

AQUALOG DIANA

Waterworks monitoring device



Revision A - Edition 09/2025





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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
Α	09/2025
-	-

Tab. 1.1.



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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

Tab. 2.2.

2.2 - IDENTIFICATION OF THE PRODUCT

Equipment	WATERWORKS MONITORING DEVICE
Series	AQUALOG DIANA
Models	AQUALOG DIANA - version with cable glands

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'
 - 2014/30/EU "EMC"



For specific type approvals, see the appropriate section on the Manufacturer's website: https://www.fio-rentini.com



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 these instructions, as provided by PIETRO FIORENTINI S.P.A.



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:

Condition operational	Reference indications
Local interface	10 minutes per month.
Sensor acquisition	1 piezoresistive sensor
Upgrade firmware code	once 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
	0.3% of the time at -25 °C
	0.5% of the time at -20 °C
	2.6% of the time at -10 °C
Temperature	41.0% of the time at +5 °C
environment	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 operator responsible for using and managing the equipment throughout

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 authorised professionals (reference paragraph 2.10) to operate 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 manual has been drawn up in Italian.

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



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;
- contact immediately PIETRO FIORENTINI S.p.A. at the addresses given in section 2.1 ("Manufacturer identification").



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

SYMBOLS USED IN THE MANUAL 2.7 -

Symbol	Definition
	Symbol used to identify important warnings for the health and safety of the operator or safety of the equipment.
A	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 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.



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.



APPLIED RATING PLATES

The equipment is equipped with a rating plate.

The plate specifies identification details of the equipment and its accessories to be provided, if necessary, to PIETRO FIORENTINI S.p.A.

ld.	Type of plate	Ir	nage	
		⊗FAST	Pietro Fiorentini S.p.a. Via Enrico Fermi 8/10 36057 Arcugnano (VI) ITALIA / ITALY	
1	AQUALOG DIANA	AQUALOG DIANA Mod. DIANA-4G-ST-BLK Rev. 0 S/N251BGAB000	Vin: 3,6 Vdc Pin< 3,6 W	<u>∧</u>

Tab. 2.7



Removing rating plates 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 rating plate bears the information described in Tab. 2.8:

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

Tab. 2.8.

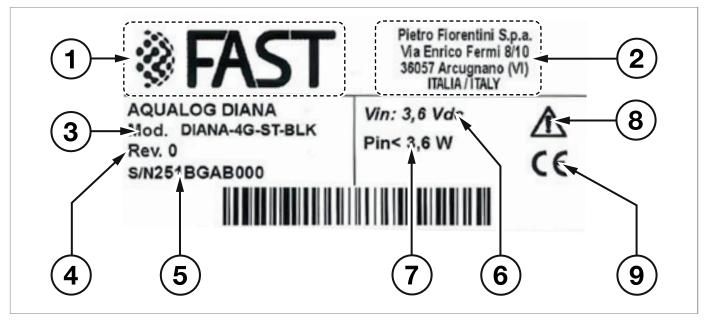


Fig. 2.1. Description of the nameplate



GLOSSARY OF UNITS OF MEASUREMENT

Type of measurement	Unit of measurement	Description	
	Sm³/h	Standard cubic metres per hour	
	Sm ³	Standard cubic metres	
Consumption and	m³/h	Cubic metres per hour	
Volumetric flow rate	m³	Cubic metres	
	l/s	Litres per second	
	I	Litres	
	bar	Bar	
Pressure	″wc	Water column inch	
	Pa	Pascal	
	°C	Degree centigrade	
Temperature	°F	Fahrenheit degree	
	K	Kelvin	
Tightening torque	Nm	Newton metre	
Sound pressure	dB	Decibel	
	V	Volt	
Other measurements	W	Watt	
	Ω	Ohm	

Tab. 2.9.



2.10 - QUALIFIED PROFESSIONAL FIGURES

Qualified operators entrusted with the use and operation of the equipment in all its technical life stages for the use for which it was supplied:

Professional figure	Definition
Installer	 Qualified operator able to: handle materials and equipment. carry out all the operations necessary to properly install the equipment safely; perform all the operations necessary to properly operate the equipment and system safely; 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.
Technical specialised/ Maintenance technician	 Trained and authorised technician on the management and use of the equipment, who must: 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.
Maintenance technician electric	 Qualified technician able to: 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. The electrical maintenance technician can operate in the presence of voltage inside the electrical panels, junction boxes, control equipment etc. only if the person is suitable (PEI). For general requirements, refer to the IEC EN 50110-1:2014 standard.
Worker in charge of transport, handling, unloading and placement on site	Operator qualified to: • the use of lifting equipment • the safe handling (even manual) of materials and equipment. 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.

Tab. 2.10.



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3 - SAFETY

3.1 - GENERAL SAFETY WARNINGS



- 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

Versions of the series AQUALOG DIANA must be installed and commissioned in accordance with the applicable regulations and standards.



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.

<u>Transformation and spare parts</u>

Any technical change is prohibited. Use only original spare parts as prescribed 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 device 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
THE STATE OF THE S	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 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.
The state of the s	Obligation to wear protective clothing. Indicates a requirement for 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.



OBLIGATIONS AND PROHIBITIONS

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

It is compulsory:

- to carefully read and understand the use, maintenance and warning manual;
- before installing the equipment, to strictly refer to the details specified on the nameplates and in the manual;
- to 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 name 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

Equipment and/or packaging PIETRO FIORENTINI S.p.A. may bear the safety pictograms described in Tab. 3.12:

Symbol	Definition
<u>^</u>	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.



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

3.6 - NOISE LEVEL

The series AQUALOG DIANA has no moving parts.

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



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 DIANA It is a datalogger for continuous monitoring of water hammer in water infrastructures with an acquisition frequency of up to 200 Hz.

Designed to operate in a very low power consumption mode, it has an integrated GPS module that guarantees high precision in the time stamping of measurements and allows for the automatic geolocalization of measurement points.

AQUALOG DIANA features:

- protection rating IP 68;
- connection to the control centre via 2G/3G/4G.

The main elements are (see Fig. 4.2):

Pos.	Description	Pos.	Description
1	Plastic enclosure	2	Cable glands
3	Clamping screws	-	-

* METROLOGICAL BATTERY not visible in figure

Tab. 4.13.



