 of the motherboard as shown in Fig. 8.40:

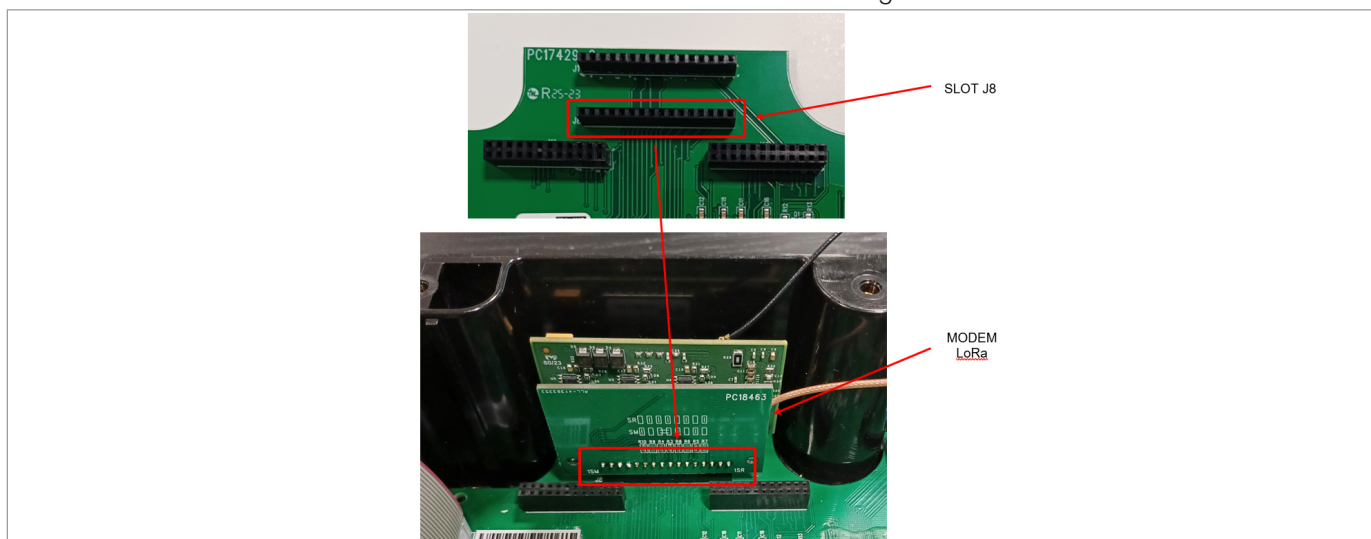


Fig. 8.40. Modem Lora – slot J8

8.6 - CONFIGURAZIONE OF NB-IOT COMMUNICATION PARAMETERS

By browsing on 'RTU → Communication' it is possible to connect the RTU with the SCADA via the NB-IoT by setting the following connection parameters in Fig. 8.41:

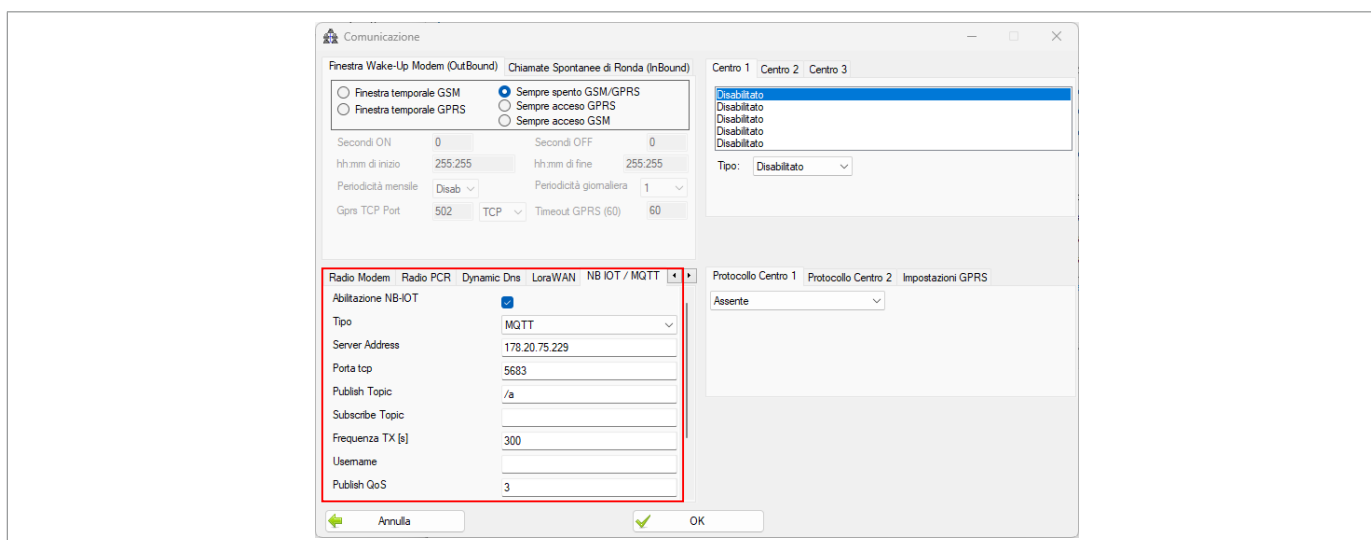


Fig. 8.41. Configuration of NB-IoT communication parameters

The LoRa modem is inserted into slot J1 of the motherboard as shown in Fig. 8.42:

