APPARECCHI SCIENTIFICI

USE AND MAINTENANCE MANUAL

K-LAB SERIES

HTS KW control

Serial N°…….

Original Instructions

TD Vers. 03/05/2023

IMPORTANT: Read this instruction manual. Failure to read, understand and follow the instructions in this manual could result in damage to the unit, injury to operating personnel, and poor equipment performance.

ATTENTION: All internal adjustments and maintenance operations must be carried out by qualified technical personnel.

The data and instructions given in this manual refer to the models currently in production; KW reserves the right to make any changes that will be deemed useful for the technical improvement of the products at any time.

Business presentation

KW APPARECCHI SCIENTIFICI S.r.l., bearing the prestigious "KW" brand, whose creation and diffusion dates to 1953, operates in the biomedical and scientific research sector.
Since 1979, the Company's management has concentrated all activities (commercial, administrative, production and the technological research laboratory) in the current headquarters located in Via della Resistenza 119 - Le Badesse-53035 Monteriggioni -Siena.
Currently the company has a staff of about 30 units, including specialized technicians, employees, workers, consultants in engineering and biology and is present both in Italy and abroad with a sales network composed of scientific collaborators and resellers, as well as with a qualified assistance network.
KW's commitment to the construction of machines at the service of new biological techniques is achieved through the synergistic effect of innovations in manufacturing and marketing processes, the use of microelectronics, constant investments in applied thermodynamic research and integrated regulation systems; this allows us to offer users a decidedly ergonomic range of products with a high technological content; and to have a high dynamism of the KW structure, with reference to:

- company quality-product safety
- product reliability
- eco-compatibility of the product.

The company's activity consists of the creation, marketing, and installation of the products currently in the catalog, which can be divided into 5 distinct sectors:
1) refrigeration

- freezers with operating temperatures down to –130 ° C, both horizontal and vertical, suitable for storing any biological material and for cold tests of various types;
- efrigerated cabinets (also with combined T) for storing sera, vaccines, various biological materials, drugs, etc.;
- refrigerated cabinets for gelfiltration and cold chromatography techniques;
- Blood cells;
- control units for liquid refrigeration;

2) controlled T environments

- stoves with a range of T up to + 250 ° C;
- stoves with paraffin;
- refrigerated thermostat cabinets with forced air circulation and thermal water flywheel;
- growth chambers with T-control and photoperiod and germination chambers;
- CO_2 incubators with% CO2 control (air jacket and water jacket) both with flow meters and with TC electronic analyzer;
- precision thermostatic baths;
- water bath with oscillating / linear stirring;

3) sterilization

- ventilated dry sterilizers with automatic control of the thermal cycle;
- glassware-drying cabinets;
- cabinets for sterile storage;

4) laboratory accessories

- accessories for completing the above equipment: tube holders, pipette holders, tube rotators, bottle rotators, etc.;

5) engineering-apparecchi speciali

- special equipment and systems on specific design for GMP, FDA, etc. certification

KW Apparecchi Scientifici has been certified for many years according to the company quality standards:

- ISO 9001: 2015 ***Quality Management Systems***
- ISO 13485:2016 ***Quality Management Systems for Medical Devices***
- ISO 45001:2018 ***Occupational health and safety***
- ISO 14001:2015 ***Environmental management system***

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1. General warnings

The recommendations, shown below, must be read carefully by the user, as they provide important information regarding the safety of installation, use and maintenance and possible dismantling.

Furthermore, before using the equipment, the operators must be trained on the contents of this instruction, use and maintenance manual.

Keep this booklet carefully for any further consultation.

After removing the packaging, check the integrity of the appliance. If in doubt, do not use the appliance and IMMEDIATELY contact the KW central technical assistance service (tel. 0577/309144).

1.1 Symbols used in the manual

The following symbols and conventions are used in this manual:

	**ATTENTION** Important operating instructions that reduce the risk of injury, even serious, or possible damage or insufficient performance of the unit
	**NOTICE** Situations in which there are dangerous voltages and the risk of electric shock
	Obligation to use gloves
	Read these instructions before use
	Particular requirements related to the presence of low temperatures
	Prohibition

	Prescription or recommendation
	Recyclable materials
	Obligation to use protective goggles
	Obligation to use safety shoes

1.2 Symbols on the device

	CE Mark
	Read the enclosed instructions before use
	Grounding point
	**NOTICE** Situations in which there are dangerous voltages and the risk of electric shock
	Danger of explosion

1.3 General Info

	The recommendations, shown below, must be read carefully by the user, as they provide important information regarding the safety of installation, use and maintenance and possible dismantling.
	This manual is an integral part of the machine/equipment and must be consulted by the operator, the maintenance worker and the safety manager and possibly by the department manager before making the machine/equipment available.
	Before using the equipment, the operators must be trained on the contents of this instruction, use and maintenance manual.
	Keep this booklet carefully for any further consultation. It must be stored in a protected, dry place, away from the sun's rays and must always be present, for consultation, near the machine.
	This information is the property of KW Apparecchi Scientifici. It is strictly forbidden to reproduce them or communicate them to third parties without explicit authorization.
	This manual cannot be altered or changed in any of its parts by the purchaser, under penalty of forfeiture of the guarantee granted and the assumption by the purchaser of all civil and criminal liability deriving from damage caused to people and/or things.
	The machine/equipment cannot be put into service or made available without having read the attached documentation, under penalty of forfeiture of the guarantee granted and the assumption by the purchaser of all civil and criminal liability deriving from damage caused. to people and/or things.
	If some photos or drawings are not consistent with what was delivered, it is likely that the photos or drawings refer to a different machine configuration, contact the assistance center.
	This manual reflects the state of the art at the time the machine/equipment was placed on the market, as well as the national and international legislative requirements for safety and hygiene in force at the time it was placed on the market; any subsequent technological innovation will not affect its validity as long as the owner always checks the compliance of the system with the provisions of future laws.

1.4 Terms and definitions

In compliance with the Machinery Directive, this documentation contains important information whose knowledge we believe is essential for both the operator and the service agent, in order to be able to operate in safe conditions.
Precisely because they are widely used terms, we believe it is essential to clearly explain the meaning attributed to:

Terms	***Description***
Operator	Person in charge of operating, regulating, carrying out, providing for routine maintenance, cleaning the machine.
Service clerk	Specialized employee, specially trained and authorized to carry out extraordinary maintenance interventions as well as repairs that require in-depth knowledge of the machine, of its operation, of the safety devices and related intervention methods.
Dangerous zone	Any area inside and / or near the machine in which the presence of an exposed person constitutes a risk for the safety and health of the same.
Exposed person	Any person wholly or partially in a danger zone.

1.5 Security

The machine/equipment in question has been built taking into account the possible risks that it can cause during its operating life.
The staff must be aware of the presence of residual risks, the precautions to be taken and the general accident prevention rules to follow and respect, therefore the operator:

- It must be adequately trained;
- Must read and learn these instructions; if he does not have reading skills, he must be verbally informed of the information relating to this manual;
- Must have a clear understanding of the concept of responsibility and competence.

	The machine/equipment must be driven and managed exclusively by operators who have read and learned the instructions. Comply fully with the instructions, procedures, warnings and general rules to be followed in this manual. Unauthorized tampering/replacement of one or more parts of the machine/equipment, the use of accessories, tools, consumables other than those indicated by the manufacturer, can constitute a real danger of injury.

In order to maintain safety conditions, the operator must always pay attention to:

- Do not tamper with any of the parts of the machine for any reason;
- Avoid the presence of people unrelated to the operation of the machine.

	In order to better avoid the risks present, the operator and all the machine operators are required to familiarize themselves with the machine/equipment in order to better evaluate its correct functionality and promptly report any anomalies; not to be distracted during the execution of maneuvers and/or other activities on the machine itself and/or in parts of it, in order to guarantee the safety of oneself and any other exposed persons, while preserving the machine/equipment from possible damage .

1.6 Intended use of the equipment

This equipment must only be used for the use for which it was expressly designed: that is, for the low-temperature storage of biological material in general and other material of a technical-scientific nature, in any case non-flammable, explosive, etc.
Any other use is to be considered improper and therefore dangerous.
KW Apparecchi Scientifici cannot be held responsible for any damage deriving from improper, erroneous and unreasonable use.

1.7 Electrical connection

The machine is equipped with protections and safety devices for the prevention of accidents at work in compliance with the laws in force.

	Connect the power cable to an interlocked CEE 2P + E + EARTH socket. The appliance is already set up to be powered with 220V / 50Hz; with the use of an electrical panel with a 16 A socket (in the case of a nominal installed power greater than 1 KW - see technical characteristics - it is necessary to use a switchboard socket with a lock in compliance with current legislation).
	The removal or tampering of the protective barriers causes the operator or assistance assistant to assume all responsibility for the dangers that may arise and/or derive from them.
	The removal or tampering of the safety devices is not allowed and KW Apparecchi Scientifici is released from any liability or legal involvement in the event of an accident.

1.8 Residual risks present during the various work phases

During the design and manufacturing phases, all measures were taken to eliminate or reduce the risks for the user of the machine; however, only the use provided for in this manual can make these measures effective. The risks that cannot be eliminated, or residuals, are those deriving from incorrect use of the machine whose probability of occurrence is limited only with the correct training and information of the operators.

2. Technical data

This manual refers to appliances:

REFRIGERATORS/FREEZERS MOD. K–LAB PL ADV SERIES

T range from 0 °C to + 15 °C/ from -20 °C to -10 °C

T SET + 4 °C and -20 °C

«*CFC FREE*»	These appliances, like all those produced by KW, are free from chlorofluorocarbons and other substances harmful to the stratospheric ozone and to the environment.

KW offers one of the widest selections of refrigerators and freezers for medical applications, for scientific research and for industry. **They are intended for the preservation of drugs, diagnostics, vaccines and serums, biological material in general and for the preservation of industrial products.** A wide range of models, capacities and technical functions allows the user to choose the ideal model. **K-LAB** products are the result of technological innovation, quality in manufacturing and continuous attention to the customer, all in the KW Apparecchi Scientifici S.r.l. tradition, matured in half a century of activity. All models are designed and built according to the ISO 9001 International Quality System and manufactured in accordance with the European safety standards CE Mark and UNI-EN-61010 for laboratory equipment.
KW has proposed, for all its product lines, to achieve safety for the product and its conservation, safety for user personnel, safety for the environment.
Security is achieved through:

- High reliability of the machine, with the use of non-flammable HFC gases with ODP (Ozone Depletion Potential) equal to 0 or with a new design of the refrigerant circuit with new HC gases with very low environmental impact GWP (Global Warming Potential), with specific components for very low temperatures and innovative fluids (with low viscosity POE oils), on the use of which a research and development program has been carried out. When HC refrigerant gases are used, the final Innovatec abbreviation “IN” is added to the model;
- A construction compliant with international safety standards on laboratory equipment and built according to manufacturing standards relating to the ISO 9001 International Quality System;
- A high level of control of all routine functions and alarms;
- The entire KW range has technical characteristics such as to guarantee the user "safety" in the most difficult conditions: high ambient temperatures, modest air circulation (necessary for condensation), as well as a short absence of power supply;
- Very low routine maintenance, high ease of use and an immediate "reading" by the user of the operating conditions, by means of the large display.

- Possibility of double redundant system for greater safety. In this case the model will contain the abbreviation "TG" (Twin Group).

KW has a sales network, through scientific collaborators and authorized resellers, as well as a qualified assistance network through training and refresher courses, carried out at the production plant.

The range of capabilities offered is truly high, capable of satisfying the most diverse needs of any laboratory, be it biomedical or industrial; this, together with the technical characteristics, places the Flex Innovatec series at the highest levels of the current state of the art in this sector.

The K-LAB HTS series devices consist of a µP digital electronic controller, with a 5"/7'' touchscreen display which guarantees:

- integrated management of all functions: refrigeration, compressor, defrost, alarm, internal evaporator fans, etc.
- T min/T max alarm, acoustic - visual, with acoustic silencing.
- Standard equipment.

Dotazione standard:

- 4 pivoting wheels (2 front with brake)
- Internal / external through hole
- USB port
- SD cart slot
- Dry contacts for remote alarms

2.1 Technical characteristics K-LAB REFRIGERATORS +4 °C SERIES

Model	External Dimensions LxPxH (mm)	Internal Dimensions LxPxH (mm)	Capacity (l)	Doors n°	Shelves n°	Power* (W)	Weight net (kg)
R400 C	600 x 620 x 1900	500 x 530 x 1370	363	1	3	385	120
R400 V	600 x 620 x 1900	500 x 530 x 1370	363	1	3	385	125
R700 C	710 x 800 x 2030	590 x 670 x 1510	597	1	3	385	150
R700 V	710 x 800 x 2030	590 x 670 x 1510	597	1	3	385	155
R700 C TG	710 x 800 x 2030	590 x 670 x 1510	597	1	3	385 Booster 770	160
R700 V TG	710 x 800 x 2030	590 x 670 x 1510	597	1	3	385 Booster 770	165
R1500 C	1420 x 800 x 2030	1300 x 670 x 1510	1315	2	3+3	570	220
R1500 V	1420 x 800 x 2030	1300 x 670 x 1510	1315	2	3+3	570	230
R1500 C TG	1420 x 800 x 2030	1300 x 670 x 1510	1315	2	6	570 Booster1140	230
R1500 V TG	1420 x 800 x 2030	1300 x 670 x 1510	1315	2	6	570 Booster1140	240

(*) rated power absorbed during operation with the door closed, the appliance empty and with an ambient temperature of 20 ° C with ventilation.

Operating temperature: +4 °C
Power supply: 230 V/ 50 Hz
Working T range: 0°C —> + 15 °C

Key of codes used:

- R (REFRIGERATOR)
- 700 (CAPACITY)
- C (CLOSED DOOR)
- X (INTERNAL-EXTERNAL STAINLESS STEEL)
- V (door in thermo-insulating triple-thickness anti-fog glass)

For some models it is possible to create a **double system** in alternation or with a booster function. The suffix "**TG**" is then added to the model code.

STRUCTURE

Single-body structure, with external cladding in pre-painted or plasticized steel sheet and internal in AISI 304 stainless steel with rounded internal corners.