Fig. 4.2. General description AQUALOG DIANA



4.2 - POWER SUPPLY DEVICES

The equipment AQUALOG DIANA is powered by a battery pack equipped with two Lithium Thionyl Chloride cells which guarantees high operating autonomy and ease of installation.

AQUALOG DIANA can also be powered by external sources:

- Photovoltaic panel.
- Micro-turbine.
- Mains power supply (230V).

4.2.1 - BATTERIES

The equipment AQUALOG DIANA can use the following battery model:

Features	Туре	Supply	
2-cell battery	Li-SOCI2	Standard	

Tab. 4.14.

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.



For technical details of the battery packs and reference operating conditions please refer to section "4.4 - Technical data".



4.2.2 - CONNECTORS

4.2.2.1 - CABLE GLAND VERSION

The cable glands used to connect the equipment are metal with O-rings.



Fig. 4.3. Cable glands, front view

Cable gland	Dimensions	Description	
P1	M16x1.5	Passage of the piezoresistive pressure sensor.	
P2	M16x1.5	Passage of the piezoresistive pressure sensor.	
Р3	M16x1.5	GPS antenna cable passage.	
P4	M16x1.5	GPRS antenna cable passage.	

Tab. 4.15.



4.3 - DESIGNED USE

4.3.1 - INTENDED USE

The equipment in question is intended for:

Operation	Permitted	Unpermitted	Work environment
Measurement of hydraulic parameters	Water mains monitoring	Any other type of different vector from that permitted.	Application in water network installations and nodes.

Tab. 4.16.

The equipment referred to was designed to be used exclusively within the limits specified on the identification plate 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

Reasonably foreseeable incorrect use means the use of the equipment in a way not foreseen in the design phase but which can result from readily predictable human behaviour:

- using the equipment in a manner other than that referred to under paragraph "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.



TECHNICAL DATA 4.4 -

General features	
External Enclosure	Fiberglass.
Casing protection rating	IP68 (immersion for 100 days at a depth of 1 metre).
Connectors	Stainless steel cable glands.
Antennas	External
Ambient temperature range of operation.	-25 °C to +60 °C
Storage temperature range	-25 °C to +70 °C
Mechanical and electrical classes	M2 E2
Supply voltage	3.6 Vdc
Autonomy	2 years with standard battery pack.
Power supply from external source	via DC/DC kit 9 - 36 Vdc (photovoltaic, micro-turbine) and/or 230 Vac
Non-volatile memory	2MBytes

Tab. 4.17.

Communication features			
Interface	Bluetooth Low Energy.		
Local communication interface	Bluetooth activation via magnet.		
Registration No.	MODBUSIEC 60870-5-104		
Communication vector	2G, 3G, 4G		
Supported SIM cards	Micro SIM		
Alarms/Events	Signalling and management of alarms and events generated by exceeding thresholds. Using the message service for alarm notification.		
Synchronization and geolocation	Via GPS module		
Data connection	Programmable centre call, configuration, archive, date/time alignment.		
Communication	Periodic, scheduled or event-driven.		

Tab. 4.18.

ΕN



4.5 - I/O CHANNELS

AQUALOG DIANA acquire signals:

• 1 analog input for mV/V cell piezoresistive sensors.

4.6 - DATA COMMUNICATION

AQUALOG DIANA uses the following communication methods:

• 2G/3G/4G modem.

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

4.7 - ANTENNAS

Antenna type	Image*
Antenna external to AQUALOG DIANA bracketed device. Suitable for installation in a thermowell or on stations where external elements could mask the GSM field.	
Antenna external to device AQUALOG DIANA "and drive-over. Suitable for installation outside the thermowell with a dedicated external pocket.	
GPS antenna outside the device.	

^{*} Images are for illustration purposes only

Tab. 4.19.



4.8 -**WIRING**

AQUALOG DIANA, can acquire signals:

1 analogue input for piezoresistive cell sensors.

4.8.1 - ANALOGUE PRESSURE INPUT

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	Image		
J2	5	PRES_VSUP_1	Positive cell power supply	IN+	IN+		
J2	6	PRES_VO_P_1	Positive cell signal	OUT+	OUT+		
J2	7	PRES_VO_N_1	Negative cell signal	OUT-			
J2	8	PRES_SEN_GND_1	Negative cell power supply	IN-	IN- OUT-		

Tab. 4.20.

Fig. 4.44 illustrates the connection of a pressure transducer to channel 1 of the device AQUALOG DIANA, represented as a resistor bridge.

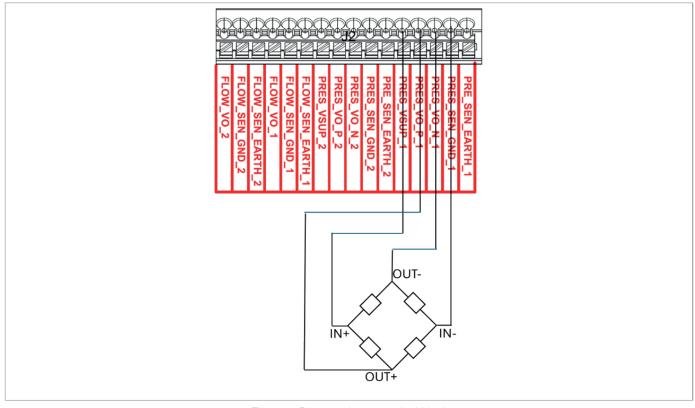


Fig. 4.4. Pressure input terminal block



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5 - USER INTERFACE

5.1 - LOCAL COMMUNICATION INTERFACE

The local communication interface is Bluetooth Low Energy.

5.1.1 - COMMUNICATION INTERFACE VIA BLUETOOTH

The Bluetooth interface allows communication with the device via the Rainbow software without removing the cover. A magnet and a PC supporting the Bluetooth Low Energy standard are required for Bluetooth power-up.

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

- 1. Place the magnet near the "WAKE UP" label (Fig. 5.5.).
- 2. Run the Rainbow programme from the PC.
- 3. Select the desired RTU and double-click the mouse.
- 4. Select 'RTU' in the top left-hand corner.
- 5. Select 'Diagnostic Monitor' from the drop-down menu.
- 6. Select the 'Bluetooth' button in the new window.
- 7. Click the "Discovery" button and wait for the text box next to it to display the device (wait about 30 seconds).
- 8. Select the device and click the "Connect" button.
- 9. Wait for the connection.