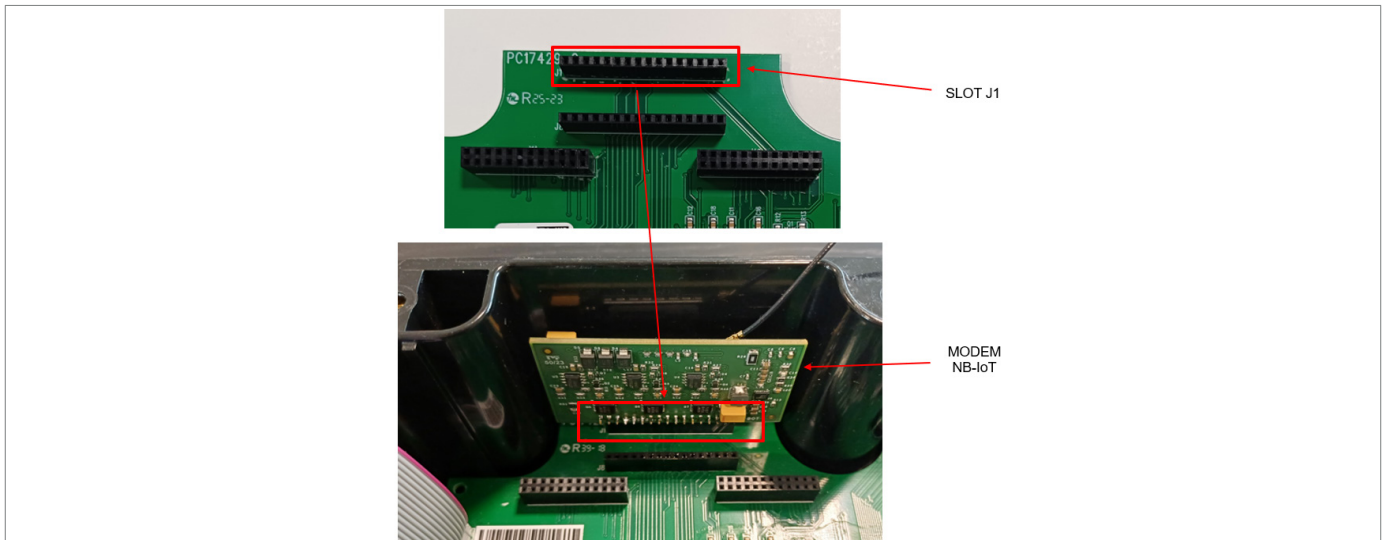


Fig. 8.42. Modem NB-IoT – slot J1

8.7 - LOCAL COMMUNICATION

By browsing to '**RTU → Monitor Diagnostics**', the local communication interface between RTU and PC can be used. This tool allows Real-Time monitoring of the machine status and all configured inputs.

To connect to the RTU, follow the connection procedure with USB, Wi-Fi or Bluetooth in “5.3 - Local communication interfaces” and click the "**Connect**" button.

When the white box in the bottom left-hand corner turns green, the software is connected to the machine.

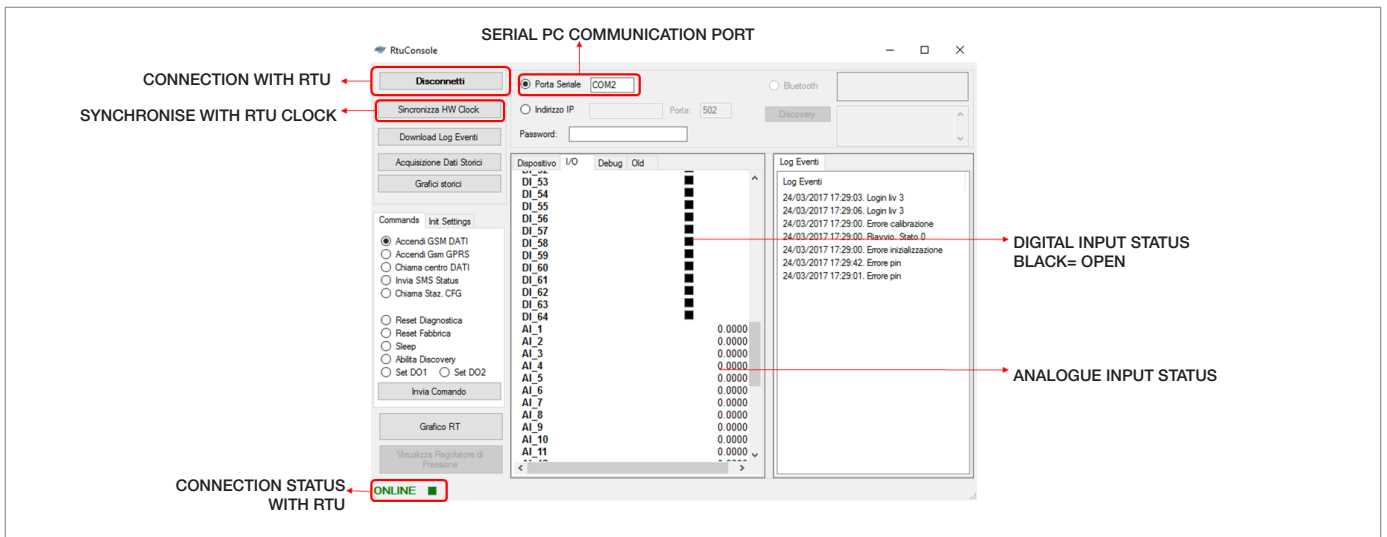


Fig. 8.43. Local communication with RTU

8.8 - BATTERY UPGRADE

By browsing to 'RTU → Monitor Diagnostics' it is possible to initialise the remaining battery value:

1. Select 'Init Settings'
2. Select 'Type' and 'Qt', then click 'Set battery 1' to initialise the RTU battery
3. Select "Type" and "Power (W)", "Voltage (V)" of the solenoid used, then click "Init Pilot Box battery" to initialise the Pilot Box battery

Example:

- 4-cell battery: select "Type: 13 Ah" and "Qt: 6" to initialise an 80 Ah battery
- 7-cell battery: select "Type: 13 Ah" and "Qt: 11" to initialise an 140 Ah battery