On request, it is possible to obtain the version with external and internal surface in 304 stainless steel. The insulation is made of high-density polyurethane foam (40kg / m^3), with a thickness of 60

mm and for the 700 and 1500 versions there is the option of an increase to 80 mm (which leads to an increase in the width of the external dimensions by 20 mm on each side).
The doors are reversible with magnetic seals, the pivoting wheels for moving the appliance and the internal height-adjustable grid shelves.
The refrigeration is ventilated with uniform temperature, with the use of a hermetic compressor with air condensation and guaranteed silence. Defrosting is electric and the lock is equipped with a key lock and internal lighting is present. The thermoregulator is powered by a backup buffer battery. The structure has a through hole for the passage of additional control probes.
In all systems it is possible to provide the condensing unit installed remotely (SPLIT).

2.2 Technical characteristics K-LAB CR REFRIGERATORS SERIES

Model	External Dimensions LxPxH (mm)	Internal Dimensions LxPxH (mm)	Capacity (l)	Doors n°	Shelved n°	Power* (W)	Weight net (kg)
CR 700 V	71 0 x 800 x 2030	590 x 670 x 1400	553	1	3	280	160
CR 1500 V	1420 x 800 x 2030	1300 x 670 x 1400	1220	2	6	420	240

(*) rated power absorbed during operation with the door closed, the appliance empty and with an ambient temperature of 20 ° C with ventilation.

Operating temperature: +4 °C
Power supply: 230 V/50 Hz
Working T range: 0°C —> + 15 °C

STRUCTURE:
Single-body structure, with external cladding in pre-painted or plasticized steel sheet and internal in AISI 304 stainless steel with rounded internal corners.
On request, it is possible to obtain the version with external and internal surface in 304 stainless steel. The insulation is made of high-density polyurethane foam (40 kg/m³), with a thickness of 60 mm and for the 700 and 1500 versions there is the option of an increase to 80 mm (which leads to an increase in the width of the external dimensions by 20 mm on each side).
The double thickness anti-fog thermal insulating glass doors are reversible with magnetic seals; the pivoting wheels for moving the appliance and the height-adjustable internal grid shelves.
The refrigeration is ventilated with uniform temperature, with the use of a hermetic compressor with air condensation and guaranteed silence. Defrosting is electric and the lock is equipped with a key lock and internal lighting is present.
The standard equipment includes shelves for the peristaltic pump (one shelf for model 700, two for 1500) and supports for positioning the chromatographic columns (two in 700, 4 in 1500). The shelves are made of AISI 304 stainless steel and can be positioned as desired by means of movable supports. The thermoregulator is powered by a backup buffer battery. The structure has a through hole for the passage of additional control probes.

2.3 Technical characteristics K-LAB FREEZER -20 °C SERIES

Model	External Dimensions LxPxH (mm)	Internal Dimensions LxPxH (mm)	Capacity (l)	Doors n°	Shelved n°	Power* (W)	Weight net (kg)
F400 C	600 x 620 x 1900	500 x 530 x 1370	363	1	3	650	120
F700 C	710 x 800 x 2030	590 x 670 x 1510	597	1	3	650	150
F2300 C	1420 x 800 x 2030	1300 x 670 x 1510	1315	2	3+3	700	220

(*) rated power absorbed during operation with the door closed, the appliance empty and with an ambient temperature of 20 ° C with ventilation.

Operating temperature: -20 °C
Power supply: 230 V/50 Hz
Working T range: -10°C —> - 22°C

Key of codes used:

- F (FREEZER)
- 700 (CAPACITY)
- C (CLOSED DOOR)
- X (INTERNAL-EXTERNAL STAINLESS STEEL)
- V (door in thermo-insulating triple-thickness anti-fog glass)

STRUCTURE

Single-body structure, with external cladding in pre-painted or plasticized steel sheet and internal in AISI 304 stainless steel with rounded internal corners. The insulation consists of high-density polyurethane foam (40 kg/m³), with a thickness of 60 mm and for the 700 and 1500 versions there is the option of an increase to 80 mm (which leads to an increase in the width of the dimensions 20 mm on each side). The doors are reversible with magnetic seals and automatic closing and door stop at 90 °, the pivoting wheels for moving the appliance and the internal height-adjustable grid shelves.

The refrigeration is ventilated with uniform temperature, with the use of a hermetic compressor with air condensation and guaranteed silence. Defrosting is electric. The lock is equipped with a key lock and internal lighting is present.

2.4 Technical characteristics K-LAB DUAL TEMPERATURE SERIES

Two independent control systems (one for the refrigerator compartment and the other for the freezer compartment), each consisting of the digital controller and the PT 1000 Ω RTD probe in charge.

Model	External Dimensions LxPxH (mm)	Internal Dimensions LxPxH (mm)	Doors n°	Shelves n°	Capacity (l) R F	Power* (W) R + F	Weight net (kg)
RF700 CC	710 x 800 x 2030	R 590 x 670 x 690 F 590 x 670 x 690	2	2+2	320 + 320	1100	150
RF1500 CC	1420 x 800 x 2030	R 650 x 670 x 1510 F 650 x 670 x 1510	2	3+3	2x 590	1234	220

(*) rated power absorbed during operation with the door closed, the appliance empty and with an ambient temperature of 20 ° C with ventilation.

Operating temperature: R 4 °C**; F** -20 °C
Power supply: 230 V/ 50 Hz
Working T range: **R** 0°C → +15 °C; **F** -22 °C →-10 °C

Key of codes used:

- RF (REFRIGERATOR-FREEZER)
- 1500 (CAPACITY)
- C (CLOSED DOOR)
- X (INTERNAL-EXTERNAL STAINLESS STEEL)
- V (door in thermo-insulating triple-thickness anti-fog glass)

STRUCTURE

The single-body structure, with external cladding in pre-painted or plasticized steel sheet and internal in AISI 304 stainless steel with rounded internal corners, consists of two separate and independent compartments. The insulation consists of high-density polyurethane foam (40 kg/m³), with a thickness of 60 mm. The doors are reversible with magnetic seals and automatic closing and door stop at 90°, the pivoting wheels for moving the appliance and the internal height-adjustable grid shelves.

The refrigeration system consists of two compressor units that are independent of each other; the refrigeration is ventilated with uniform temperature, with the use of hermetic compressors with air condensation and guaranteed silence. Defrosting is electric for both compartments. The lock is equipped with a key lock (on all doors) and internal lighting is present.

2.5 Technical characteristics K-LAB 2T SERIES

Vertical refrigerators with two temperatures.

The K-LAB 2T series seeks to satisfy the need for the storage of drugs and other products that require different thermal conditions. The two compartments are completely independent in their functions and clearly separated and each compartment has a control panel with the digital electronic controller and the RTD PT 1000 Ω probe.

Model	External Dimensions LxPxH (mm)	Internal Dimensions LxPxH (mm)	Doors n°	Shelves n°	Capacity (l) R R	Power* (W) R + R	Weight net (kg)
RR700 C	710 x 790 x 2030	R 590 x 670 x 690 F 590 x 670 x 690	2	2+2	273	860	220
RR700 V	710 x 790 x 2030	R 590 x 670 x 690 F 590 x 670 x 690	2	2+2	273	860	250
RR1500 C	1420 x 790 x 2030	R 650 x 670 x 1510 F 650 x 670 x 1510	2	3+3	658	968	340
RR1500 V	1420 x 790 x 2030	R 650 x 670 x 1510 F 650 x 670 x 1510	2	3+3	658	968	350

(*) rated power absorbed during operation with the door closed, the appliance empty and with an ambient temperature of 20 ° C with ventilation.

Operating temperature: R 4 °C**; F** -20 °C
Power supply: 230 V /50 Hz
Working T range: **R** 0°C → +15 °C

STRUCTURE

The single-body structure, with external cladding in pre-painted or plasticized steel sheet and internal in AISI 304 stainless steel with rounded internal corners, consists of two separate and independent compartments. The insulation consists of high-density polyurethane foam (40kg / m³), with a thickness of 60 mm. The doors are reversible with magnetic seals and automatic closing and door stop at 90 °, the pivoting wheels for moving the appliance and the internal height-adjustable grid shelves.
The refrigeration system consists of two compressor units that are independent of each other; the refrigeration is ventilated with uniform temperature, with the use of hermetic compressors with air condensation and guaranteed silence.

The technical-functional characteristics are the same as the KLAB REFRIGERATORS series; with double independent refrigeration systems and double control systems. Defrosting is electric for both compartments. The lock is equipped with a key lock (on all doors) and internal lighting is present.

2.6 Accessories (available on request)

- Adjustable feet.
- Additional grids in chromed or plasticized steel (max 6).
- Additional grids in AISI 304 stainless steel.
- Extractable drawers (perforated) in AISI 304 stainless steel mounted on sliding and anti-tipping guides.
- Internal dividers (for drawers) in ABS plastic material.
- Internal dividers (for drawers) in AISI 304 steel.
- Weekly cycle disc recorder (52 discs included).
- Internal electrical socket and external magnetothermic switch.
- Additional room probe of the PT100 Ω type with 4-20 mA converter.
- Additional probe PT 100 Ω.
- Internal fan angular speed regulator.
- Arrangement for cabinet for connection to remote groups.
- 115V/ 60 Hz power supply, on request.
- Execution without internal electrical contacts.
- Remote alarm device.
- Electronic locking for door opening with PIN.
- Ethernet expansion module.

2.6.1 System with additional PT100 panel probe (optional)

If there is an additional PT100 probe with plug on the rear panel, the relative connections are:

- pole 1 red wire;
- pole 2 white wire;
- pole 3 red wire.

2.6.2 Weekly cycle chart disk recorder (optional)

The freezer is designed to be able to add, upon request, a graphic disk recorder.
For its operation, refer to its dedicated manual.

3. Installation

3.1 PPE mandatory for installation

	The clothing and PPE (personal protective equipment) of those who work or carry out maintenance on the machine/equipment must comply with the essential safety requirements in force in their country, as indicated in the EEC directive 89/656 and 89/868 relating to use of personal protective equipment.

During the product installation phases, the use of the following PPE is mandatory:

	Gloves against mechanical agents
	Safety goggles
	Safety shoes

3.2 Trasport and unpacking

	**If the equipment is not transported in the VERTICAL position, at least twenty-four hours must be spent in this position before starting it.** In any case, contact our customer service for information on the correct charging procedure for the device.

The product is packed in KW Apparecchi Scientifici to guarantee its integrity during transport.

	Handling on wheels is however not recommended for long stretches and on uneven surfaces.

In the event that it is necessary to transport the instrument, the original packaging (or equivalent) must be requested from KW APPARECCHI SCIENTIFICI SRL. KW is not liable for any damage resulting from the transport of the instrument in unsuitable packaging.
After removing the packaging, make sure the appliance is intact. if in doubt, do not use the appliance and contact the KW central technical assistance service - tel. 0577/309144.

	All the packaging materials used for the new device can be disposed of safely. Cardboard can be crushed and destined for waste paper; the sheets are in polystyrene free from fluoro-hydrochloric hydrocarbons and the wrapping is in branded nylon: these substances can be recycled.

3.3 Safety and accident prevention

The device was designed and built with appropriate measures in order to ensure the safety and health of the user:

- *stability*: the machine has been designed and built in such a way as to ensure stability in all expected operating conditions if positioned flat with the help of the adjustable feet;
- *surfaces, edges, corners*: within the limits allowed by their functions, the accessible parts of the machine are free of sharp corners and sharp edges;
- *movable elements*: all elements with the possibility of movement have been designed, built and arranged in such a way as to avoid risks;
- *electricity*: the machine has been designed and built in such a way as to prevent the risks deriving from electricity, in compliance with the specific legislation in force. The electrical safety of this appliance is ensured when the appliance is correctly connected to an efficient grounding system, as required by current electrical safety standards;
- *noise*: the machine was designed and built in such a way as to minimize the risk of noise pollution. The average noise value at 1 m. away (in front of the device) and at a height of 1.5 m., is within 52 dB (A). This value also depends on the state of the fans, the cleanliness of the air-cooled exchangers, etc. Beyond 3 meters away, the noise drops, on average, below about 48 dB (A).

 	The use of any electrical equipment requires the observance of some fundamental rules: • do not touch the appliance with wet or damp hands or feet; • do not use the appliance with bare feet; • do not use extension cables, except with particular caution (and with prior notification and authorization from the CENTRAL TECHNICAL ASSISTANCE SERVICE).

 	• do not pull the power cable, or the appliance itself, to remove the plug from the socket; • do not leave the equipment exposed to atmospheric agents; • do not allow the equipment to be used by incapable persons, without supervision;

- the fixed guards (fixed protections solidly connected to the structure) must remain in their seat, correctly fixed and in perfect integrity during all operations relating to normal operation;
- do not put explosive materials or cans/containers with flammable substances into the device; in contact with the electrical parts, any leaks of gas (flammable) can ignite. Do not store different materials that are incompatible and/or not clearly separated or materials that require different storage temperatures;
- do not allow children to play with the appliance and/or it is within their reach;
- use the appliance only in the temperature range for which it is built and tested; do not use at different temperatures;
- do not try to alter - in any way - the configuration and adjustment parameters of the electronic instrument of the control panel;
- do not modify the electrical wiring or mechanical connections in any way.

Since the freezer has the purpose of keeping the material contained in it at a very low temperature, whenever you ask to open the door, it is recommended to always wear gloves with adequate thermal protection.

Before carrying out any cleaning or maintenance operation, disconnect the appliance from the electrical power supply by pulling out the plug.

3.4 Positioning and electrical connection

The installation must be carried out according to the instructions of KW Apparecchi Scientifici S.r.l. by professionally qualified personnel. Incorrect installation can cause damage to people, animals or things, for which KW Apparecchi Scientifici cannot be held responsible.

At the time of installation by the user, the device is moved in the manner described above, unpacked and positioned flat (level).
If the appliance is equipped with adjustable feet, rotate them to compensate for any unevenness in the ground.
If the appliance is equipped with wheels, engage the brake for maximum stability.

Check that the electrical capacity of the system and of the power sockets are adequate for the maximum power of the appliance indicated on the plate. If in doubt, contact professionally qualified personnel.

	During the installation of the Incubator, make sure that EASY EXTRACTION OF THE PLUG FROM THE ELECTRIC POWER SOCKET is always allowed.