If there is no Bluetooth interaction between the Rainbow software and the device, after approximately 1 minute the BT communication channel will be turned off and it will be necessary to reactivate it as indicated in point 1.



Fig. 5.5. Bluetooth Enable Label



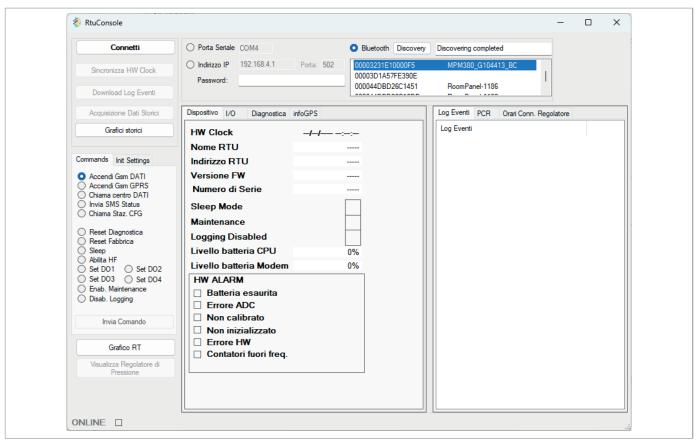


Fig. 5.6. Rainbow interface for Bluetooth connection



6 - TRANSPORT AND HANDLING

SPECIFIC WARNINGS FOR TRANSPORT AND HANDLING 6.1 -



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 and means.

Transport and handling	
Operator qualification	Installer.
PPE required	
	MARNING!
	The PPE listed in this table is related to the risk associated with the equipment.
	For the required PPE to protect against risks associated with the workplace,
	installation or operating conditions, please refer to:the regulations in force in the country of installation;
	any information provided by the Safety Manager at the installation facility.
Weights and dimen-	For dimensions and weights please refer to section "6.3 - Physical characteristics of the
sions	device".
of the equipment	

Tab. 6.21.



6.1.1 - PACKAGING AND FASTENERS USED FOR TRANSPORT

The transport packaging has been designed and manufactured to avoid damage during normal transport, storage and handling.

The equipment must be kept in the packaging until installation.

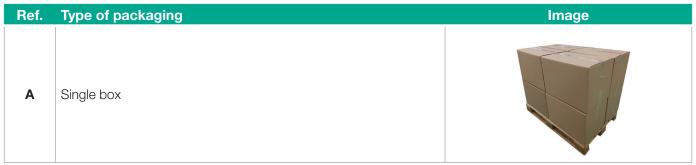
Upon receiving the equipment, it is necessary to:

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



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.

In Tab. 6.22 the types of packaging used are described:



Tab. 6.22.

6.2 -PACKAGING CONTENT

AQUALOG DIANA is shipped with:

- battery inside, to be connected;
- external LTE modem antenna;
- external GPS antenna:
- wall mounting bracket.



6.3 -PHYSICAL CHARACTERISTICS OF THE DEVICE

6.3.1 - CABLE GLAND VERSION



Fig. 6.7. Dimensions AQUALOG DIANA front view

Weights and dimensions		
Α	114 mm	
В	75 mm	
С	209 mm	
D	190 mm	
Weight	1 kg	

Tab. 6.23.



6.3.2 - LOWER SIDE

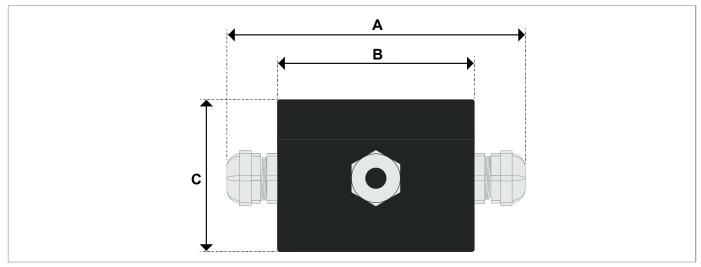


Fig. 6.8. Exterior bottom view

Dimensions [mm]		
Α	114 mm	
В	75 mm	
С	58 mm	

Tab. 6.24.



EQUIPMENT ANCHORING AND LIFTING METHOD 6.4 -

HAZARD!

Using lifting equipment (if necessary) for unloading, carrying and handling packages is reserved only for skilled operators who have been properly trained and instructed (with licence 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.

A 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 handling the equipment:

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



6.4.1 - FORKLIFT HANDLING METHOD

A HAZARD!

It is forbidden to:

- transit under suspended loads;
- 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. 6.255:

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. NOTICE! Fasten the load to the forks with clamps or similar devices if required.	3
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.	4 POTE POTE POTE



Step	Action	lmage
5	Tilt the mast backwards (towards the driver's seat) to help the over- turning moment and to ensure greater load stability during tran- sport.	5 COPIL COMMON TO SERVICE OF THE PARTY OF TH
	Adjust transport speed according to the type of floor and load, avoiding jerky movements.	
	• WARNING!	
6	 If: 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. 6.25.



6.5 - PACKAGING REMOVAL

Packaging removal		
Operator qualification	• Installer.	
	MARNING!	
PPE required	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:	
	 the regulations in force in the country of installation; 	
	any information provided by the Safety Manager at the installation facility.	

Tab. 6.26.

To unpack the cardboard boxes (single or multiple) supported by a pallet, proceed as described in Tab. 6.27:

Step	Action	
1	Remove the stretch film around the pallet.	
2	Remove the 4 support corners.	
	Move the boxes of the equipment from the pallet to their intended place.	
3	NOTICE!	
	Have at least 2 operators manually move the packages if required due to their dimensions/weight.	

Tab. 6.27.



After removing all packaging materials, check for any anomalies.

If there are anomalies:

- · do not install the equipment;
- contactPIETRO 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



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.

If the equipment needs to be stored for an extended period, the minimum environmental conditions for the intended storage are provided in Tab. 6.28 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. 6.28.

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 ≤ 25°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.



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

GENERAL WARNINGS 7.1 -



/! 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 strictly forbidden to make any 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 - ENVIRONMENTAL CONDITIONS ALLOWED



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.



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 pha-

Before installation, it must be ensured that:

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

Installation		
Operator qualification	Installer.	
PPE required	WARNING! The PPE listed in this table is related to the risk associated with the equipment. For the required PPE to protect against risks associated with the workplace, installation or operating conditions, please refer to: 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/connections of the equipment.	