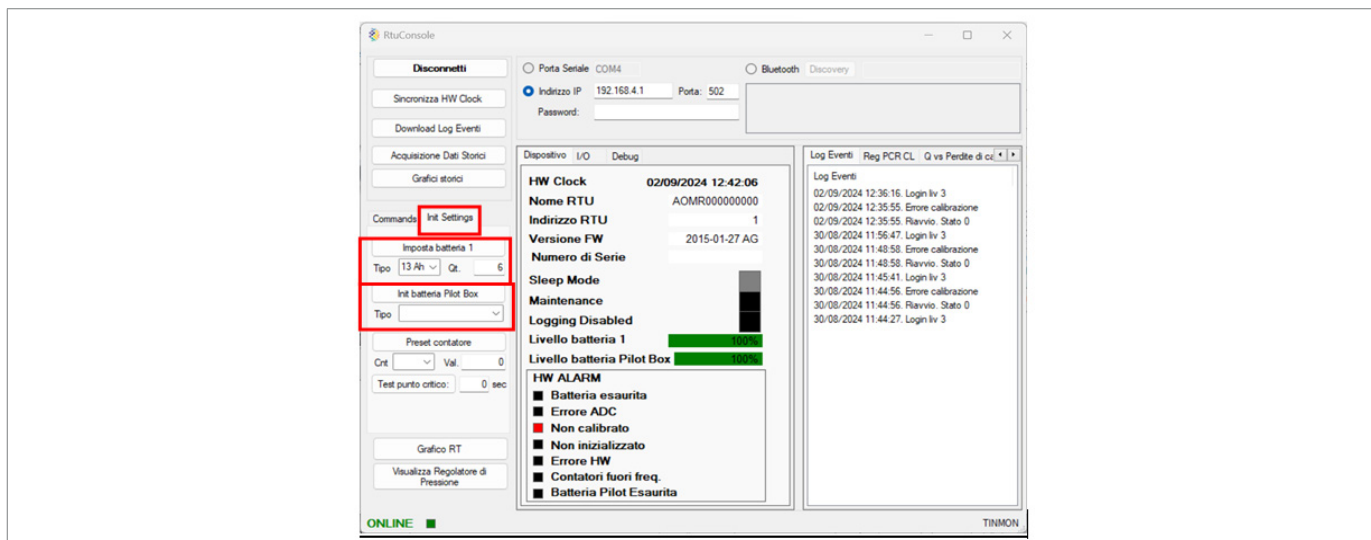


Fig. 8.44. Battery initialisation screen

8.9 - ALARMS ACTION

By browsing to 'RTU → Alarms Action', it is possible to configure the operations to be performed in the event of an analogue or digital alarm. Each type of alarm can be paired with several possible operations. Changes require the device to be reconfigured.

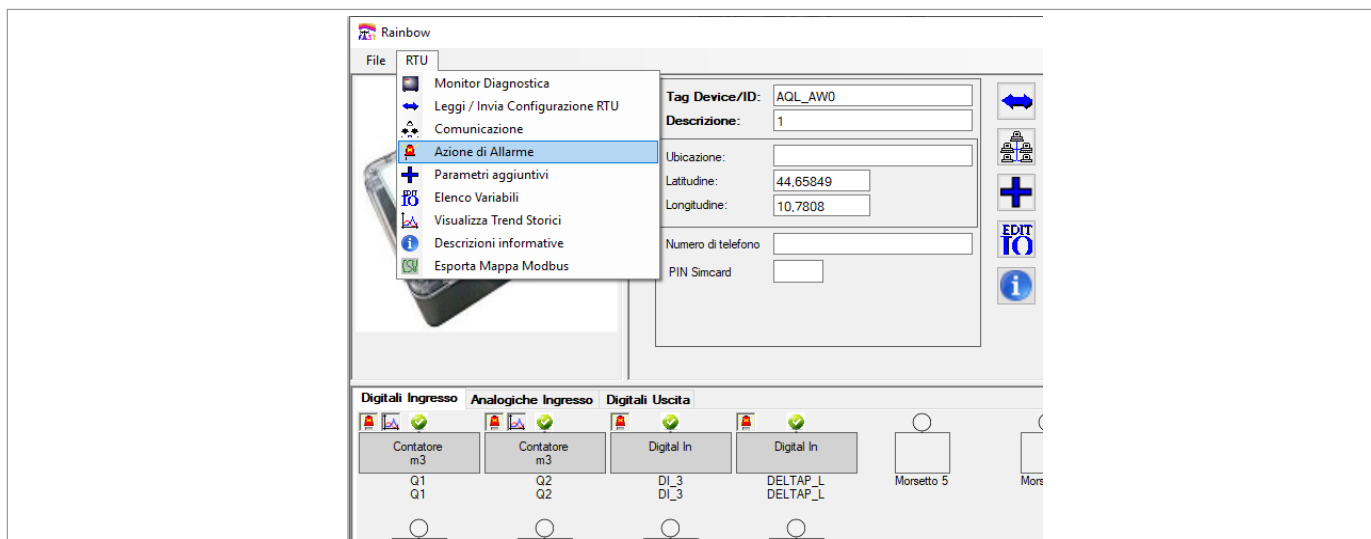


Fig. 8.45. Alarms action configuration screen

8.9.1 - ADDING AN ALARM ACTION

In order to add a new alarm action, the following steps must be followed:

1. Select the Aqualog-AW to be configured from the Rainbow start page
2. Select the 'RTU' menu at the top left of the Aqualog AW page
3. Select '**Alarm Action**' in the menu
4. On the new page there should only be the 'Call Centre' entry
5. Pair the measurement to be monitored with centre call to the new alarm action
6. Set number of attempts and interval of call repetition attempts
7. Press 'Save' at the bottom left
8. Send the configuration