3.5.1 Place of installation

The device is suitable for installation in a dry and airable environment.
Do not place the appliance outdoors and do not expose it to rain.
The place must not be exposed to direct sunlight and must not be near a heat source such as a radiator, stove, other heat-dissipating equipment (sterilizer, autoclave, etc.). For the lighting of the positioning area, the use of fluorescent lamps is recommended.

	Particular attention must be paid to localization.

Leave a space of approximately 250 mm. at least, behind the chiller to allow air to circulate freely.
The heated air at the rear of the appliance must be able to flow out unhindered.
Under no circumstances must the ventilation space between the appliance and the wall or the ventilation grille be obstructed.

If flammable gases are present inside the appliance, it must finally be installed in a compartment that has a sufficiently large volume to avoid dangerous concentrations in the event of leaks. The minimum volume that the room must have can be calculated using the lower flammability limit (LFL) of the gas and the quantity of the same gas present in the circuit, using the following formula:

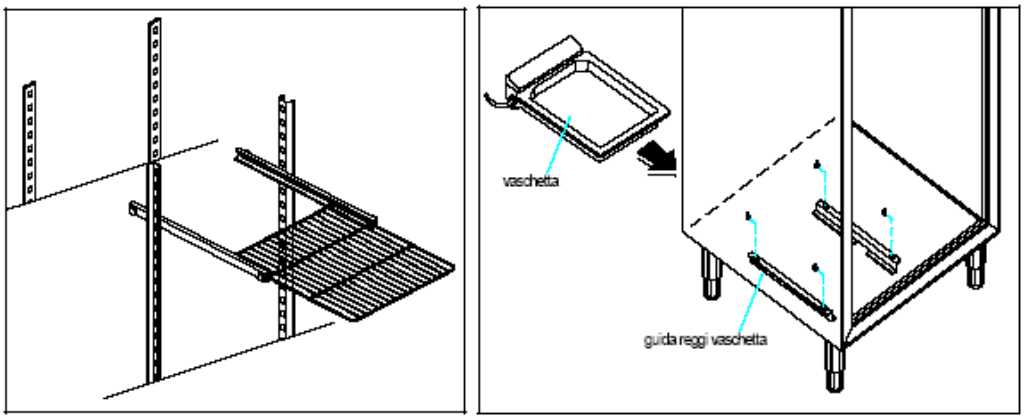
V_{min}= (gas charge in Kg) / (0.2 x LFL)

For example, if there are 0.15 kg of R290 in the circuit which has an LFL value of 0.038 kg / m^3, the minimum volume will be 19.7 m^3.

The appliance must be installed in a fixed and level way.
Any unevenness in the floor must be compensated for, at the user's discretion.
Do not leave the device on the supply pallet.

Place the grill supports inside the appliance in the most suitable position for use.
Arrange the material by placing it on the racks, taking care not to push it deep beyond the limit of the rear edge of the racks themselves to avoid excessive cooling of the material due to its proximity to the evaporator located at the bottom of the cell.

If present, mount the condensate drain pan by inserting it into the special guides positioned below the appliance; then insert the electric resistance in the hole made under the tray itself.



The room where the instrument is located must have air exchange, through a natural circulation or, better, a forced circulation; if the T is close to + 30 °C it is necessary, for the hottest periods, to use an air conditioner/conditioner to remove the condensation heat from the freezer, which varies from model to model; average reference value about 700/800 W; this must be multiplied by the number of machines present in the same room or zone.

Additional warnings:

1. The appliance should be unpacked and installed by a single person or by qualified technical personnel, in order to avoid damage to persons or property. After removing the packaging, make sure the device is intact. In case of doubt and / or damage to the appliance, immediately inform the supplier and do not use the appliance.
2. If the appliance needs to be moved, disconnect the plug cable from the power socket before handling.
3. The appliance is equipped with a lock for closing the door. The locking keys must be kept out of the reach of children and unauthorized personnel trained in their use.
4. The electrical safety of this equipment is only ensured when the equipment is correctly connected to an efficient grounding system, as required by current electrical safety standards. It is necessary to verify this fundamental safety requirement and, in case of doubt, to request an accurate check of the system by professionally qualified personnel. KW App. Scientifici cannot be held responsible for any damage caused by the lack or inefficient earthing of the system.
5. It is absolutely forbidden to insert fingers above the upper front panel of the appliance and in the rear area of the appliance.
6. Do not allow the equipment to be used by incapable people and above all to be used unsupervised; alarm conditions not acknowledged (warned) in good time, can lead to loss of the material stored in the internal compartment and/or can cause greater damage to the equipment itself and involve risks for the user personnel.
7. Make sure that the door is well closed and that the contact on the micro-switch is efficient.

8. Insert the material inside the cell, taking care not to place it in contact with the metal plate (the evaporator) placed in the back wall of the appliance.

KW declines all responsibility for any damage occurring in the use of the equipment produced or marketed by it, if the recommendations made have not been observed exactly and scrupulously by the user.

4. General indication for use

The chiller is intended for storing products at low temperatures; it does not have the ability to freeze quantities introduced at room temperature; then introduce the material by fractionating it in quantities not exceeding 1-2 kg at a time, if not already at the desired conservation T.

The temperature regulator performs a regulating action.

	**The T in the room must not exceed +30 C; Max admissible T + 32°C, but for limited periods.** The equipment also works with higher T, but in really difficult thermodynamic conditions.
	**ATTENTION: the MINIMUM temperature of the room must not be lower than 10°C, otherwise the appliance may not work properly and face possible failures.**

The set temperature recovery time, after 1-2 minutes opening, depends on the quantity introduced, the number of internal counter doors open, the room T, the T set itself.

	It is advisable to always use the remote alarm signal system supplied with the device.
	Pay attention to the use of the door: operate so that it remains open for a few minutes, during the introduction and removal of the material.
	Make sure that the door is closed correctly and to do this always lock the door. The device is supplied with two keys, one of which must be placed in a safe place, in case of loss of the other.

	Always use thermal protective gloves suitable for the low temperatures inside the appliance.

It is advisable to equip the appliance with a T recorder with a probe independent from the control system of the appliance (also in the KW catalog in different more or less sophisticated versions), capable of describing the trend of T without any solution continuity (provided that the battery charge is checked periodically).

	**The user, therefore, must be aware of the need for continuous control of the equipment (even during the night and on holidays), in order to have the time to transfer the material to another device, in case of failure and / or to check the efficiency of the CO_2 backup system.**

5. Energy saving recommendations

In order to minimize energy consumption by the appliance, we recommend the following:

1) **Installation and placement.** Make sure the appliance is placed in a cool, dry room with adequate ventilation. Make sure it is not exposed to direct sunlight and is not placed near a direct heat source such as a radiator or laboratory stove. Being exposed to heat will mean that the compressor has to work harder to keep your fridge at the right temperature, which means more energy use and a reduction in the life of your appliance.
   Make sure there is space on all sides of the appliance and that there is sufficient air exhaust at the base of the refrigerator and in the rear wall. Also, check that no vents or grilles are blocked. Without this air gap, the appliance will not be able to release the heat from the compressor, which means it will heat up and have to work harder to keep the products inside safe.

   In this regard, follow the instructions given in the chapter "Positioning and electrical connection".
2) **Periodic cleaning.** Periodically clean the condenser of the appliance, following the instructions given in the chapter "Cleaning and ordinary maintenance". Accumulation of dust and debris increases energy consumption. The heat exchange surfaces, dusty, have to work harder, increasing energy consumption and placing the appliance at risk of potential failures in the future.
3) **Set point temperature.** You need to make sure your fridge and freezer are set to the correct temperatures to save energy.
   Periodically check the calibration of the T controller. An accurate temperature setting can save you money immediately.
4) **Door seals.** An ineffective door seal will allow air to escape and enter. This means that the appliance will have to use more energy to keep the samples cold. Check the gasket for wear or damage and replace if necessary.

An excellent way to carry out this check is with a sheet of A4 printer paper: place the sheet between the door gasket and that of the appliance; if the sheet falls or moves, the door seal is faulty and will need to be replaced, or the door is not well adjusted and will therefore need to be fixed.

5) **Door openings.** Another way to save energy is to keep the doors closed as much as possible. Leaving the doors open allows air to escape and makes the fridge-freezer work harder. The control system has an opening sensor and a pre-set max time, beyond which an open-door alarm is triggered.
6) **Defrosting.** Be sure to reduce frost accumulation regularly. Too much frost can build up on the evaporator surfaces inside the appliance, overloading the system. This can also make it more difficult to maintain Set Point temperatures or lower temperatures.
   Depending on the technology used, the appliance can have automatic defrosting or manual defrosting.
   - KW adopts smart defrosting for positive T and for negative T > -20°C which minimizes the number of openings, decreases the defrost intervals, continuously measuring the T on the evaporating surfaces. However, an excessive number of defrosts results in excessive energy consumption, due to the introduction of heat to remove the frost and subsequent extra energy consumption to balance the above heat. Furthermore, defrosting worsens the storage conditions of the samples, due to the inevitable rises in T.
   - In refrigerators (T > 0 °C) KW mostly adopts defrosting by compressor standstill, without introducing any heat. The internal recirculation air is sufficient to guarantee the absence of frost on the evaporating surfaces, having designed an evaporator in which the evaporation T of the refrigerant is close to 0°C.
   - For T < -20°C, KW adopts manual defrosting. If the appliance requires manual defrosting, make sure to do it every 6-12 months or whenever you notice an excessive accumulation of frost (a thickness > 1.5 cm. on the walls or on the evaporating shelves. The lower the set point is , the longer the defrost interval will be.

     For the defrosting procedure, consult the dedicated chapter "Cleaning and routine maintenance".

Using automatic defrosting for T < -20°C involves a really large consumption of energy and a deterioration of storage conditions which is often not acceptable. When working at low temperatures, the heating cycles of the samples have amplitude beyond 10°C and this leads to a deterioration of the biological state of the samples, with potentially serious losses of the same, which have an economic and scientific value, well above the cost of the kWh.

7) **Correct storage of samples**. When storing samples in the freezer for later use, make sure they have cooled down first. This reduces the amount of heat inside your freezer and uses more energy for freezing. Also be careful not to introduce excessive quantities of samples in a single solution, forcing the refrigeration system to work for a long time to restore the SP.

Follow these quick and easy steps to make sure your fridge-freezer is as energy efficient as possible. This will prolong the life of your appliance, help protect the environment and also save you money.

6. Technical assistance service

	In the event of breakdown and / or malfunctioning of the equipment, contact the authorized technical assistance center: for any repairs, request the use of original spare parts. Failure to comply with the above can compromise the safety of the equipment.

The technical assistance of the equipment present on the national territory is made through a maintenance service, both direct and with authorized technical assistance centers distributed throughout all regions of Italy.
The center operating in Monteriggioni (Siena), Via della Resistenza n.119 -53035 tel. 0577-309143-5 e-mail: assistance@kwkw.it. For a copy of the manual, send a request to ga-red@kwkw.it.

7. Power on

The device is already tested in the factory, and therefore, once positioned and properly connected to the mains, it can be turned on immediately (except as indicated above).

- remove the envelope containing the instructions and keys from the inside;
- remove the protective cap from the nib of the disc temperature recorder (if present);
- connect the appliance to a suitable power socket;
- wait for the program to load (about 2 minutes) until the power on screen (STANDBY) appears on the display.

	**It is recommended to start using the appliance at least 12 hours after the first start-up.**
	**If the appliance does not restart after being deprived of power by disconnecting the switch or plug, wait 10 minutes before turning the power back on, the appliance will resume normal operation.**

- **Cooling time**

The cooler takes about a couple of hours to go down to the set temperature: do not use the appliance before it has reached the right operating temperature.
A time of 12 hours at least for the first stabilization is recommended.

- **Recovery Time**

The set temperature recovery time, after 1-2 minutes opening, depends on the quantity introduced, the number of internal counter doors open, the room T, the T set itself.

8. Digital controller

8.1 Power on

After connecting the appliance to an appropriate power socket, operate the magnetothermic switch located on the back of the appliance and press the power symbol on the screen for at least 3 seconds.

If the **power-on password (usually 255)** has been enabled, enter it using the numeric keypad shown below..

If the password has been set correctly, the device is switched on with the sequences shown below, otherwise the **ERROR** frame is returned and the display returns to the Stand-By state. A typing error can be cleared with the **C** key on the keypad.

8.2 Side keys meaning

On the sides of the screen there are 6 keys, 3 on each side whose name and meaning are indicated below:

MENU KEY
accesses the menu panel

INFO KEY
accesses the information panel
from the Home Page

ESCAPE KEY
goes back one level
switches to *easy/scientific* Home

UP KEY
increases the variable
flicks multiple pages forward

UP KEY
decreases the variable
flicks multiple pages back

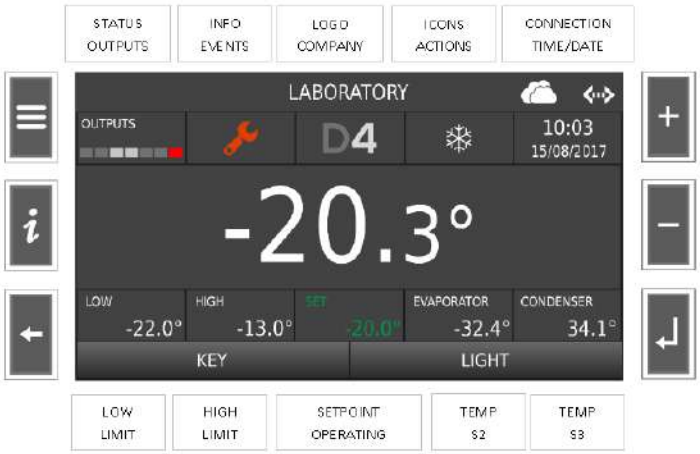
ENTER KEY
confirms the value and exits

8.3 Main screen

In the single temperature configuration two types of Home Page are provided: **EASY** or **SCIENTIFIC**. The external **ESCAPE** key selects one mode or the other. The header shows the **MACHINE_NAME** (in the example LABORATORY) that can be edited from the SETTINGS MENU.

a) HOME PAGE EASY

The **EVENTS** area (represented by the second box) will show different icons depending on the alarm in progress: the **RED THERMOMETER** icon in the event of a temperature alarm, **RED KEY** in the event of a fault, **ENVELOPE** in the event of an event that has ceased and is not displayed in **LIST OF EVENTS**.
In case of simultaneous presence of **FAULT** and **ALARM**, the temperature alarm icon has priority over the fault icon. The third box shows the company logo (D4 in this case).