Tab. 7.29.



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.



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 device AQUALOG DIANA with brackets.	
2	Unscrew and remove the cover screws.	
3	Remove the cover.	
4	Disconnect the battery pack.	
	Connect the signal cables from the field (refer to section '4.8 - Wiring').	
	NOTICE!	
5	The terminals used for connection are 'spring-loaded'. To perform this step: 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	Connect the external antenna to the appropriate connector on the outer tail.	



To insert the SIM card:

Step	Action	
8	Insert the SIM card into the modem slot (Fig. 7.9).	
9	Connect the battery pack.	
10	Connect via Bluetooth interface.	
11	Set up the equipment (refer to chapter "8 - Configuration").	
12	Check with Rainbow's tools that the measurements are correct.	
13	Make a connection test and check that communication is stable (refer to paragraphs "8.8 - 2G, 3G and 4G data call communication test").	
14	Place the cover on the box.	
15	Insert all the screws first and then tighten them. WARNING! Please check that: 1. the lid is correctly positioned and fully flush; 2. there are no loose cables; then tighten the screws to avoid losing the IP68 protection rating.	

Tab. 7.30.

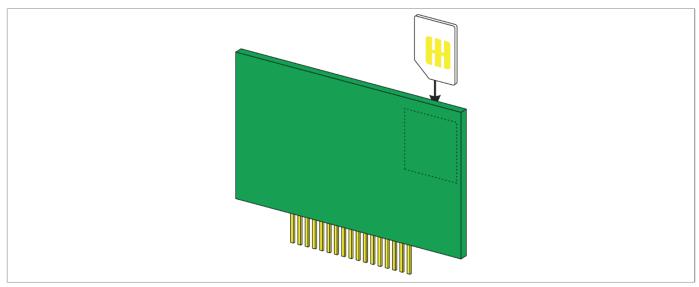


Fig. 7.9. Installation procedure



8 - CONFIGURATION

SAFETY REQUIREMENTS FOR CONFIGURATION 8.1 -

Configuration		
Operator qualification	Specialised technician.Installer.	
	WARNING!	
PPE required	The PPE listed in this table is related to the risk associated with the equipment. For the required PPE to protect against risks associated with the workplace, installation or operating conditions, please refer to: • the regulations in force in the country of installation; • any information provided by the Safety Manager at the installation facility.	

Tab. 8.31.

8.2 -**EQUIPMENT CONFIGURATION**



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

Configuring data loggers AQUALOG DIANA can be done through 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. 8.1010).
- 3. Select the desired RTU (Fig. 8.1111).



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

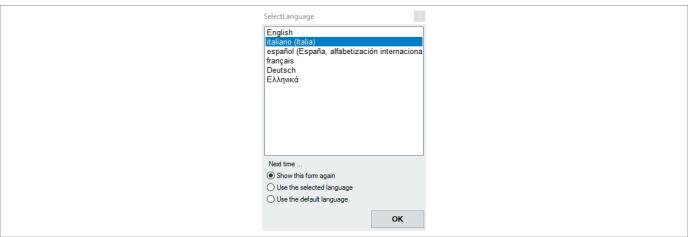
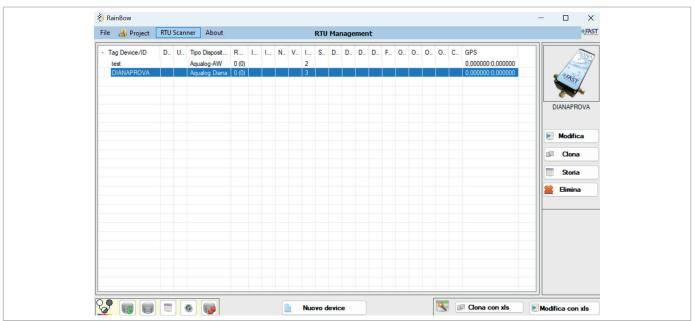


Fig. 8.10. Select language



Select RTU Fig. 8.11.

EN



8.2.2 - OPENING THE DATABASE

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

If you need to select an RTU from another list, proceed as follows:

1. Select in the top left-hand corner "File", then "Open Database" and left-click.

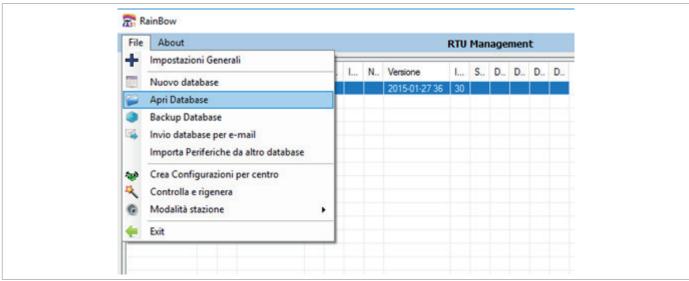


Fig. 8.12. Opening the Database

2. Search the PC's network drive for the file with the extension .sdf then click "Open".

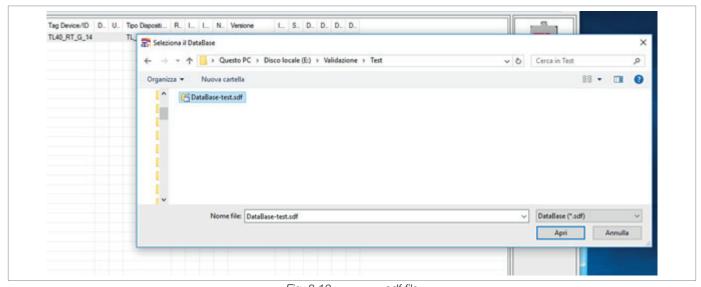


Fig. 8.13. .sdf file



3. Check the programme screen for the correct file extension.

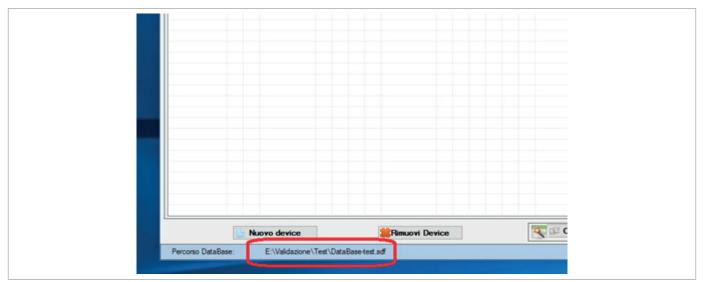


Fig. 8.14. Database verification



8.3 - RTU INTERFACE

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



Fig. 8.15. RTU Configuration

The following parameters can be configured on this page:

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

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

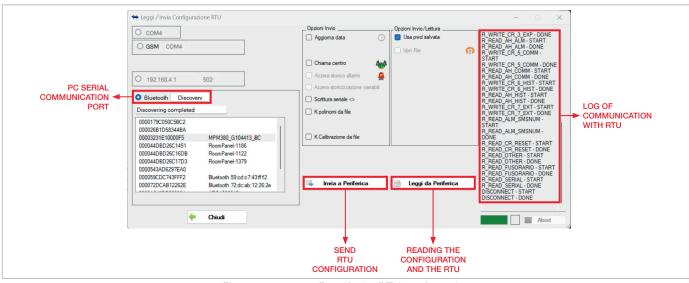


Fig. 8.16. Read/write RTU configuration

To send the configuration, please refer to the Wi-Fi or Bluetooth connection procedure in section "5.1 - Local communication interface".



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 via local communication panel. Individual channels can be customised by setting a TAG and a photo.

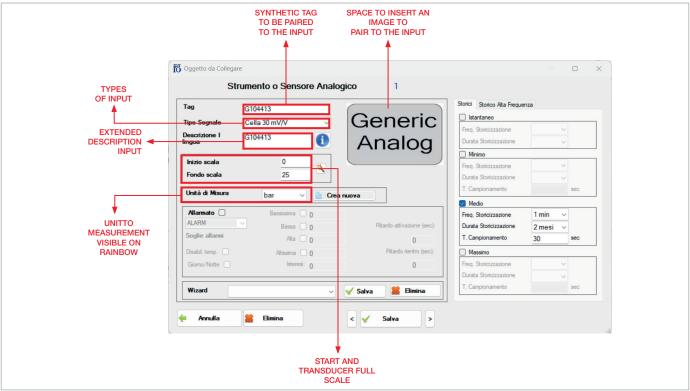


Fig. 8.17. Analogue input configuration



8.3.2 - DATALOGGER

The analogue input variable can be logged according to four different strategies:

- Instantaneous value.
- Minimum.
- Medium.
- Maximum.

The storage time interval can be configured for each one. For the minimum, medium, maximum modes, it is also possible to configure the calculation period (sampling time).

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

The device's logging capacity depends on the frequency and duration of logging.

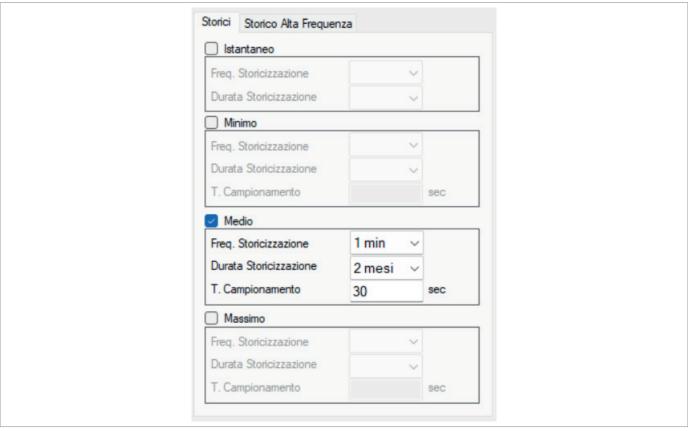


Fig. 8.18. Analogue variable logging mode



AQUALOG DIANA offers the possibility of high-frequency sampling of fast transients of the analogue input variable.

In water networks, the typical application is the monitoring of the so-called "water hammer". The functionality must be enabled in the configuration window of the analogue variables in the 'High Frequency History' tab.

Enabling this feature requires defining:

- upper deviation (value of the variation of the variable) that causes the event recording to begin;
- control window, time interval within which the variation must be contained.



Fig. 8.19. Enabling high-frequency logging

Event recording consists of saving a trace of 3072 samples containing the trend of the measurement from 3 seconds before to 27 seconds after the start of the variation.

The memory of the AQUALOG DIANA can contain up to 100 "Water Hammer" events.

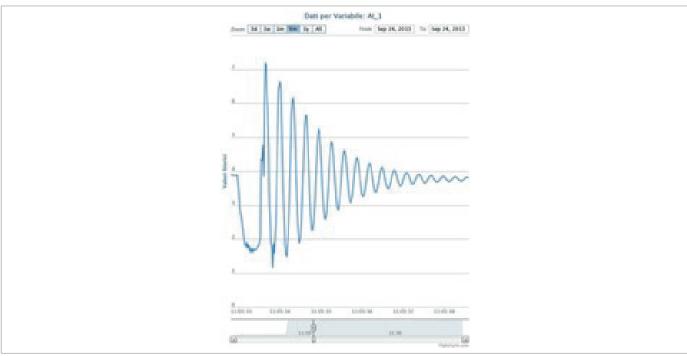


Fig. 8.20. Example of sampling chart



8.3.3 - ENABLING ALARMS ON INPUTS

Input variables, both analogue and counting inputs (e.g. flow rates), can be alarmed and thus configured for triggering alarms.

For analogue variables there are 2 minimum thresholds (very low, low) and 2 maximum thresholds (high, very high) with possible activation and return delays.

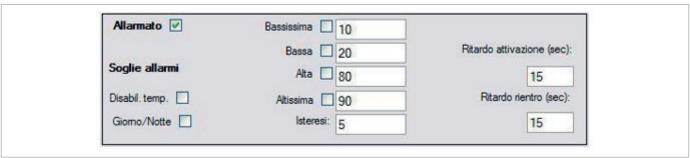


Fig. 8.21. Configuration of alarms on analogue measurements

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

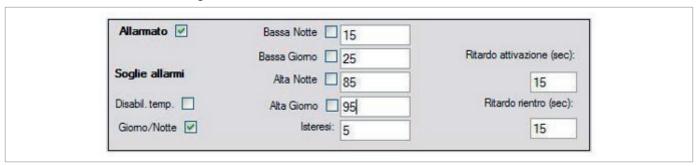


Fig. 8.22. Configuration of alarms in day/night mode on analogue measurements



CONFIGURING 2G/3G/4G COMMUNICATION PARAMETERS

By navigating to "RTU → Communication" it is possible to connect the RTU with the SCADA via the GPRS modem by setting the following connection parameters:

- Set the mode "GPRS always off" in the section "Outbound".
- In the section "Inbound" set the IP and port of the centre of interest.
- Set the number of attempts greater than 0. 3.
- Configure on "GPRS settings" the APN parameters, network username and password.
- 5. Set the communication protocol and its parameters.
- 6. Click "OK" and confirm the change of data.