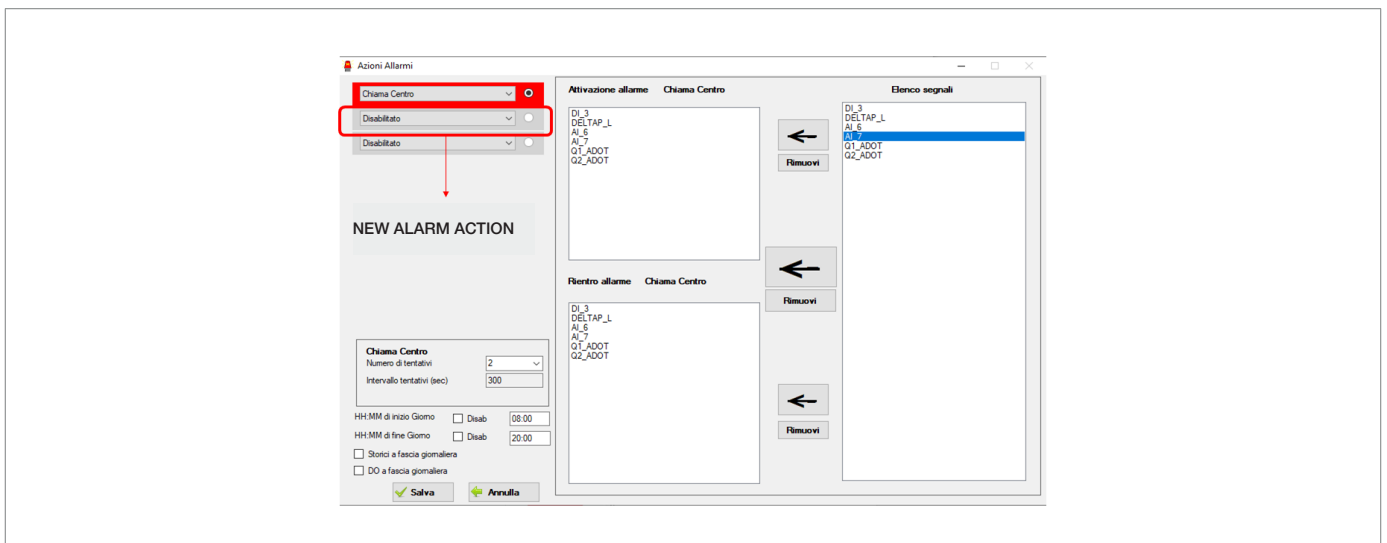


Fig. 8.46. New alarm action selection

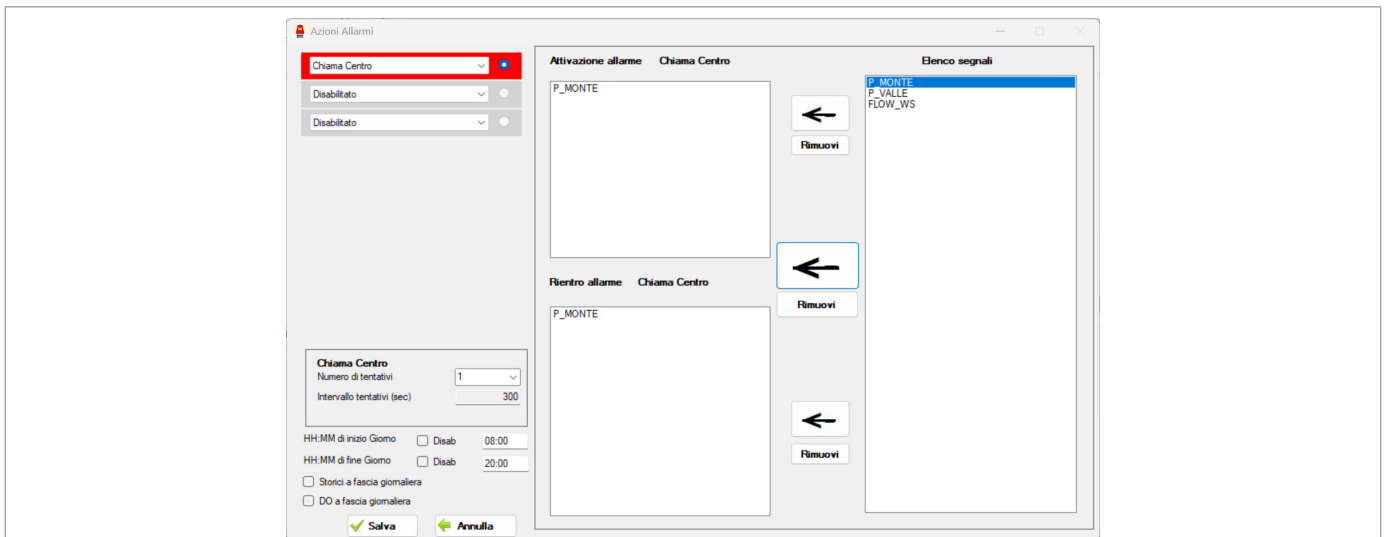


Fig. 8.47. New alarm action configuration

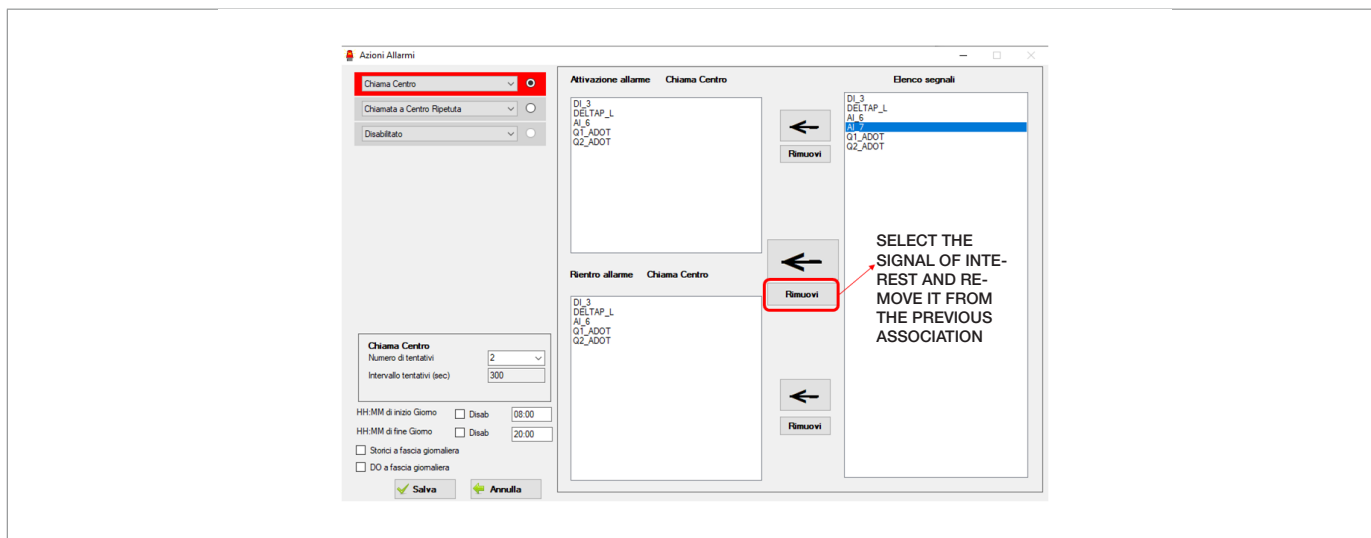


Fig. 8.48. Previous alarm action removing

8.10 - 2G, 3G, 4G DATA CALL COMMUNICATION TEST

1. Double-click on the configuration from the list on the 'Rainbow' screen
2. Activate the local Wi-Fi connection, refer to section "5.3 - Local communication interfaces"
3. Select 'Diagnostic Monitor' from the RTU menu at the top left