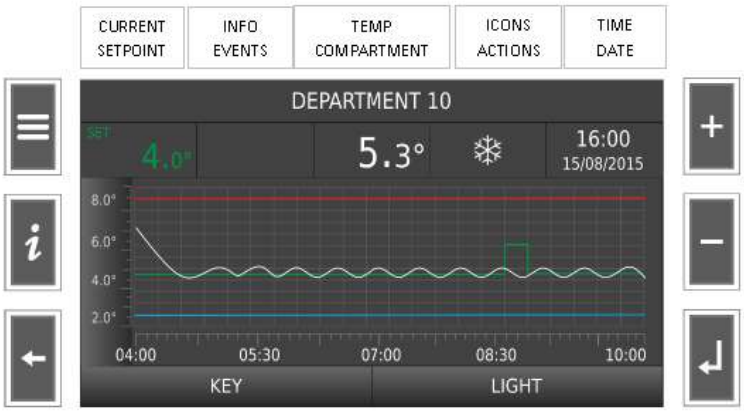


In the fourth box at the top, the actions of the refrigeration unit are indicated with an icon according to the following table:

PAUSE	STAND-BY	COOL	DEFROST	DRIPPING
no icon				
HEAT	HUMIDIFY	DEHUMIDIFY	BACKUP CO2	ADJUS STOP
COOL/DEHUMID	COOL/HUMID	DEFROST/DEHUMID	DEFROST/HUMID	HEAT/DEHUMID

The time and date are shown in the last (fifth) box at the top.
The low temperature alarm limit temperature is shown in the first box on the bottom left.
The second shows the temperature of the high temperature alarm limit.
The third shows the operating set point temperature.
The fourth shows the evaporator S2 temperature.
N.B. In the dual-stage superfreezer units the EVAPORATOR string is replaced by the **2nd STAGE string.**
The fifth box shows the condenser temperature S3 for devices that have probe S3 configured as a condenser probe; otherwise, other variables based on the configuration of the device [EVAPORATOR 2/SET RH%/THERMOSTAT/% HOUR COMPRESSOR].
In the center, the compartment temperature given by the PT100 monitor probe is displayed. If the PT100 monitor probe is faulty or disabled, the compartment temperature is read by probe S1 and is highlighted in purple.

b) HOME PAGE SCIENTIFIC



In the Scientific mode the graph traces the values of the compartment and setpoint temperature recorded in the last 6 hours with sampling **every 30 seconds** (720 points) where the minimum and maximum values of axis Y match the alarm limits of low temperature **-1°C** and high temperature

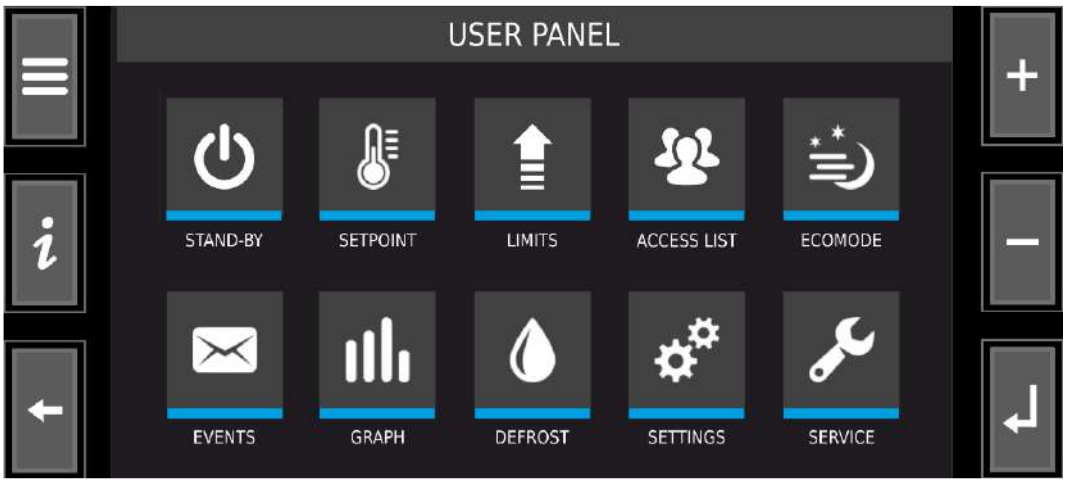
+1°C. Shutting down the controller deletes the mapping on display; when switched on again, the graph repopulates from right to left.

N.B. Other keys

In both views of the home page there are keys for **turning on the interior light** and for **opening the door** with an electric lock, if provided for on the models in question.

8.4 User panel

In both views of the home page there are keys for turning on the interior light and for opening the door with an electric lock, if provided for on the models in question.



1) **STAND-BY**: the long pressure of the icon turns off the device
2) **SETPOINT**: accesses the compartment temperature setting panel
3) **LIMITS**: accesses the setting panel of the temperature alarm limits
4) **ACCESS LOG** list of access and actions (*)
5) **ECOMODE**: accesses the setting panel of the energy savings mode
6) **EVENTS**: accesses the event list (recorded alarms and faults)
7) **GRAPH**: accesses the calendar of records and graph display
8) **DEFROST**: starts a manual defrost
9) **SETTINGS**: accesses the SETTINGS menu
10) **SERVICE**: accesses the SERVICE menu

1) STAND-BY

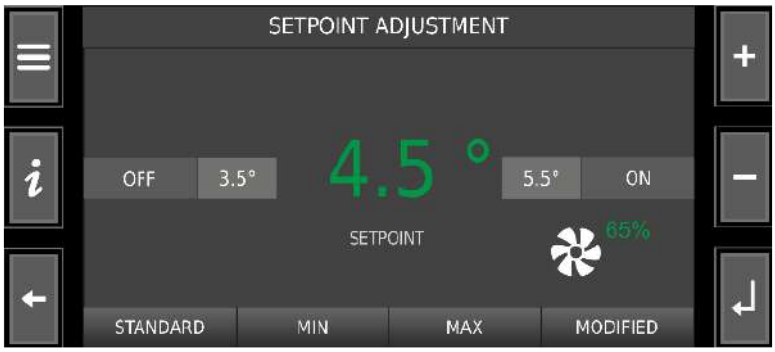
Pressing the STAND-BY key for 2 seconds activates the shutdown phase. With USER password different from zero, this is requested to complete the shutdown sequence. If the password was correctly set the device turns off, otherwise the ERROR frame appears and the display goes back to the Home Page.

2) SET POINT

Pressing the **SETPOINT** icon displays the temperature set setting frame. With USER password **different from zero**, it is requested to access the setting of the new value. The password is edited via the numerical keypad and confirmed by pressing ***ENTER***. If the password was correctly set the temperature set setting frame is accessed, otherwise the **ERROR** frame appears and the display goes back to the starting frame. When the page opens the current setpoint is displayed.
The ***UP/DW*** keys modify the set value. The new value is saved by pressing the external ***ENTER*** key with request to confirm. The non-editable values indicated by the ON and OFF labels respectively represent the compressor on/off values.

Starting from left to right, the following are found in the **SET POINT EDIT PANEL**:

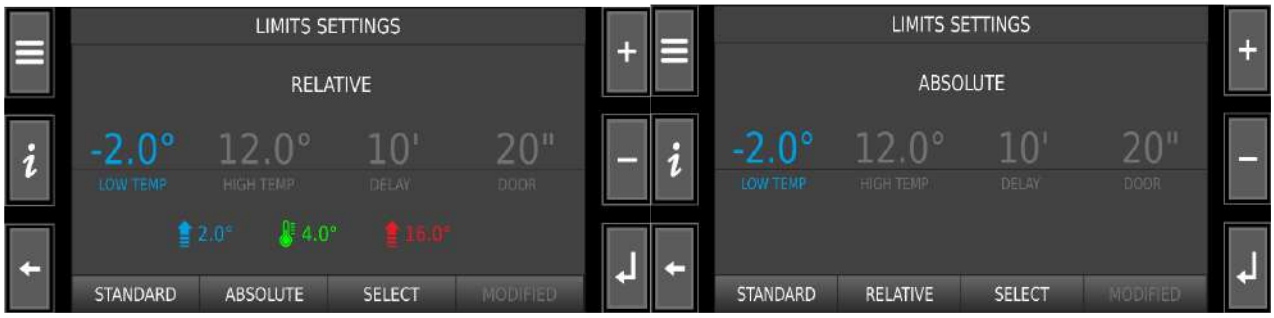
- The **STANDARD** key sets the default set
- The **MIN and MAX** keys set the minimum/masimum value settable of the set
- The **CURRENT/MODIFIED** key retrieves the set in progress/preset set
- The **ESCAPE** key returns to the USER MENU without saving the value with exit/confirm request.



3) SETTING AND ALARM LIMIT

Pressing the LIMITS icon presents the frame for setting the temperature limits and alarm delays. With passwords enabled, a password is requested in the same way as in the previous paragraph. When the page is opened, the operating values are displayed.
The modification of the limits involves the automatic modification of the relative parameters both in the monitor and controller section:

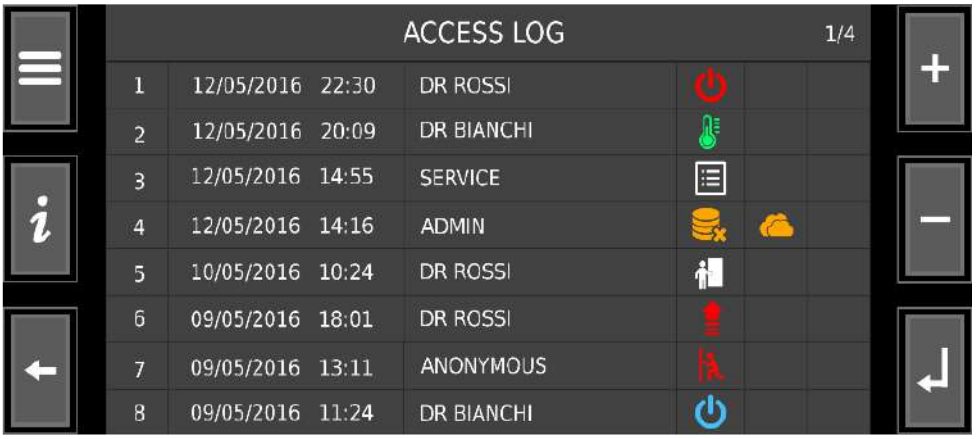
- CONTROL SECTION PARAMETERS::
  LOW TEMP: **ALL**;
  HIGH TEMP: **ALH**;
  DELAY **ALD**;
  DOOR: **DOO**.
- MONITOR SECTION PARAMETERS:
  LOW TEMP: **LAA**;
  HIGH TEMP:**HAA**;
  DELAY **DSA**;
  DOOR: **DOO**.



- The external ***UP/DW*** keys increase/decrease the value selected by the ***SELECT*** key.
- The ***STANDARD*** key sets the default value
- The ***ABSOLUTE/RELATIVE*** key sets in rotation the type of setting of limit cwith confirmation of the change occurred; the limits can be set both absolute and relative to the setpoint. The calculated value of the relative limits is displayed below the value bar.
- The ***SELECT*** key enables the value to be set to rotate.
- The ***CURRENT/MODIFIED*** key recovers the value in progress / preset
- The ***ESCAPE*** key returns to the USER MENU without saving the value map [with confirmation]
- The ***ENTER*** key returns to the USER MENU saving the map of values [with confirmation]

4) ACCESS LOG

Pressing the LOG ACCESS icon from the USER MENU leads to the display the last 32 events, updated every 30 seconds.



The symbols on the right of each row indicate the type of intervention / modification carried out during access, according to the following table: for each possible modification, the affected menu is indicated and the level of permission you need to be able to implement it.

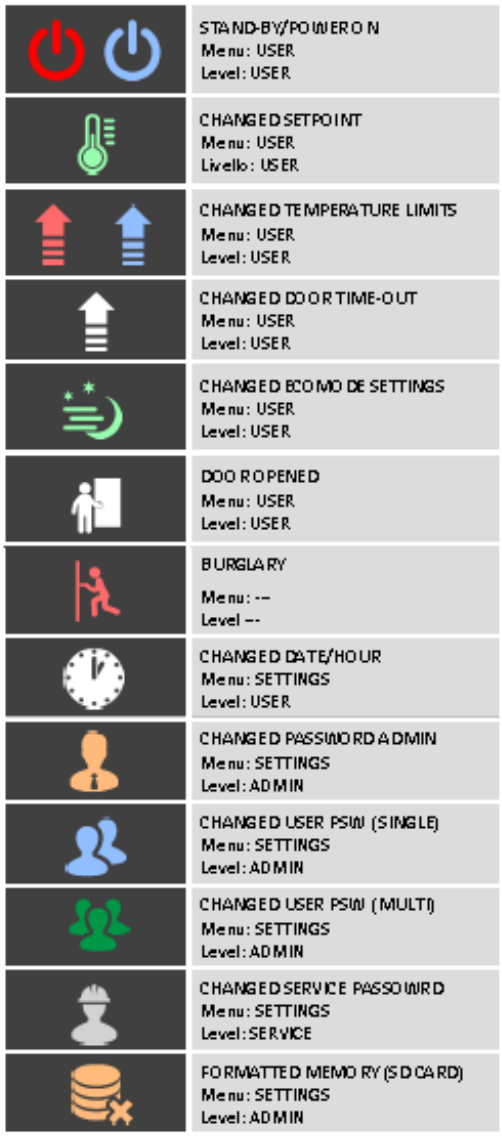
Each action is associated with the date and time of completion, and the user who performed it.