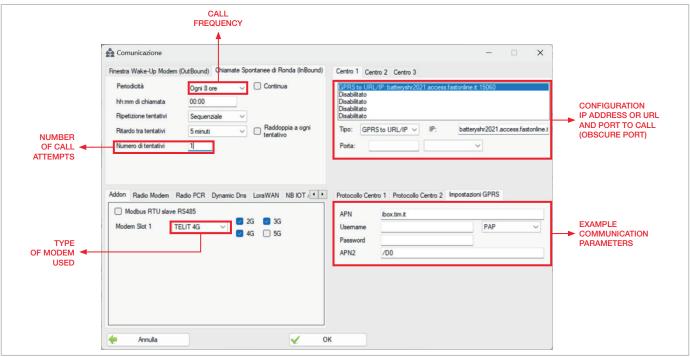


Fig. 8.23. Configuring connection parameters for RTU with 2G/3G/4G calling

The 2G/3G/4G modem is soldered onto the motherboard as shown Fig. 8.24.:

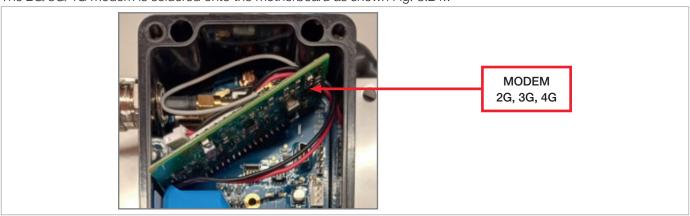


Fig. 8.24. 2G/3G/4G modem



8.5 -LOCAL COMMUNICATION

By navigating to "RTU → Diagnostic Monitor" it is possible to use the local communication interface between RTU and PC. This tool allows Real-Time monitoring of the machine status and all configured inputs.

To connect to the RTU, follow the Bluetooth connection procedure in paragraph "5.1 - Local communication interfaces" and click "Connect".

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

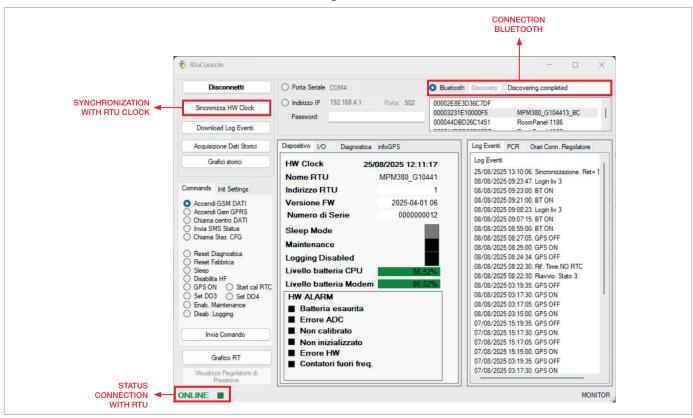


Fig. 8.25. Local communication window with RTU



BATTERY UPGRADE

By navigating to "RTU -> Diagnostic monitor" it is possible to initialize the remaining battery value:

- Select "Init Settings".
- Select "Type" and "Qt", then click "Set Battery 1" to initialize the RTU battery.

Example: Select "Type: 13 Ah" and "Qt: 3" to initialize a 40 Ah battery (2-cell battery)

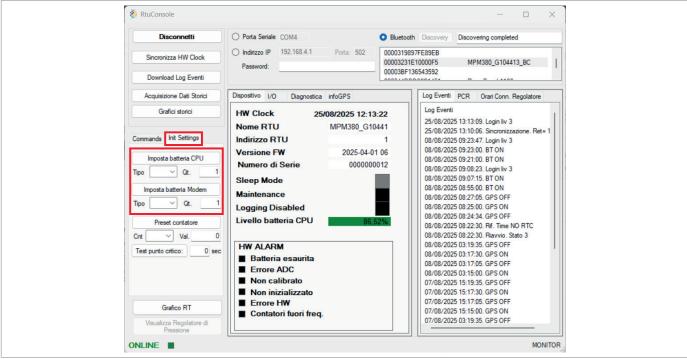


Fig. 8.26. Battery initialization screen



8.7 -**ALARM ACTION**

"By navigating to "RTU → Alarm 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.

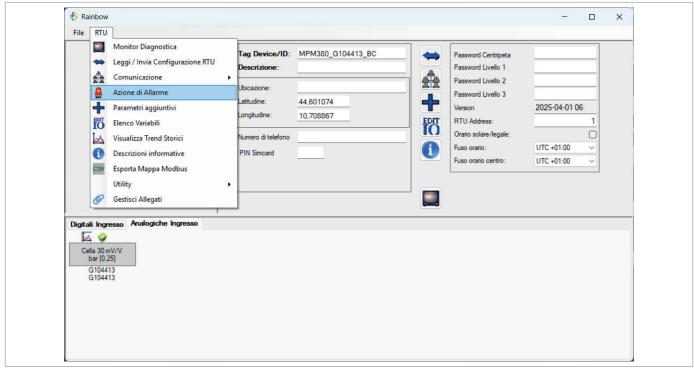


Fig. 8.27. Alarm Actions Configuration Window



8.7.1 - ADD AN ALARM ACTION

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

- 1. Select the AQUALOG DIANA to be configured from the Rainbow start page.
- Select the "RTU" menu in the top left-hand corner of the AQUALOG DIANApage
- 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 bottom left.
- 8. Send the configuration.