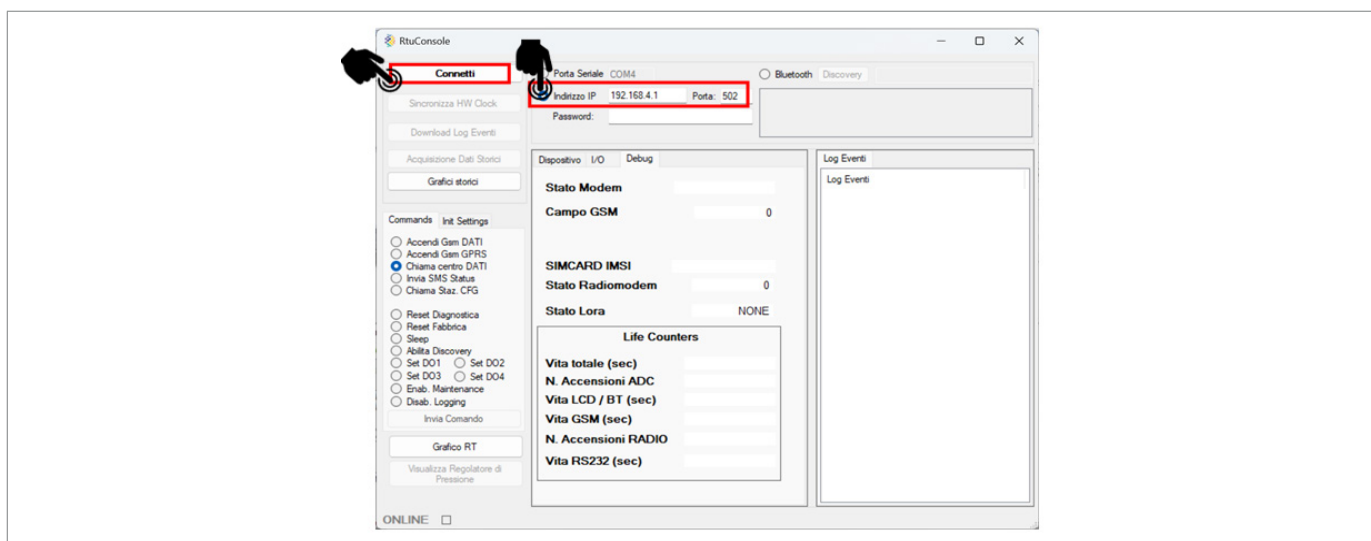


Fig. 8.49. Diagnostic monitor selection

4. Select the Wi-Fi communication channel (IP: 192.168.4.1; port: 502), then click on 'Connect'

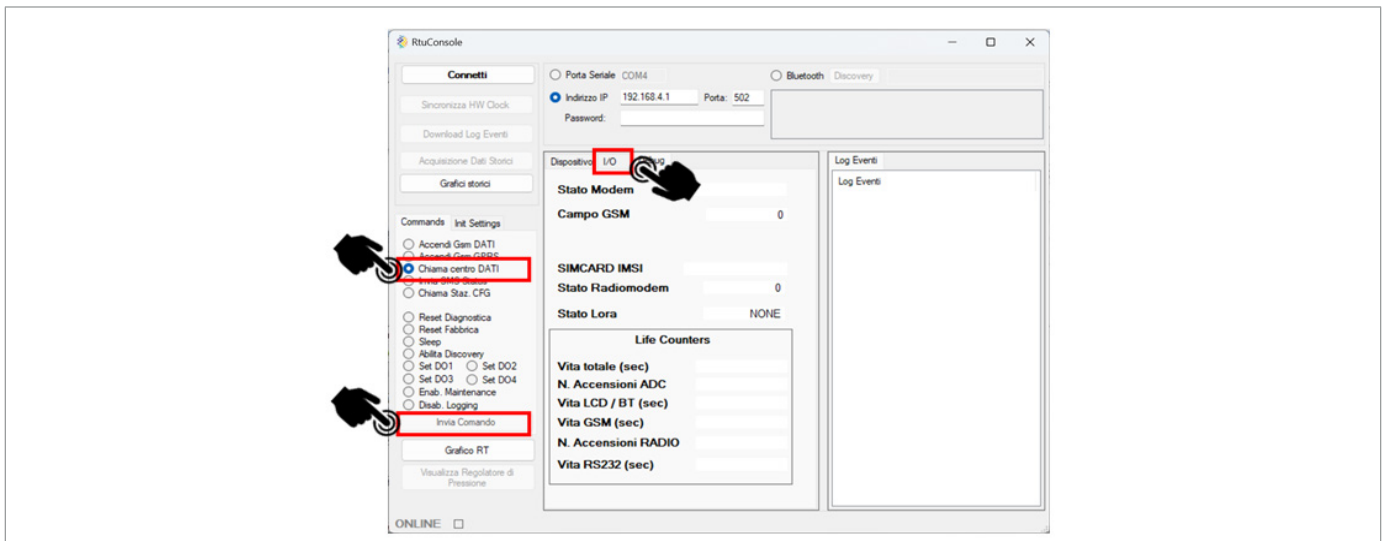


Fig. 8.50. Connection

5. Select "Call DATA Centre", then "Send Command"
6. Check the modem status from the 'Debug' window
7. Verify on the display that the system performs the steps in the 'Diagnostic monitor debugging' section (refer to Tab. 8.49)

Step	Modem status
Switch-on	Modem in switch-on
Network registration	Modem in provider cell registration
GPRS registration	Attempt to touch on the APN
GPRS call	Attempt to access the centre
Data Exchange	Send packages 1... to the centre
Connection closure	Communication closure

Tab. 8.49.

NOTICE!

This can also be checked from the RTU display in the 'Modem' section.
The 'Data Exchange' step displays the progress of packets 'PKT GPRS 1...!'.