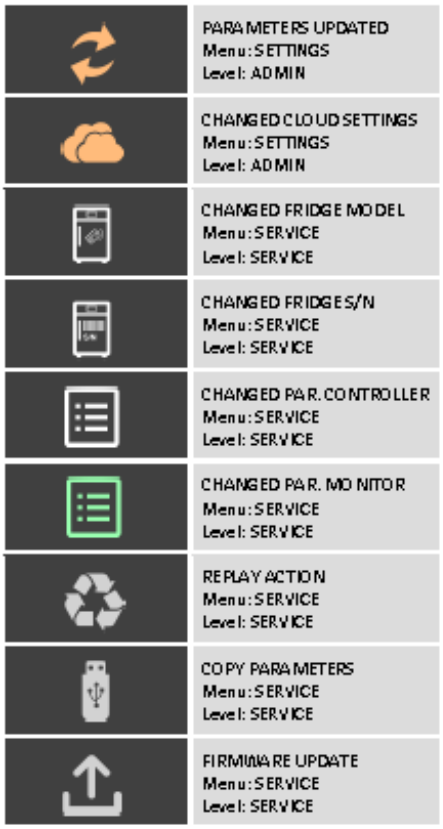
If an action is performed on a menu that has a null access password, the action is stored and indicated as performed by "**FREE ACCESS**".

In the single password configuration, users are preset to "**USER**", "**ADMIN**" and "**SERVICE**".

In the multi-password configuration, users are defined by the strings set in the SETTINGS/PASSWORD menu.

In dual-zone/redundant configurations, the zone in which the action was performed (A/B) is indicated next to the action icon. Some icons are replicated for both zones, underlining the fact that the changes are extended to the whole system as a whole.

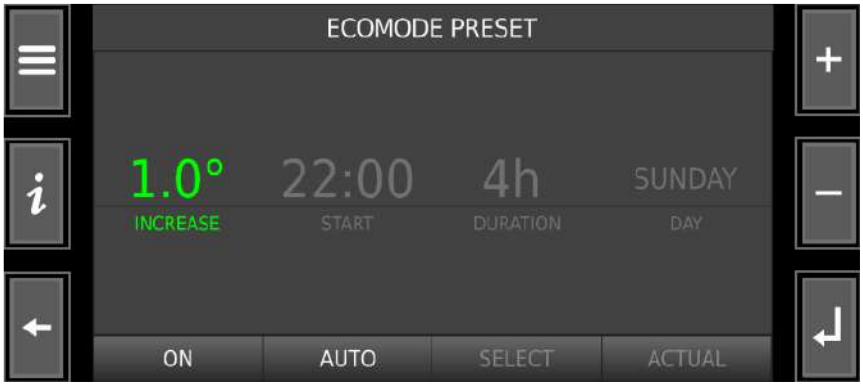




5) ECO MODE

Pressing the ECOMODE icon displays the timed or automatic temperature profile setting panel. With passwords enabled, the password is required to access the setting of the new configuration. This function allows you to increase the setpoint value at certain times in order to reduce the consumption of the appliance.

- The **ON/OFF** key disables / enables ECOMODE; if the key is **OFF** the other keys are disabled.
- The **AUTO/TIMER** button sets the ECOMODE TIMER / AUTO function in rotation; in AUTO mode the SELECTION key is disabled and only the INCREMENT variable is selected.
- The **SELECT** key, in TIMER mode, enables the values to be set in rotation.
- The **CURRENT/CHANGED** key retrieves the current / preset value.
- The external **ESCAPE** key returns to the USER MENU without saving with a request to exit/confirm.



6) EVENTS

The set of recorded **alarms and faults** are recorded and displayed in the **EVENT LIST**. Pressing the **EVENT icon on the Home Page** or pressing the ***INFO*** key during an alarm or fault or notification status leads to the reading of the EVENT LIST.

With an event in progress the left box flashes red, otherwise it remains grey. If more than 4 events are recorded, a new page is added. The top-right bar shows the page index. The pages can be scrolled forward and back using the ***UP/DW*** keys. Return to the Home Page occurs by pressing the ***ESCAPE*** key. If there are no events recorded, the empty list frame appears for 2 sec.

EVENT LIST (alarm and faults)

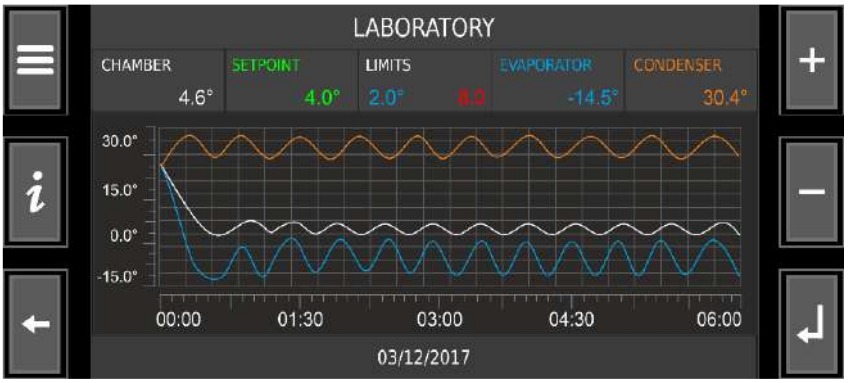
- HIGH TEMPERATURE
- LOW TEMPERATURE
- DOOR OPEN
- BLACK-OUT
- MAINS FAULT
- Sx PROBE
- LOW EVAPORATION
- HIGH CONDENSATION
- HIGH PRESSURE
- DEFROSTING TIME
- FAULTY BATTERY
- DOOR SWITCH
- UNIT FAULT
- LOAD FAULT

- U1 RELAY FAULT
- U2 RELAY FAULT
- RELAY FAULT

7) HISTORICAL GRAPH

Pressing the **GRAPH** icon accesses the select menu of the historical graph. When the **CALENDAR** page opens, the selected day is the current one and it is highlighted by a white bar. Press ***UP*** to scroll the months forward and ***DW*** to scroll them back. Press the **TODAY** key to go back to the current day. The grey boxes indicate the lack of data, the green boxes the presence of data, the red boxes the presence of a discrepancy. Press the key of the requested day to access the display frame of the daily graph.

The graph opens with start at 00:00 hours and end at 06:00 hours. Pressing the external ***UP/DW*** keys the time axis with 6-hour time slots are scrolled forward/back. To select a different day, go back to the calendar by pressing the ***ESCAPE*** key. The temperature of the respective probes are traced enabling with a click the corresponding box; each square shows the average temperature values calculated in the 24 hours of the current day. The boxes from left allow the cyclic selection of the relative probes.

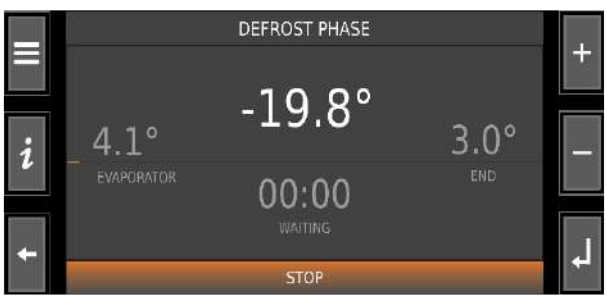


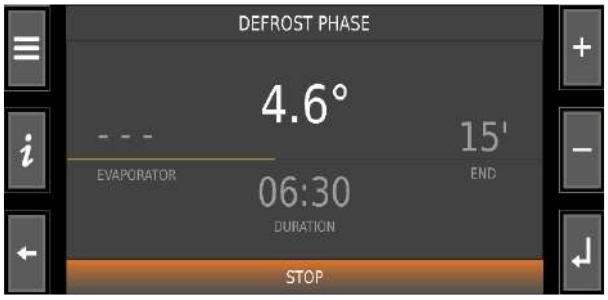
8) DEFROSTING

Pressing the DEFROST icon starts a defrost if there are the conditions provided, otherwise it shows the ERROR frame and returns to the USER MENU. Start of the defrost phase, which may include a stand-by time, leads to the **PANNELLO DEFROST (DEFROST PANEL)** frame. Otherwise, if defrosting is started automatically, it remains in the Home Page showing the defrosting status icon.

a) Waiting phase

The defrosting initiation can contemplate a stand-by phase in which the timer 00:00 flashes without increasing the time until initiation for conditions reached.





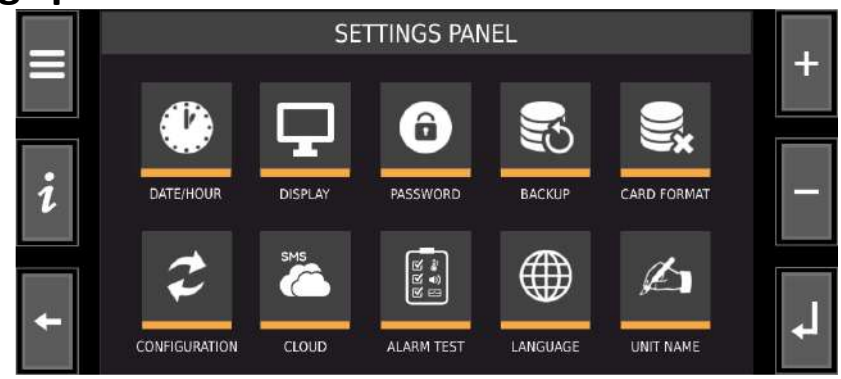
a) Defrost and dripping phase

During defrosting the yellow central bar moves from left to right and the timer starts counting the time. The defrosting end temperature is displayed right of the display. The dripping phase, if provided, is indicated by the DRIPPING string under the timer.

b) Interruption

Defrosting can be interrupted by pressing the **STOP key during the stand-by and running phases but not during dripping.** At the end of defrosting the display automatically goes back to the home page. During any moment of the defrosting phases, via the ESC key, it is possible to go back to the Home Page.

8.5 Settings panel



From the MENU PANEL on the main HOME PAGE, you can select the SETTINGS button, to reach the SETTINGS PANEL. The following functions are found in this panel:

1) **DATE/HOUR**: accesses the setting date/time panel
2) **DISPLAY**: accesses the setting of the screensaver panel, buzzer and logos
3) **PASSWORD**: accesses the setting panel of the passwords, admin, user, service
4) **BACKUP**: accesses the backup data download panel

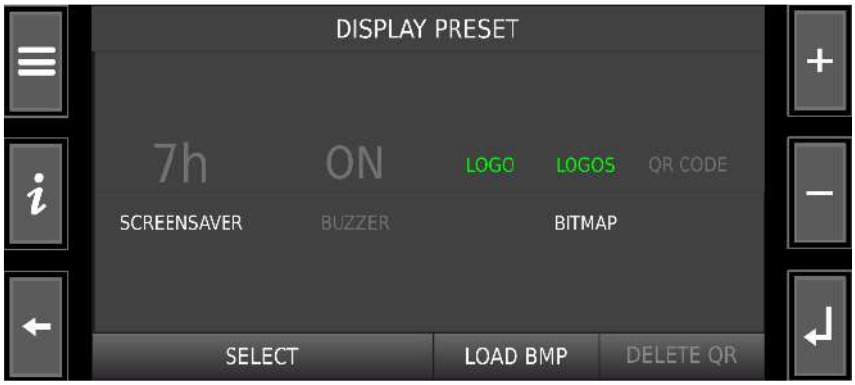
5) **CARD FORMAT**: allows deleting the thermoregulation data
6) **UPDATE**: accesses the configuration panel of the connected devices
7) **CLOUD**: accesses the network parameter and SMS service setting menu
8) **ALARM TEST**: accesses the recording menu of the alert telephone numbers
9) **LANGUAGE**: accesses the setting panel of the language
10) **UNIT NAME** accesses the editing panel of the Home Page title

1) Date/time

Pressing the DATE/TIME icon displays the system date and time setting panel. The password may be required to access the clock setting.
When the page is opened, the current RTC values are displayed. The SELECT key enables the value to be set in rotation. The external UP/DW keys increase/decrease the selected value. The new date/time is saved by pressing the ENTER key with a confirmation request.
N.B. A date/time change does not allow you to recall the temperature graphs of the current day from 00:00 to the time of the date change; the temperature values are in any case saved in the backup data inside the microSD and can be recalled from the STUDIOGRAPH 2.0 application.
The system clock does not automatically manage daylight saving time.
The connection to the Cloud refers to the UTC time transparent to the time conventions of the nation. Browsing on the Cloud refers to the zone time conventions if the device used provides for automatic management.

2) DISPLAY

Pressing the **DISPLAY** icon shows the display configuration frame. The ***SELECT*** key enables in rotation the value to be set:
SCREENSAVER: screensaver time of intervention (0h=disabled)
BUZZER: buzzer enabling/disabling.



Selecting **BITMAP** highlights in white the files in the device. To load a new graphic file press the ***LOAD BMP*** key where inserting the USB pen is requested. The BMP files recognised in the VLX/PAR folder are highlighted green.

- The ***SELECT*** key enables in rotation the value to be set
- The ***LOAD BMP*** load graphic files from USB pen
- The ***DELETE QR*** erase the QR CODE saved before on display panel
- The ***ESCAPE*** key returns to the USER MENU without saving with exit/confirm request
- The external ***UP/DW*** keys increase/decrease the value selected.
- The ***ENTER*** key goes to the USER MENU saving the configuration and the BMPs

3) PASSWORD

- The ***SELECT*** button leads to spin on modifiable password.
- If the password ADMIN = 0 or typed it correctly then the next time you press the SELECT button brings about password ADMIN/USER/MULTI fields;
- If the password ADMIN > 0 then the next press the SELECT button cycles among the ADMIN password fields and SERVICE;
- The password is edited using the keypad ; It erases one digit at a time by pressing ***C;***
- The ***ESCAPE*** key returns to the SETTINGS MENU without saving and password might have been set;
- The ***ENTER*** key returns to the SETTINGS MENU by saving the passwords set.

1. PASSWORD ADMIN

On first entry, the value is zero so the value that will be set using the keypad and confirmed with the ***ENTER*** key will define the ADMIN password. Defined password ADMIN, the next input is displayed by three asterisks and must be made using the keypad. Confirming an incorrect value back to SETTINGS MENU otherwise continues for viewing or changing the password USER single or multi-user or the same password ADMIN.

2. SINGLE USER PASSWORD

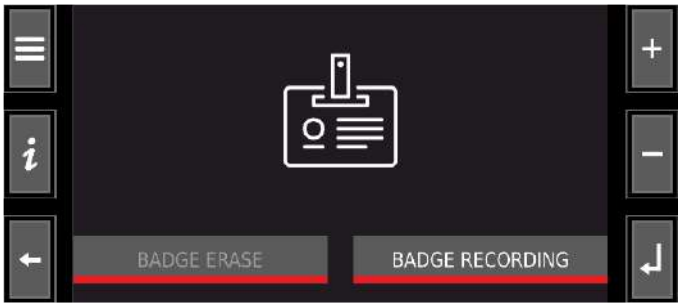
By setting a correct value of the ADMIN password, using the SELECT key go to the SINGLE USER PASSWORD field and set the value using the keypad, confirming with the ENTER key.