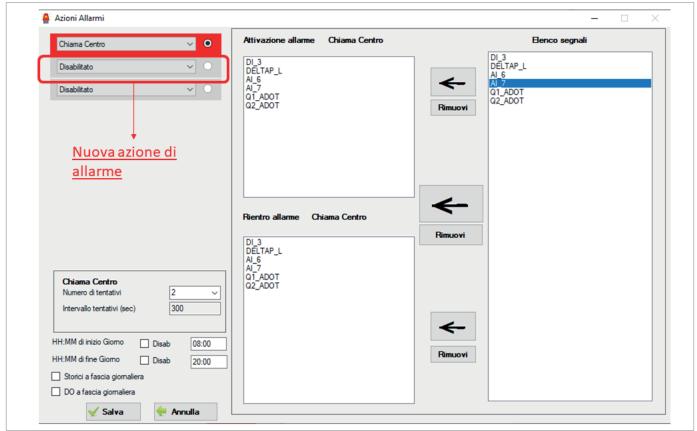


Fig. 8.28. Selecting the new alarm action



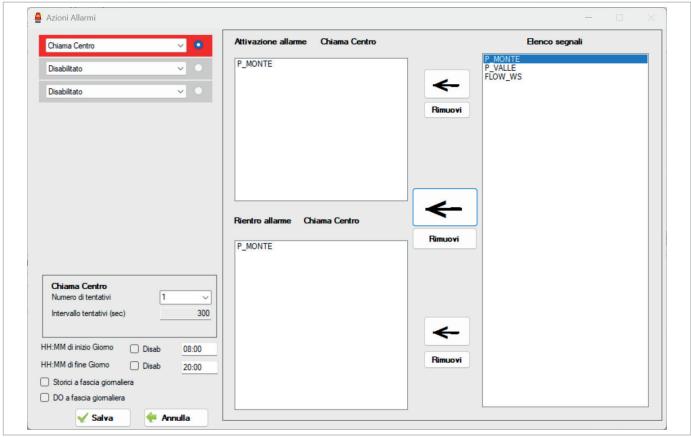


Fig. 8.29. Configuring the new alarm action

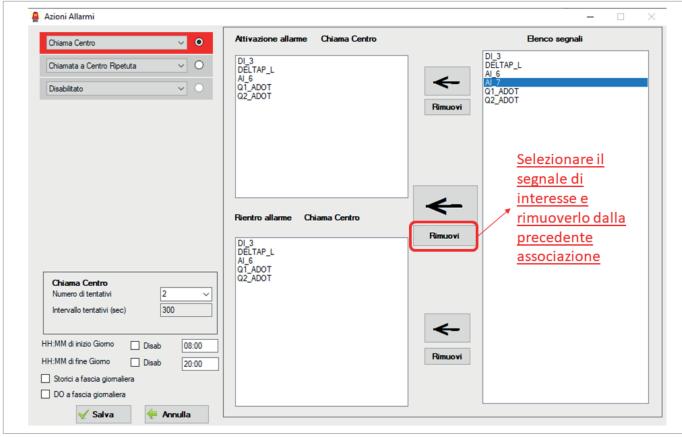


Fig. 8.30. Removing the old alarm action



2G, 3G AND 4G DATA CALL COMMUNICATION TEST 8.8 -

- Double-click on the configuration from the list on the 'Rainbow' screen
- Activate the local Bluetooth connection, refer to paragraph "5.3 Local communication interfaces". 2.
- Select 'Diagnostic Monitor' from the RTU menu at the top left. 3.
- Select the Bluetooth communication channel, then click "Connect". 4.

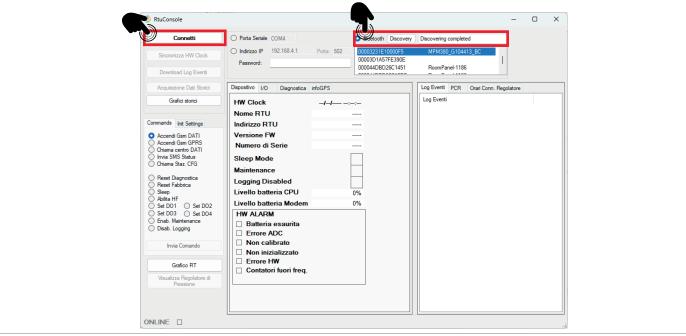


Fig. 8.31. Diagnostic monitor selection

- Select "DATA Centre Call", then "Send Command".
- 6. Check the modern status from the 'Diagnostics' window.

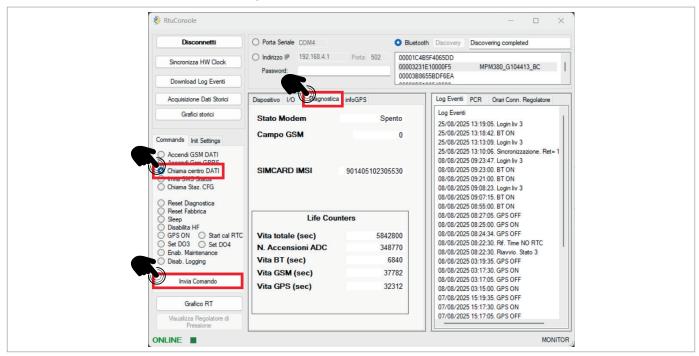


Fig. 8.32. Connection

EN



7. Verify that the system performs the steps in the "Diagnostics" window (refer to Tab. 8.322):

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

Tab. 8.32.

GPS COMMUNICATION TEST 8.9 -

- 1. Double-click on the configuration from the list on the 'Rainbow' screen
- 2. Activate the local Bluetooth connection, refer to paragraph "5.3 Local communication interfaces".
- Select 'Diagnostic Monitor' from the RTU menu at the top left.
- Select the Bluetooth communication channel, then click "Connect".

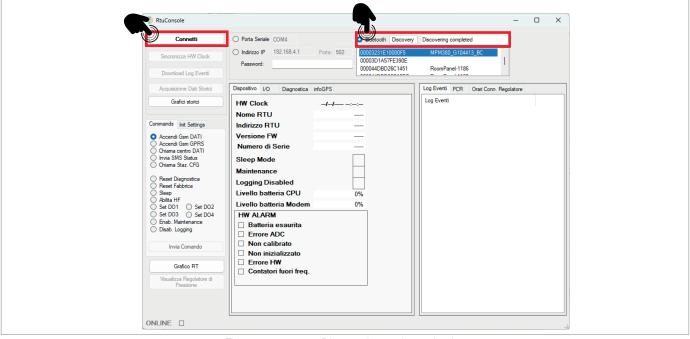


Fig. 8.33. Diagnostic monitor selection

- 5. Select "GPS ON", then "Send Command".
- 6. Check the reception status from the "Event Log" window.
- 7. Verify that the system performs the steps:
 - Cmd GPS On: Send GPS recording command.
 - Sync GPS OK 4 Sat: GPS registration successful with 4 satellites found.
 - GPS OFF: Turns off GPS.