8.11 - COMMUNICATION TEST AND LORA DATA SENDING

1. Double-click the configuration from the list on the 'Rainbow' screen
2. Activate the local Wi-Fi connection, refer to section "5.3 - Local communication interfaces"
3. Select 'Monitor Diagnostics' from the RTU menu in the top left-hand corner

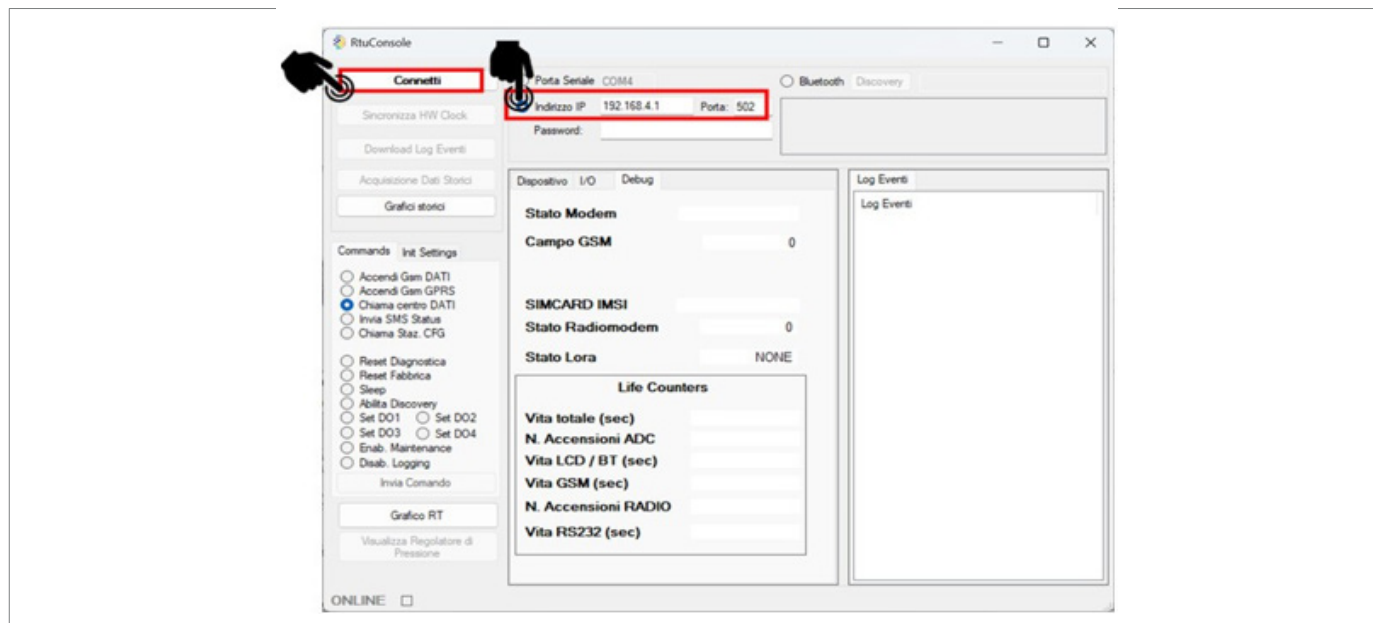


Fig. 8.51. Rainbow interface for Wi-Fi connection

4. Check that in the debug section, the LoRa mode changes from INIT to READY

NONE	Off
INIT	On
READY	Ready to send packets
FAIL	Attempt failed

Tab. 8.50 LoRa modem modes

5. Force a packet sending by entering the Init Setting menu by clicking on critical point test

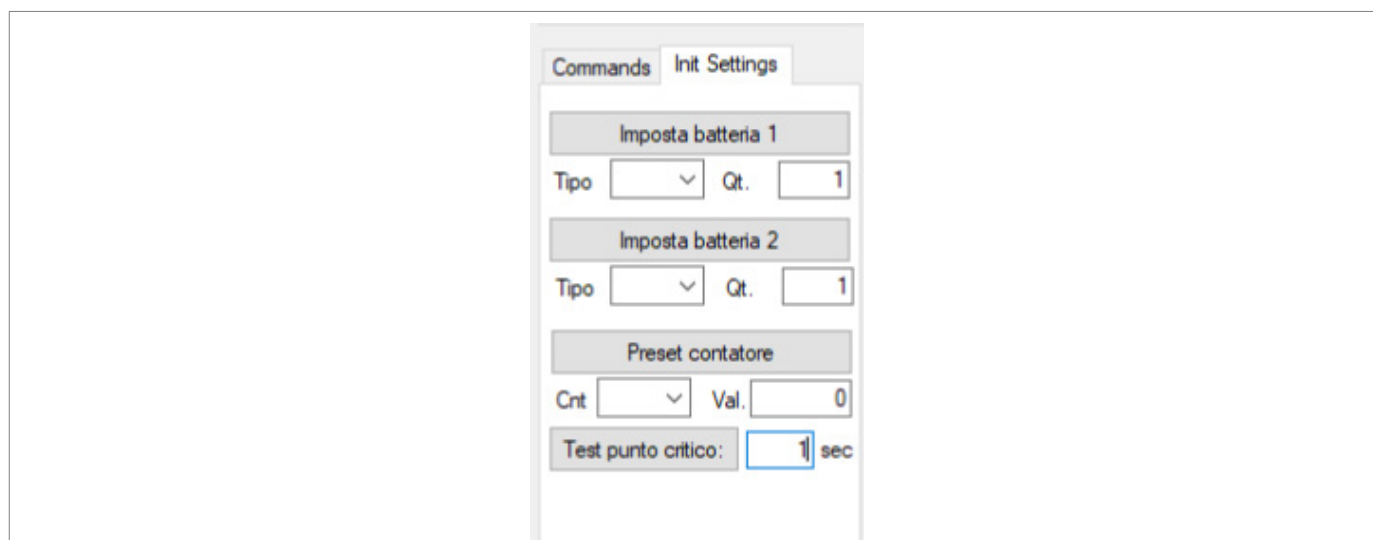


Fig. 8.52. Send test packets

6. Wait a few seconds, check that a new data packet is visible on the broker.

8.12 - RESET

RESET FACTORY: clears the internal RTU configuration while maintaining the calibration of the analogue acquisition channels:

1. Connect the USB cable to the RTU
2. Run the 'Rainbow' software
3. Select an Aqualog AW RTU
4. Click the "**RTU → Monitor Diagnostics**" button
5. Select the COM port paired with the USB cable and click 'Connect'
6. Wait for the connection
7. Select the 'Factory Reset' item and click the 'Send command' button
8. Wait for the message 'Reset in progress'
9. Log off

9 - MAINTENANCE AND FUNCTIONAL CHECKS

9.1 - GENERAL WARNINGS

HAZARD!