3. PASSWORD MULTIUSER

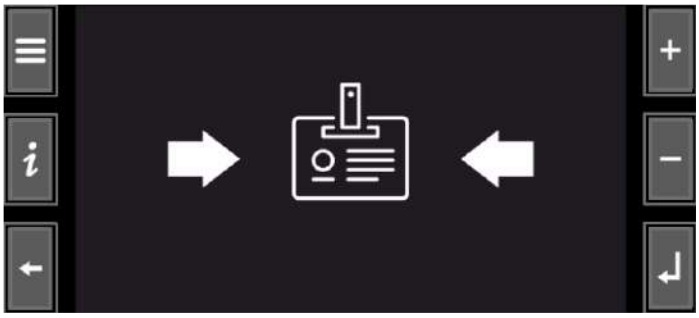
After you correctly set the ADMIN password or if is equal to zero, through the ***SELECT*** key move to multiple password position and press the ***ENTER*** key, that presents the USERS TABLE.

The icons and strings with gray style indicate not configured fields, green style configured fields. Click any of the fields to set the user password, record the badge, if the badge reader device is connected, and associate the user name; the display shows the numeric keypad and password to set lit in green. After setting the numeric password, click on the BADGE icon if the badge reader device is connected (see par. 13:42) and finally click on the ***id free user*** string to edit the user name to be associated (Fig. 3C); in this position the keypad enables all alphanumeric keys. When complete, the display goes to the users table updated to the latest recording.

If the BADGE is also registered, the password will only be used in case of failure of the RFID badge reader. To register the BADGE, click on the central icon depicting the tag: the display shows the registration request frame only if the password has been previously set, otherwise it returns the alert frame (red handle).



Confirming on RECORDING the flashing request frame appears.



After having passed the badge in front of the **TAG reader**, the green check-in frame will appear. (Fig.7) and the display will return to the USER REGISTRATION frame with the green badge icon to indicate the successful registration. Finally click on the free user id string by deleting it with the red key and edit the username to be associated with the BADGE.

In this position the keypad enables all alphanumeric keys. At the end confirm the recordings with the ***ENTER***key and the display returns to the updated USER TABLE.

From the INSERT PASSWORD frame click on the BADGE icon to delete registered badges; confirming CANCEL BADGE with a subsequent confirmation frame: the registration of the badge is deleted with a check mark of cancellation.
The system offers the possibility to memorize up to **32 numeric passwords** of 5 digits, and to associate them with a username for easy access recognition.
The system is enabled to recognize at least one valid multi-user password. Access to the menus that require the USER level are accessible by correctly typing any of the multipasswords entered; a password uniqueness check is performed, i.e two passwords with the same value cannot coexist.
In the absence of the conditions described access to the USER level menus is allowed by entering the 3-digit USER password (single password access, as currently).

The ADMIN and SERVICE level menus follow the 3-digit single password criteria.

4. PASSWORD SERVICE

The **SERVICE** password is set independently of the other passwords. At the first entry the value is zero and therefore the value that will be set will define the **SERVICE** password. Once the **SERVICE** password has been defined, the next time you enter this menu, the password is indicated by three asterisks and must be entered using the keypad. Confirming an incorrect value, the display returns to the SETTINGS MENU, otherwise it can be changed using the keypad by confirming the new value with the ENTER key.

When a password is entered to enter a protected menu, the system is unlocked and allows access to all the permissions menus (USER or ADMIN or SERVICE). The unlock time is such that more consecutive operations can be performed without re-entering the password.

4) BACKUP

The BACKUP menu transfers the thermoregulation data on usb pen. Pressing the **BACKUP** icon shows the usb-pen insertion request frame with20-second time-out. If the usb-pen has been recognised, the setting page of the months to download is displayed, otherwise the display goes back to the SETTINGS MENU.

The ***UP/DW*** keys increase/decrease the number of months to transfer; pressing the ***ENTER*** key starts the data download with the progress bar; at the end, it goes back to the SETTINGS MENU.

The ***ESCAPE*** key leads to the SETTINGS MENU without transferring the data.

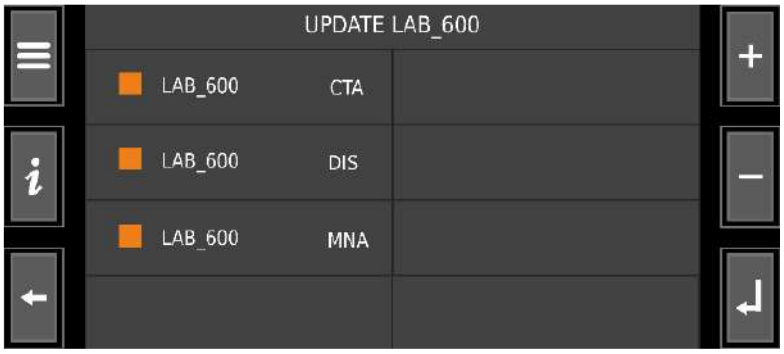
5) Internal SD CARD Formatting

The FORMAT function deletes all thermoregulation data from the BACKUP folder. Pressing the FORMAT icon shows the ADMIN password entering request frame. If the password is entered correctly the device, after confirmation, deletes the data followed by the result frame, otherwise it goes back to the SETTINGS MENU.

6) Parameters Update

The UPDATE menu performs the configuration of the device through the files generated by the application DataBuilder 3.0. The icon pressure UPDATE presents the insertion of the USB-pen request frame. If the usb-pen has been recognized, you see the page of the configuration folder (see fig.) contained in VLX/PAR, otherwise the display goes back to the SETTINGS MENU.

The folder, selected by clicking on the relevant field, presents the set of configuration files that can be selected/deselected by clicking on the relevant box (see fig.); when the file is cleared the square style changes from yellow to gray. Each folder can contain a maximum of 5 configuration files (DIS-CTA-CTB-MNA-MNB). To confirm the sending of one or more configuration files to the devices press the ***ENTER*** key. If within the VLX/PAR folder of USB-pen contains the logo.bmp image files, and logos.bmp qr.bmp while transferring files the image shows the frame with the green marking of the file in upload.



Following the successful configuration, the control board will be restarted with the appearance of the restart icon.

Once the transfer is complete, the configuration files are saved in the microSD and eeprom of the display panel.

7) ALARM TEST

The icon pressure TEST start the alarm test WITH the following sequences:

a. 3 seconds alarm icon with buzzer on;
b. Activate the alarm relay for 3 seconds according these sequences OFF/ON/OFF;
c. Back to Home Page

8) LANGUAGE

Pressing the **LANGUAGE** icon shows the frame for selecting the text languages. The language is selected in a mutually exclusive manner by clicking on the select box, which changes from grey to orange.

To choose the language use the keys as follows:

- The UP/DW keys browse the language setting pages, if enabled
- The ***ESCAPE*** key leads to the SETTINGS MENU without changing the language
- The ***ENTER*** key, *after confirmation*, sets the selected language.

9) MACHINE NAME

Pressing the **TITLE** icon shows the editing frame of the machine name that is displayed in the Home Page header. To confirm the text [max 24 characters] press ***ENTER***.

The external ***ESCAPE*** key takes the display back to the SETTINGS MENU without saving the edited text.

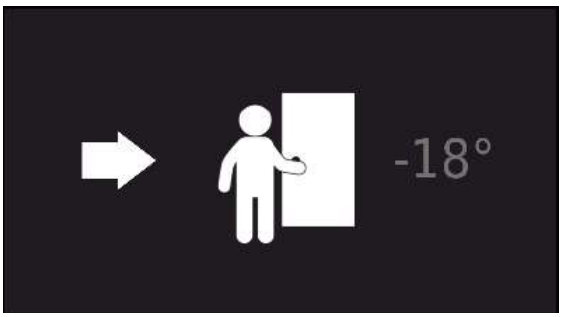
8.6 Service panel

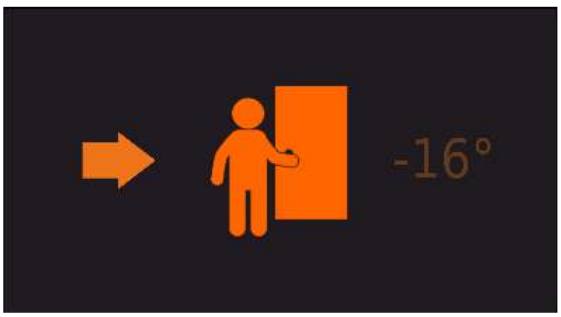
The Service key gives access to the Service Panel, a menu that allows a series of machine settings and is therefore password protected. Only those who have constructive knowledge of the machine can enter this menu.

8.7 Events, pre-alarm, allarm, fault and notification

1) Door open and door alarm

With the door open, within the time limit defined by the DOO parameter, the display shows the frame of Fig.1 with a flashing arrow and the indication of the compartment temperature; once the DOO time has elapsed, the alarm status is activated with buzzer active and orange style. From this frame it is possible to return to the Home Page by pressing the external **ESCAPE** key or by closing the door.





The onset of an alarm or fault state is notified via the EVENT frame:

2) High temperature or low temperature pre-alarm status

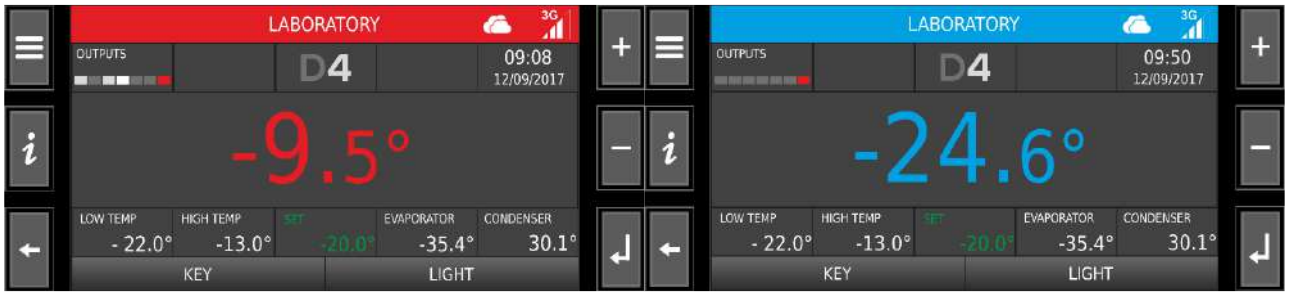
- FONT OF COMPARTMENT TEMPERATURE AND HEADER BAR YELLOW**;**
- EVENTS INFO AREA EMPTY;
- BUZZER OFF.

3) Alarm notification

- **EVENT FRAME WITH RED THERMOMETER ICON;**
- **ACTIVE BUZZER** 1 sec on and 1 sec off;
- External keys disabled;
- The buzzer is silenced by pressing the display area that displays the LIST OF EVENTS;
- Exiting the EVENT LIST brings you back to the HOME PAGE;
- The buzzer is automatically silenced after a time predefined by the manufacturer (BUF MINUTES) even if the display area is not pressed;
- The buzzer is silenced if the alarm event returns;
- The buzzer is reactivated at the expiration of the set repetition time (BUR MINUTES) if the alarm persists

4) High/low temperature status

- SPACE TEMPERATURE font AND RED/BLUE header bar**;**
- RED THERMOMETER icon in the EVENTS INFO area**;**
- The buzzer is reactivated at the expiration of the set repetition time (BUR MINUTES) if the alarm persists;
- The buzzer is silenced by pressing the display area;
- Pressing the area containing the RED THERMOMETER displays the LIST OF EVENTS.



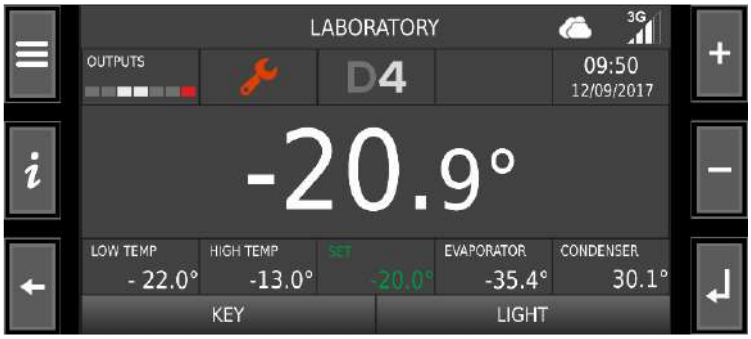
5) Fault Notification

- **EVENT FRAME WITH RED KEY ICON;**
- **ACTIVE BUZZER** 1 sec on and 1 sec off;
- External keys disabled;
- The buzzer is silenced by pressing the display area that displays the LIST OF EVENTS;

- Exiting the EVENT LIST brings you back to the HOME PAGE;
- The buzzer is automatically silenced after a time predefined by the manufacturer (BUF MINUTES) even if the display area is not pressed;
- The buzzer is silenced if the alarm event returns;
- The buzzer is reactivated at the expiration of the set repetition time (BUR MINUTES) if the alarm persists.

6) Fault status

- Font of the SPACE TEMPERATURE UNCHANGED**;**
- RED KEY icon in the EVENTS INFO area**;**
- The buzzer is reactivated at the expiration of the set reiteration time (BUR MINUTES) if the fault persists;
- The buzzer is silenced by pressing the display area;
- Pressing the area containing the RED KEY displays the LIST OF EVENTS.



7) Notification of alarm or fault return

The return of a temperature or fault alarm, without having entered the EVENT LIST during the active status of the event, shows the ENVELOPE icon in the EVENT INFO area of the HOME PAGE; the icon is deleted by entering the EVENT LIST from the MENU or by clicking on the area containing the icon.