EN



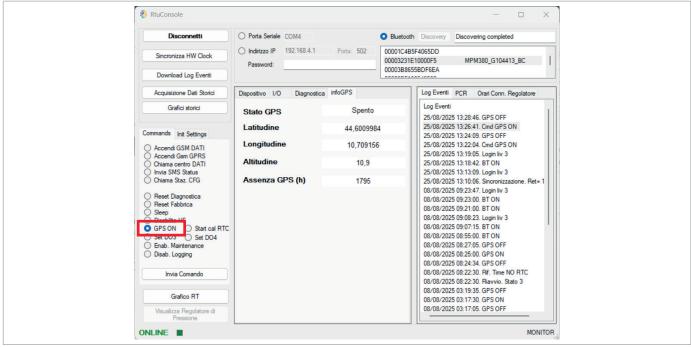


Fig. 8.34. GPS connection

8.10 - RESET

There are two RTU reset modes:

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

- 1. Connect the USB cable to the RTU (via USB connection kit).
- 2. Run the "Rainbow" software.
- 3. Select an RTU of type AQUALOG DIANA
- 3. Click the button "RTU Diagnostic Monitor".
- 4. Select the COM port paired with the USB cable and click 'Connect'
- 5. Wait for the connection.
- 6. Select the 'Factory Reset' item and click the 'Send command' button.
- 7. Wait for the message 'Reset in progress'.
- 8. 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 covered in this manual may only be carried out with the prior authorisation of PIETRO FIORENTINI S.p.A.. No liability for personal injury or damage to property can be attributed to PIETRO FIORENTINI S.p.A. for work other than that described or performed in a manner other than indicated.

A 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 necessary clarification.

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. 9.333, in case of anomalies detected in the equipment, which require its removal and replacement from the field:

Step	Action	
1	Turn off the main power switch upstream of the equipment (in the case of a device powered by a 230VAC mains).	
2	Unscrew and remove the cover screws.	
3	Open the lid.	
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.	
	Tob 0.22	

Tab. 9.33.





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

Commissioning and maintenance operations						
Routine mainte-	All those operations that the operator must preventively carry out to ensure proper operation of the device over time.					
nance	NOTICE!					
	The equipment does not require routine maintenance.					
Special mainte-	All those operations to be carried out by the operator when the equipment requires them.					
nance	This those operations to be earned out by the operator when the equipment requires them.					

Tab. 9.34.

9.2 - SPECIAL MAINTENANCE

9.2.1 - REPLACING BATTERIES

Replacing batteries	
Operator qualification	Specialised technician.Maintenance Technician.
PPE required	 WARNING! The PPE listed in this table is related to the risk associated with the equipment. For the required PPE to protect against risks associated with the workplace, installation or operating conditions, please refer to: the regulations in force in the country of installation; any information provided by the Safety Manager at the installation facility.
Equipment required	Allen key, 6 mm.

Tab. 9.35.



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 battery packs supplied by PIETRO FIORENTINI S.p.A. must be carried out using the original packaging, which complies with 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 follows:

Step	Action		
1	Unscrew and remove the clamping screws.		
2	Remove the cover.		
3	Disconnect the battery connector from the housing (A) and remove the battery (B) from 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	Fit the cover.		
6	Insert and secure the clamping screws.		

Tab. 9.36.

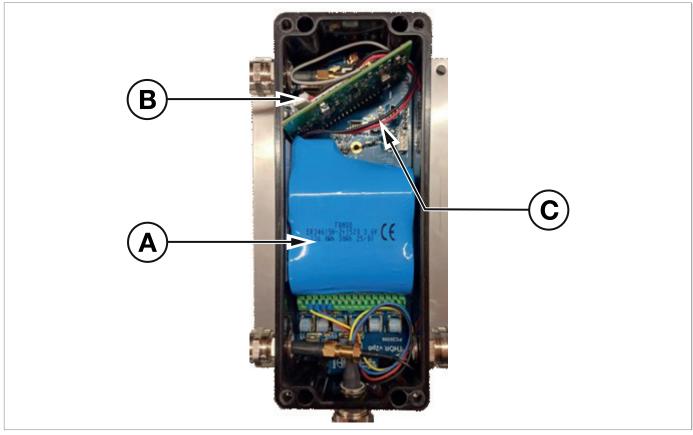


Fig. 9.35. Replacing the battery pack



10 - UNINSTALLATION AND DISPOSAL

10.1 - GENERAL SAFETY WARNINGS



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



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	Installer.				
	MARNING!				
PPE required	The PPE listed in this table is related to the risk associated with the equipment. For the required PPE to protect against risks associated with the workplace, installation or operating conditions, please refer to: • 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/connections of the equipment.				

Tab. 10.37.

10.3 - INFORMATION REQUIRED IN CASE OF NEW INSTALLATION



Should the equipment be reused after uninstallation, refer to chapters "7 - Installation" and "8 - Configuration".

10.4 - STORAGE OF THE BATTERIES



Refer to paragraph 6.6.1 to store the batteries.

10.5 - INFORMATION REQUIRED IN CASE OF RE-INSTALLATION



Should the equipment be reused after uninstallation, please refer to Chapter "7 - Installation".



10.6 - DISPOSAL INFORMATION



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

The equipment was manufactured with materials that can be recycled by specialised companies. To dispose of the equipment correctly, proceed as indicated in Tab. 10.3838:

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. 10.38.

The equipment in any possible configuration consists of the materials described in Tab. 10.3939:

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	Referred to paragraph "10.7 - Disposing of the batteries".		

Tab. 10.39.



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).



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 ≤ 500 g per unit.

10.7.1.1 - BATTERY PACKAGING



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





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

The batteries that are <u>removed</u> 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



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



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

11.3 - PUTTING BACK BATTERIES

Summary of installed batteries:

Features	Туре	Supply
2-cell battery	Li-SOCI2	Standard

Tab. 11.40.

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