- Maintenance work must be carried out by qualified personnel trained on safety in the workplace and authorised to carry out equipment-related activities.
- Repair or maintenance work not provided for in this manual may be carried out only if approved by PIETRO FIORENTINI S.p.A.. PIETRO FIORENTINI S.p.A. shall not be held liable for damage to persons or property resulting from operations other than those described herein or carried out in ways other than as indicated.

HAZARD!

Special maintenance:

- requires extensive and specialised knowledge of the machines, operations required, risks involved and correct procedures to operate safely;
- must be provided by qualified, trained and authorised technicians.

WARNING!

In case of doubt, do not perform any work.

Contact PIETRO FIORENTINI S.p.A. for the necessary clarifications.

NOTICE!

Before starting maintenance on the equipment, it is advisable to make sure that the authorised operator has:


- the necessary equipment;
- appropriate spare parts.

Operate as described in Tab. 9.51. in case of anomalies detected in the equipment, which require its removal and replacement from the field:

Passo	Azione
1	Switch off the main power switch upstream of the device (in the case of a device powered from the 230VAC mains)
2	Unscrew and remove the cover screws
3	Open the cover
4	Disconnect the batteries
5	Disconnect the cables of any sensors or measurements wired to the instrument
6	Disassemble the device
7	Contact PIETRO FIORENTINI S.p.A.

Tab. 9.51.




The equipment maintenance operations are divided, from an operational point of view, into two main categories:

Commissioning and maintenance operations	
Routine maintenance	All those operations that the operator must preventively carry out to ensure proper operation of the device over time. <div style="border: 1px solid #00a651; padding: 5px; margin-top: 5px;">  NOTICE! The equipment does not require routine maintenance. </div>
Special maintenance	All those operations to be carried out by the operator as required by the equipment.

Tab. 9.52.

9.1 - SPECIAL MAINTENANCE

9.1.1 - REPLACING THE BATTERIES

Replacing batteries	
Operator qualification	<ul style="list-style-type: none"> Specialised technician. Maintenance Technician.
PPE required	<div style="display: flex; align-items: center; gap: 10px;">      </div> <div style="background-color: #f4a460; padding: 5px; margin-top: 5px;">  WARNING! </div> <p>The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:</p> <ul style="list-style-type: none"> the regulations in force in the country of installation; <u>any information provided by the Safety Manager at the installation facility.</u>
Equipment required	Allen key, 6 mm.

Tab. 9.53.

HAZARD!

Batteries, especially end-of-life (exhausted) batteries, are dangerous and sensitive to shock, vibration and exposure to naked flames. Failure to comply with this document may lead to the risk of explosion, fire, harmful emissions which may have serious consequences for health.

ATTENTION!

Use only battery packs supplied by PIETRO FIORENTINI S.p.A.

ATTENTION!

All operations must be carried out:

- in the absence of an explosive atmosphere;
- away from heat sources;
- in a place protected from bad weather;
- as far as possible from water sources that could cause a reaction with the lithium contained inside the batteries.

 ATTENTION!

Operators should not wear jewellery or metal ornaments (rings, necklaces, bracelets and earrings) that may come into contact with electronic components and/or battery terminals to avoid potential short circuits.

 ATTENTION!

The fire extinguishers to be used in the event of a fire must be of class D as they are effective in extinguishing fires in the presence of lithium.

 ATTENTION!

The transport of the battery packs supplied by PIETRO FIORENTINI S.p.A. must be carried out using the original packaging, which complies with the current ADR regulations.

 ATTENTION!

After replacing a battery, it is necessary to realign the remaining battery life indicators.

To **replace the battery pack**, proceed as described below:

Step	Action
1	Unscrew and remove the clamping screws.
2	Remove the cover.
3	Disconnect the battery connector from the housing (A) and take the battery (B) out of the compartment. ⚠ ATTENTION! Store the replaced communication battery in ADR compliant packaging.
4	Insert the connector of the new communication battery into the housing (A). ! NOTICE! Position the cables (C) in such a way that the equipment can be closed.
5	Insert and secure the clamping screws.
6	Fit the cover.

Tab. 9.54.

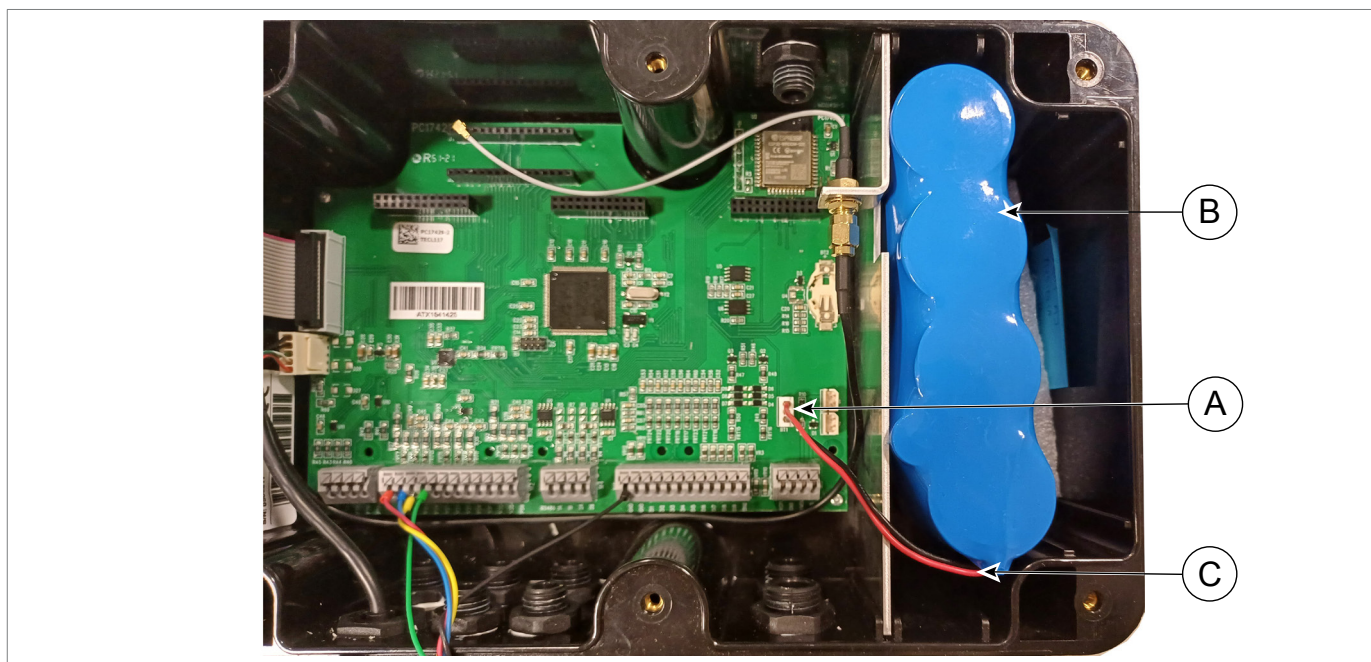


Fig. 9.53. Battery replacement

10 - UNINSTALLATION AND DISPOSAL

10.1 - GENERAL SAFETY WARNINGS

HAZARD!