8.8 Warnings

The warnings represent the discrepancies that are not recorded in the EVENT LIST. Their display occupies the entire frame with an icon in the centre of the display and descriptive string. In case of simultaneous warnings these are displayed cyclically with 4 seconds of presence per event. Pressing *ENTER* or the arising of an alarm or fault event, shows the Home Page, clears the display and disable the buzzer. If manual acknowledgment is not given, the notification is automatically excluded after a time set by the manufacturer [BUF minutes] and is reactivated when the repetition time expires [BUR minutes] if the cause that generated the warning does not expire. The precedence of the notifications on the display, in order of decreasing priority, is as follows:
FAULTS -> ALARMS -> GENERIC WARNING -> DOOR OPEN -> NON-READABLE MICROSD

8.8.1 Warning MicroSD

If the microSD is not detected or is illegible, the event is notified on the display with the warning frame shown on the side. After a manual acknowledgment using the ENTER key, flashing yellow, the warning is repeated every 5 minutes until the problem is resolved. During the notification the buzzer is active intermittently.

9. No mains

The power outage status is communicated as soon as the electricity is interrupted. The following WARNING frame appears in this condition with buzzer active. Pressing on the display area returns to the Home Page and silences the buzzer.

10. Mains Fault

In the absence of power, expired the preset delay time, the controller enters the **MAINS FAULT** status. The buzzer **is activated** and pressing on the display area, that shows the RED SPANNER icon, leads to the EVENT LIST and silences the buzzer. In the Home Page this status is indicated with the red spanner icon and the appearance of the battery icon with 4 charge notches, 100% - 75% - 50% - 25%. When the charge percentage drops below 25%, the battery icon starts flashing. All keys are disabled except for the DOOR key that remains active for the solenoid bolt unlock.

- **Backlight off and on**

After one minute from notifying the Mains Fault, the backlight of the displays turns off and on again for 10 seconds when the display area is pressed, in order to decrease energy consumption; this up to minimum battery level, beyond which the system will go into auto off to prevent damaging the backup battery.

- **High temperature pre-alarm in mains fault**

If in the absence of power, the temperature pre-alarm status is generated, the temperature value turns yellow but does not reactivate the back-light if this is already off.

- **High temperature alarm in mains fault**

VIEW OF ALARM WITHIN ONE MINUTE FROM NOTIFICATION

If in the absence of power, the device detects a high temperature alarm, the buzzer activates, the back-light activates for one minute and the RED THERMOMETER icon is displayed. Pressing the display area shows the EVENT LIST. Pressing the ***ESCAPE*** key goes back to the Home Page; if the ***ESCAPE*** key is not pressed within one minute, the display automatically turns off and the controller goes back to the Home Page.

VIEW OF ALARM AFTER ONE MINUTE FROM NOTIFICATION

If the display area is not pressed within one minute from the occurrence of the alarm, the backlight turns off. Pressing the display area temporarily turns on the back-light and displays the EVENT LIST. Pressing the ***ESCAPE*** key goes back to the Home Page. If the ***ESCAPE*** key is not pressed within one minute, the backlight turns off and the display automatically goes back to the Home Page.

11. Info panel

Pressing the INFO key shows the following illustrated frames:

- if present, the PT100 monitor probe;
- if the monitor probe is not present;
- **i**n configuration with humidity probe. The panel values are continuously updated;
- With the UP key you can view the following pages (Fig.4 and 5) with the DW key the previous pages, with the ESCAPE key you go back to the Home Page.

The battery box shows the operating status.

1)


2)


3)


4)


5) 

12. Backup battery management

The back-up system uses 2700 mA/h rechargeable nickel-metal hydride batteries with a total voltage of about 11.7V. Alternatively, lead-acid batteries 12V - 3A/h can be used.
If a battery with voltage Vbatt> = VPD is connected to the input, it is detected as **present**.
The circuit detects the **absent** battery status for voltage values **Vbatt <VAD**.
In the presence of the mains, the battery is tested every TBT minutes; the duration of the measurement of the voltage under dummy load is BTD seconds. The voltage measurement is shown on the display.
Battery charging is triggered under the following conditions:

- At the transition from absent battery to battery detected with voltage Vbatt> = VPD
- Upon returning from any blackout;
- At the transition from the stand-by state to the on state;
- If after a test the voltage is Vbatt <VRS

The **state of charge** remains charged as long as the voltage does not exceed the VRE Volt value or the expected time-out time of MRT hours has elapsed; upon reaching the charge time-out if Vbatt> = VRT, a measure relating to the last charge test, the battery is considered **inefficient**, otherwise it is considered **faulty** but not disconnected.

The battery voltage, in the absence of electricity, is continuously monitored. As soon as a battery voltage Vbatt <VBR is detected, the “kill” signal is sent so that the high-level processes can be completed; after TBK seconds the battery is disconnected in order to avoid a destructive discharge.
All battery states are periodically recorded on microSD while only the **absent**, **inefficient** and **faulty** battery states generate a *BATTERY WARNING* transmitted to the display board.

13. Data management

The functional variables of the controller are saved every 30 seconds in a non-editable binary file on a microSD card installed inside the panel. The recorded data can be transferred via the USB port on a key and read on any PC on which the STUDIOGRAPH program has been installed.

Description of the export columns

SR	*Refrigerator Serial Number*
MR	*Refrigerator Model*
NM	*Refrigerator Name*
S1 °C	*NTC thermostat probe*
S2 °C	*NTC evaporator probe*
S3 °C	*NTC condenser probe*
RH %	*Humidity %*
MONITOR °C	*PT100M monitor probe*
THERMO °C	*PT100 thermostat probe*
SET °C	*Setpoint*
SETo °C	*Operational setpoint*
SET_RH %	*Humidity setpoint*
HI TEMP °C	*High temperature limit*
LO TEMP °C	*Low temperature limit*
HI TEMPm °C	*Monitor high temp. limit*
LO TEMPm °C	*Monitor low temp. limit*
D1	*D1 Digital input status*
D2	*D2 Digital input status*
D3	*D3 Digital input status*
D1	*Monitor D1 digital input status*
RELAIS U1	*U1 Relay status*
RELAIS U2	*U2 Relay status*
RELAIS U3	*U3 Relay status*
RELAIS U4	*U4 Relay status*
RELAIS U5	*U5 Relay status*
RELAIS U6	*U6 Relay status*
LED BAR	*LED output status*
PCB °C	*Technical compartment probe*
Vin V	*V board power supply*

MAINS Vac	*Mains voltage*
BATT %	*Battery charge %*
TEST BATT V	*Battery voltage*
DOOR STATUS	*Door status*
ACTIONS	*Action in progress*
ALARMS	*Alarm in progress*
ALARMS_m	*Alarm in progress (monitor)*
FAULTS	*Fault in progress*
FAULTS_m	*Fault in progress (monitor)*
WARNING	*Warning in progress*
WARNING_m	*Warning in progress (monitor)*
U1 %	*U1 Relay use percentage*
U2 %	*U2 Relay use percentage*
U3 %	*U3 Relay use percentage*
U4 %	*U4 Relay use percentage*
U5 %	*U5 Relay use percentage*
U6 %	*U6 Relay use percentage*
U7 %	*U7 Relay use percentage*
EH °C	*Max evaporator calibration*
EL °C	*Min evaporator calibration*
DELTA T °C	*Thermal exchange*
COMP 1h %	*Compressor operation % (1h)*
COMP 24h %	*Compressor operation % (24h)*
COMP ON	*Time on compressor*
COMP OFF	*Time off compressor*
COMP LIFE	*Compressor total hours*
VA	*Power absorbed by loads*
PASSWORD	*User password*
ACTION	*Last user action*

*With the device in **STAND-BY**, the writes to the microSD and the upload to the CLOUD are blocked.*

Description of the records

ACTIONS	
PAUSE	*Pause phase*
WAIT	*Waiting cooling action*
COOL	*Cooling action*
HEAT	*Heating action*
HUMI	*Warm phase*
DEHU	*Dry phase*
CO2	*CO2 active*
DRIP	*Dripping phase*
DEF_MAN	*Manuals defrost*
DEF_SER	*Defrost from serial command*
DEF_TIMER	*Timer defrost*
DEF_KHRS	*Hours compressor defrost*
DEF_RTC	*Real Time Clock defrost*
DEF_INC	*defrost per incr. evaporazione*
DEF_TUNE	*No tuning defrost*
DEF_AUTO	*Automatic defrost*
DEF_SAFE	*Safety defrost*
DEF_CLEAN	*Off&Clean criterion defrost*
DEF_LOW	*Low evaporation defrost*
DEF_WAIT	*Waiting defrost*

WARNINGS_CTR/MON	
NORMAL	*Regular*
DOOR	*Open door*
DOOR_TIME	*Door alarm time-out*
DIRTY_CND	*Dirty condenser*
SAFE_MODE	*Safety criterion*
RELAIS_LIFE	*Relay life*
PWR	*Power Supply out of range*
MAINS	*Mains out of range*
B-OUT	*Mains failure*
S1-S4	*Probe S1/S4 unbalance*
BT_UNPLUG	*Unconnected battery*
THER_SAFE	*Safety thermostat*

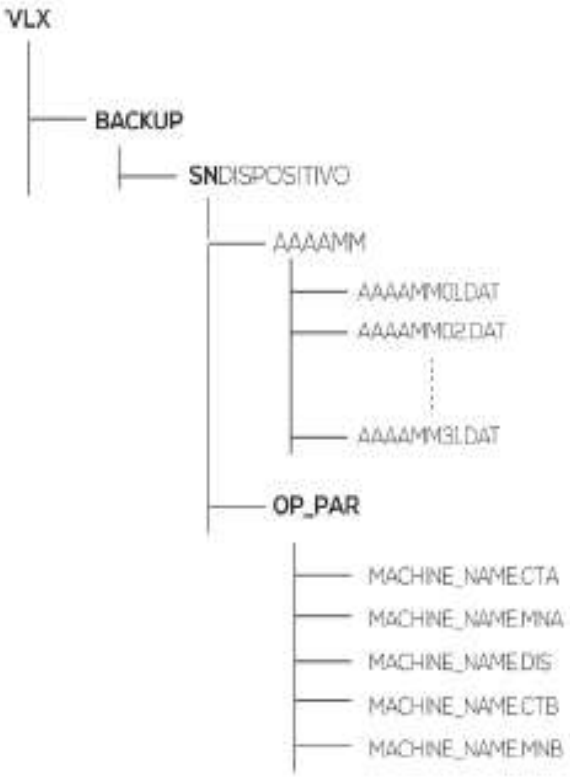
STATUS_BATTERY	
ENAB	*Battery enabled*
UNPLUG	*Unconnected battery*
DETECT	*Detected battery*
TESTING	*Battery test*
CHARGE	*Battery charging*
BACKUP	*Battery backup*
EXPIRED	*Battery expired*
FAILED	*Battery fault*

FAULTS_CTR/MON	
NORMAL	*Regular*
S1	*S1 probe failure*
S2	*S2 probe failure*
S3	*S3 probe failure*
S4	*S4 probe failure*
S5	*S5 probe failure*
NTC_BOARD	*Board probe failure*
TEM_BOARD	*High temperature board*
HIGH_CND	*High condenser temperature*
LOW_EVA	*Low evaporator temperature*
HP1	*High pressure unit 1*
HP2	*High pressure unit 2*
DEF_TIME	*Defrost time-out*
SW_DOOR	*Door switch failure*
MAINS	*Mains failure*
U1B	*U1B relay failure*
U2B	*U2B relay failure*
Ux	*U3/U6 relay failure*
U1	*U1 load failure*
U2	*U2 load failure*
U3	*U3 load failure*
U4	*U4 load failure*
U5	*U5 load failure*
U6	*U6 load failure*
LOGIC_COM	*Intenal communication failure*
TWIN	*Unit failure*
BATTERY	*Battery failure*
microSD	*MicroSD failure*

ALARM_CTR/MON	
NORMAL	*Regular*
HIGH	*High temperature alarm*
HIGH B-OUT	*High temperature back-out*
HIGH DOOR	*High temperature for door open*
LOW	*Low temperature alarm*

DOOR_INFO	
CLOSE	*Door closed*
OPEN	*Door open*

Data Download



The functional data, present in the microSD memory, can be saved via the USB port in a pen drive by accessing the BACKUP MENU; with this operation, the VLX / BACKUP folders are automatically created with the folder named with the serial number of the refrigeration unit entered when configuring the device inside; if the S / N is not entered, the folder name is R00000. The folder contains the month folders [yyyamm] which contain the daily files [yyyymmdd.dat]. The latter are read and decoded by the THERMOCONVERTER 3.0 PC application. Inside the S / N folder there is also the OP_PAR folder which contains the parametric configuration files of the devices connected to the network. The file name coincides with the MACHINE NAME of the device shown in the header of the Home Page.

14. Diagnostics and alarms

The device is designed to signal, after a certain delay, if the internal temperature has exceeded the lower and upper temperature limits. Furthermore, it is designed to signal an extended door opening time as soon as it remains open for more than a predetermined time.

For other anomalies, refer to the manual relating to the attached temperature control unit and, if necessary, request assistance by reporting the defects found to the KW manufacturer: Telephone 0577-309144

ATTENTION

KW declines all responsibility for any damage occurring in the use of the equipment produced or marketed by it, if the recommendations made have not been observed exactly and scrupulously by users.

15. Possible problems

The following table lists other possible problems with causes and remedies.

PROBLEMS	CAUSES	REMEDIES
The device does not start	No mains power supply	Check that there is voltage on the power socket
	Power cable interrupted	Check the cable and that there are no internal breaks
	Blown fuses	Check the fuses
The door does not close	Ice formation on the seals	Remove the ice, adjust the hinges (Ass. KW)
	Objects protruding excessively from the inner case	Remove the object
Poor cooling	Ambient temperature> + 30 ° C	Check the ambient ° T and properly ventilate the room
	Dirty condenser	Clean the condenser
	Air intakes obstructed (appliance leaning against the wall)	Position the appliance correctly
	Excessive insertion of hot material into the appliance	Wait a few hours or remove some of the material
When the appliance is started, the Q.E. switch trips.	Short circuit in the appliance	Search for the short circuit and call the Ass. KW
	Ground losses in the plant	Search for dispersions and call the Ass. KW
The display does not signal	Electronic part in failure	Call the Ass. KW
Noisy equipment	Unstable furniture position	To verify
	Something is in contact with the cabinet	To verify
	The fans are dirty and / or damaged	Check and replace them if necessary (KW ASS.)
The chart recorder is not working properly	The paper does not flow	Check and replace the battery
	It does not write the T.	Check and replace the nib
	There is no movement	Call the ASS. KW

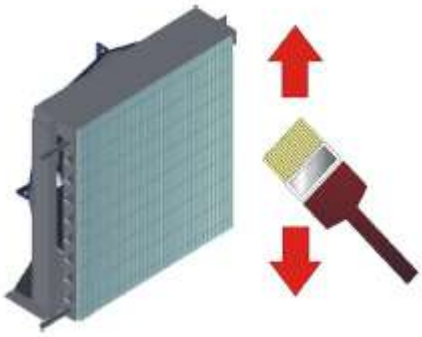
For other anomalies, refer to the manual relating to the attached temperature controller and call for assistance if necessary, reporting the defects found to the KW manufacturer:
Telephone 0577-309144
ATTENTION: KW declines all responsibility for any damage occurring in the use of the equipment produced or marketed by it, if the recommendations made have not been observed exactly and scrupulously by users.