Make sure that there are no potentially explosive ignition sources in the work area set up to uninstall and/or dispose of the equipment.

WARNING!

Before proceeding with uninstallation and disposal, make the equipment safe by disconnecting it from any power supply.

10.2 - QUALIFICATION OF THE OPERATORS IN CHARGE

Uninstallation

Operator qualification	<ul style="list-style-type: none"> Installer.
PPE required	<div style="display: flex; align-items: center;">  </div> <div style="background-color: #f4a460; padding: 5px; margin-top: 5px;">  WARNING! </div> <p>The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:</p> <ul style="list-style-type: none"> the regulations in force in the country of installation; any information provided by the Safety Manager at the installation facility.
Equipment required	Keys to fix inlet and outlet connections fittings/equipment.

Tab. 10.55.

10.3 - INFORMATION REQUIRED IN CASE OF NEW INSTALLATION

NOTICE!

Should the equipment be reused after uninstallation, refer to chapters: "Installation" and "Configuration".

10.4 - STORAGE OF THE BATTERIES

NOTICE!

Refer to paragraph 6.6.1 to store the batteries.

10.5 - INFORMATION REQUIRED IN CASE OF RE-INSTALLATION

NOTICE!

Refer to chapter 7 "Installation" if the equipment is to be reused after uninstallation.

10.6 - DISPOSAL INFORMATION

NOTICE!

- **Proper disposal prevents damage to humans and the environment and promotes the reuse of precious raw materials.**
- **Bear in mind that the regulations in force in the country of installation must be complied with.**
- **Illegal or improper disposal involves the application of the penalties provided for by the regulations in force in the country of installation.**



When removing the device from the field, it must not be disposed of with normal waste. Dispose of the device pursuant to the provisions of It. Legislative Decree 14 March 2014, no. 49 "Implementation of directive 2012/19/EU on waste electric and electronic equipment (WEEE).

The equipment was manufactured with materials that can be recycled by specialised companies. For proper disposal of the equipment, proceed as specified in Tab. 10.52.:

Step	Action
1	Set up a large work area free from obstacles where to safely dismantle the equipment.
2	Sort the various components by type of material for easier recycling through separate collection.
3	Send the materials obtained in Step 2 to a specialised company.

Tab. 10.52.

The equipment in any configuration consists of the materials described in Tab. 10.53.:

Material	Disposal/recycling indications
Plastic	It must be dismantled and disposed of separately.
Steel	Disassemble and collect separately. It must be recycled through the specific collection centres.
Stainless steel	Disassemble and collect separately. It must be recycled through the specific collection centres.
Aluminium	Disassemble and collect separately. It must be recycled through the specific collection centres.
Electronic components	Disassemble and collect separately. It must be recycled through the specific collection centres.
Lithium batteries	Refer to paragraph 10.7.1 "Disposing of the batteries".

Tab. 10.53.

NOTICE!

The above materials refer to standard versions. Different materials can be provided for specific needs.

10.7 - DISPOSING OF THE BATTERIES

Proceed with disposal in compliance with the requirements:

- the transport and packaging requirements given in the chapter;
- of the legislation in force in the country of installation of the equipment.

WARNING!

When disposing of the batteries, they must be removed from the equipment, as indicated in Directive 2006/66/EC art.12 paragraph 3.

The transport of batteries to the intermediate treatment facilities is not subject to the provisions of ADR, if:

- a quality assurance system is implemented to ensure that the total quantity of lithium cells and batteries per transport unit does not exceed 333 kg (the total quantity of lithium cells and batteries in the batch can be determined by a statistical method included in the quality assurance system);
- a copy of the quality assurance records must be made available to the competent authority if it so requests).

NOTICE!

You can ship batteries and/or batteries for recycling or disposal under a partial exemption scheme, in accordance with special provision 636.

This exemption applies to lithium batteries/batteries of gross mass \leq 500 g per unit.

10.7.1.1 - BATTERY PACKAGING

NOTICE!

The packages must be labelled in accordance with ADR, i.e. with a diamond shape on the side and code UN3090.



NOTICE!

The packages must bear the indication "LITHIUM BATTERIES FOR DISPOSAL" or "LITHIUM BATTERIES FOR RECYCLING".

The batteries that are removed from the equipment must be packed in such a way:

- to be protected from any damage due to transport and handling;
- to prevent any accidental movement;
- to prevent the terminals from bearing the weight of other elements;
- to be protected from short circuits.

For this purpose, the original packaging or alternatively, packaging compliant with the ADR regulations, can be used.

If batteries not removed from the equipment but still inside it are transported, the packaging may not be approved but must still be:

- sufficiently robust and able to contain and protect the equipment;
- constructed in such a way as to prevent the equipment from operating accidentally during transport.

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11 - RECOMMENDED SPARE PARTS

11.1 - GENERAL WARNINGS

NOTICE!

If spare parts not recommended are used, PIETRO FIORENTINI S.p.A. their declared performance cannot be guaranteed.

It is recommended to use original spare parts PIETRO FIORENTINI S.p.A.

PIETRO FIORENTINI S.p.A. shall not be held liable for any damage caused by using non-original parts.

11.2 - HOW TO REQUEST SPARE PARTS

NOTICE!

For specific information, please refer to the sales network of PIETRO FIORENTINI S.p.A.

11.3 - PUTTING BACK BATTERIES

Reference to the spare batteries order codes:

Features	Type	Supply
4-cell battery	Lithium	Standard
7-cell battery	Lithium	Optional

Tab. 11.54.

TM0179ENG