16. Ordinary cleaning and maintenance

In any case, disconnect the appliance before cleaning it. Pull out the plug and rewind the power cord. Clean the interior and exterior walls of the cabinet with warm water, to which a small dose of detergent has been added. Never use abrasive or acid detergents or solutions. We recommend the use of a universal detergent with a neutral pH.

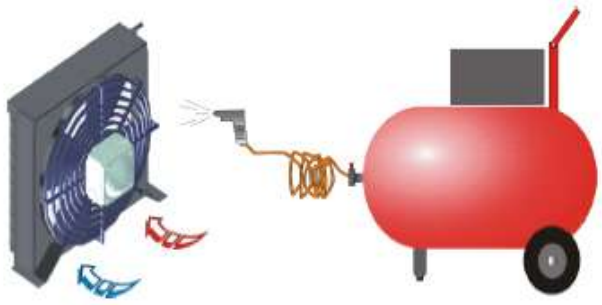
It is forbidden to use water jets for cleaning.
The application of products designed to give shine is recommended only on the external walls.
Clean taking the utmost care that during cleaning the water does not penetrate any electrical parts placed inside the refrigerated compartment. Dry everything with a cloth.
IMPORTANT: for cleaning stainless steel it is absolutely necessary to avoid the use of abrasive paste, steel wool and brushes of common steel, as ferrous particles can deposit which, oxidizing, will cause rust spots.

16.1 Condenser cleaning



Cleaning the condenser located on the back of the cabinet is recommended at least twice a year; in case of use in particularly dusty environments it is advisable to carry out it more frequently (even monthly).

It is advisable to have this operation carried out by technical personnel (however it is not covered by the warranty), to use a ladder (in accordance with safety regulations), by moving the equipment away from the wall in advance (at least 80 cm. Approximately); cleaning can be carried out using soft bristle brushes and a vacuum cleaner, or compressed air, taking care not to bend the fins of the condenser itself.



When carrying out this operation, it is mandatory to use protective gloves to avoid any cuts to the hands, a dust mask and protective goggles.

CLEANING THE CONDENSER, AS WELL AS ENSURING BETTER OPERATION. OF THE EQUIPMENT, WILL ALLOW TO OBTAIN CONSISTENT REDUCTIONS IN ELECTRICITY CONSUMPTION.
ATTENTION: Do not remove or damage the data plate on the right side of the cabinet.

N.B .: if the appliance has recently been turned off, some parts may be very hot, be careful not to touch them with your bare hands!
Once the cleaning operations have been carried out, reassemble all the grids, reposition the appliance, reconnect it to the mains and finally turn on the main switch.

N.B.: the machine cleaning operation, if performed by expert personnel, takes a few tens of minutes, so it is not generally necessary to empty the appliance. However, keep in mind that the internal temperature, at the end of this operation, could have risen to approximately –30/-20 °C.

16.2 Gaskets

The lid or door gasket must be checked from the point of view of tightness, if ice forms, remove it by thawing, do not tear the gasket. It is necessary to keep the gasket lubricated with silicone grease or with other grease of the non-freezing type.
IMPORTANT: the lid or door must be kept closed as much as possible and the openings reduced to the minimum necessary.

16.3 Elimination of frost

The frost that forms inside the appliance must be eliminated once it reaches a thickness of a few millimeters by turning off the appliance, after moving the load to another suitable equipment.

Be sure to plan ahead when you plan to defrost your appliance. If you need somewhere to store your samples while defrosting, use another freezer or cooler bags.
To proceed with defrosting, switch off the appliance, if possible open the doors and let it reach room temperature, allowing any ice formed to melt. Avoid using hair dryers or similar to speed up the process for safety reasons.
Pay attention to the water produced by defrosting and prepare any towels for cleaning.
Be careful when removing ice: make sure you do not accidentally knock internal parts of the freezer, as this could cause significant damage. Use a plastic scraper to avoid any accidents.
After removing all the ice, you can clean the inside of the freezer with hot water and a drop of detergent, and then proceed with drying with a dry cloth.

16.4 External surface

With a brush or vacuum cleaner, remove the dust that has settled on the freezer.
The outside of the appliance should be cleaned with a cloth and wax and silicone spray. Or with a wet cloth and neutral pH detergent diluted with water; it is recommended not to use abrasives or to use water jets.
Periodically wash the inside with a cloth soaked in a solution of denatured ethyl alcohol (90 °).

Optional: after cleaning above, the stainless steel interior can be made bright and shiny, with products with acid pH <5% non-ionic surfactants 5-15% anionic surfactants Biodegradability 90%, *poured onto a damp cloth from pass on the stainless steel surface. Then wipe with a wet cloth and finally with a dry cloth.*

The outside of the appliance must be cleaned with neutral detergent diluted with water, it is recommended not to use abrasives or volatile detergents.

16.5 Precautions in case of prolonged stop

Clean the surfaces as indicated above. Cover the external parts with a light layer of mineral oil. Leave the power cord disconnected, leave the doors slightly open to avoid the formation of fungi and bad smells, inserting a low and wide container filled with water and vinegar inside.

Before restarting the appliance after a prolonged stop, wash the internal surfaces again as indicated in the previous point.

16.6 Precautions when working on flammable refrigerant gases

If the refrigerant gas used is flammable and explosive, it is recommended, in the event of an intervention that requires opening the circuit, to implement all the required safety measures. In particular, it is advisable to ventilate the area during the intervention itself and in any case to avoid open flames and ignition sources of any kind.

16.7 Preventive maintenance recommended by the manufacturer

It is advisable to provide for periodic maintenance by KW (which can be purchased separately) consisting of a general check with variable frequency according to the type of appliance:

- For equipment with negative temperatures, at least one annual check;
- For equipment with positive temperatures, at least one check every two years.

17. C.A.T. KW authorized in Italy

The technical assistance of the equipment present on the national territory is made through a maintenance service, both direct and with authorized technical assistance centers distributed throughout all regions of Italy.

FOR THE ADMINISTRATIVE ACTIVATION OF THE TECHNICAL INTERVENTION AND TO ACTIVATE THE AREA TECHNICAL ASSISTANCE CENTER, IT IS NECESSARY TO SEND A REQUEST EMAIL TO assistance@kwkw.it OR A COMMUNICATION VIA TEL. AT THE NUMBER 0577-309144.

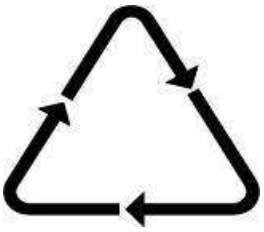
FOR EVERY REPORT ALWAYS INDICATE:

- THE YEAR OF CONSTRUCTION;

- MODEL;
- THE SERIAL NUMBER OF THE APPLIANCE.

18. Waste disposal and device demolition

18.1 Refrigerated appliance



The appliance needs to be scrapped according to local regulations for waste disposal.
Make it useless by cutting the power cord, also remove the door. For the disposal of metal parts, plastics, electronic boards, lead batteries, compressor oil and freon, follow the local disposal regulations.

18.2 Electric and electronic waste disposal instruction

Pursuant to the European Directive 2012/19/CE, this appliance must be disposed of as **W**aste **E**lectrical and **E**lectronic **E**quipment (**WEEE**) when it is no longer used.

The aforementioned directive and the laws in force prohibit WEEE from being disposed of as "**normal household waste**" because it must be disposed of as "separate collection", complying with local collection provisions or delivering it to the point of sale or distributor in the case of purchase of a new equivalent appliance.

The crossed-out wheeled bin symbol, shown here and affixed to the appliance or its packaging, establishes the aforementioned prohibition.

By ensuring that this product is disposed of correctly, the user contributes to:

- prevent potential negative consequences for the environment and health caused by the dispersion of the pollutants contained within the equipment;
- recycle part of the materials of which the appliance is made, reducing the use of natural resources and the amount of waste to be disposed of.

Failure to comply with these disposal laws is punishable by a financial penalty.
The manufacturer of this equipment, identified by the label affixed to each device, is committed to the management of the WEEE treatment and recovery activities pursuant to Legislative Decree 152/2005.

18.3 Packaging

The packaging materials are recyclable and made up of paper, cardboard, polystyrene and plastic. For disposal, follow local regulations. The packaging material (plastic bags, polystyrene parts, etc.) must be kept out of the reach of children as it is a potential source of danger.

18.4 Dangerous materials

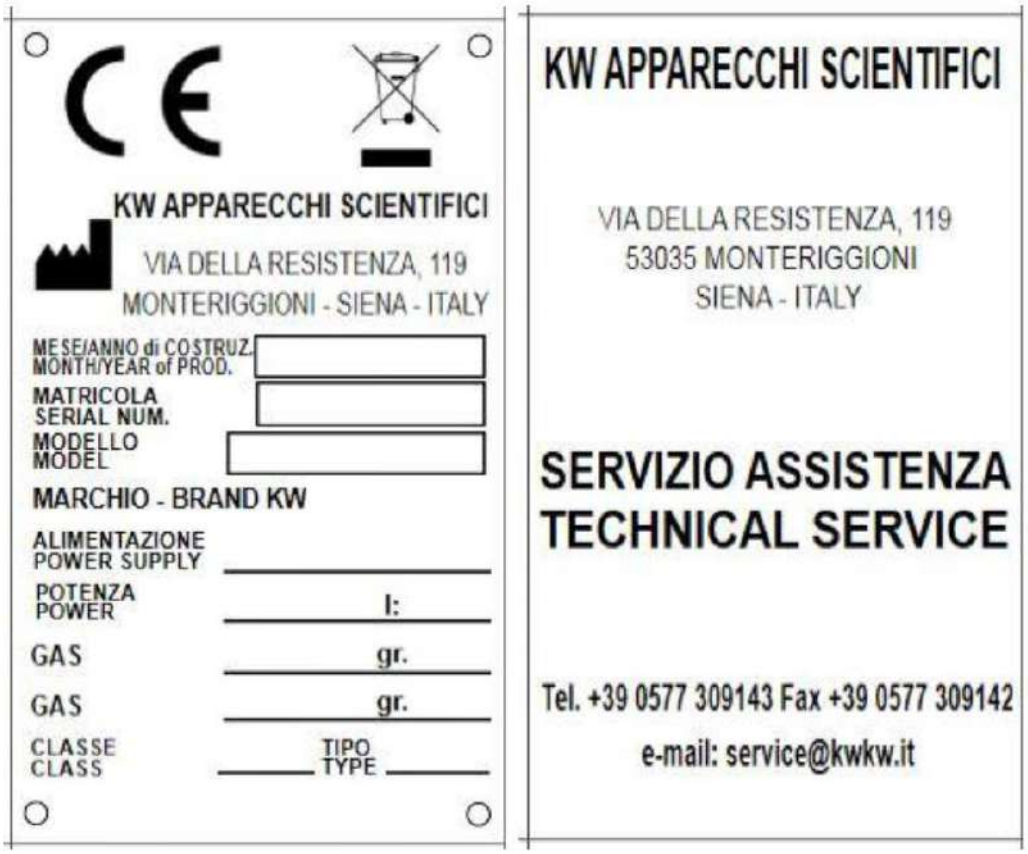
There are no dangerous substances on this equipment, as required by the laws in force and in particular by the RAEE directive 2012/96/ EC.
The only attention should be paid if there are flammable gases inside the appliance such as ethane or propylene. Even if present in small quantities, avoid releasing these substances in the presence of open flames and without adequate ventilation of the room.

During disposal, plastic, ferrous and non-ferrous metal components, glass, lead and lithium batteries, electronic boards with their components, lamps, polyurethane foam and mineral oils will be treated.

ATTENTION

This appliance is not suitable for the storage of corrosive substances or whose vapors are corrosive

19.CE Mark



If flammable fluid is present

20.CE Mark declaration of conformity

CE

The manufacturer: **KW APPARECCHI SCIENTIFICI S.R.L.**

Via della Resistenza 119 53035 Monteriggioni (SI) –ITALIA
Tel.0577/309144 e-mail: kw@kwkw.it, web: www.kwkw.it
Trade Mark: **KW APPARECCHI SCIENTIFICI S.R.L.**

DECLARES THAT:

The device: **Model: _____** **Serial Number _____**

IT COMPLIES WITH THE FOLLOWING CE COMMUNITY DIRECTIVES:

- MACHINERY DIRECTIVE	**2006/42/CE**
- ELECTROMAGNETIC COMPATIBILITY	**2014/30/UE**
- LOW VOLTAGE	**2014/35/UE**

TECHNICAL STANDARDS APPLIED:
- CEI EN 61010-1:2010
- CEI EN 61326-1:2013

Name: Ing. Fabiani Stefano
Status: CEO & President

Signature 

Monteriggioni, ……

21.Warranty rules

This appliance is warranted for the period of:

☐ **12** months ☐ **24** months ☐ **36** months ☐ other _____

from the date of the sales invoice. Within this period, the buyer has the right in the event of imperfect operation of the appliance, to free replacement of unusable parts due to an ascertained material defect, provided that the defective parts are returned to KW and the actual defect is found.

The warranty does not cover parts normally subject to wear, such as gaskets, lighting lamps, the battery. It does not cover failures and / or malfunctions resulting from failure to periodically clean the condenser (where present), it also does not cover cases of machine block, due to the intervention of the manual reset safety pressure switch (KP5) (for the refrigerated versions).

The warranty is void if the products are used in a way that does not comply with the instructions given in the company manual or if they are modified, repaired or disassembled outside the company workshop or by persons that the company has not authorized in writing for repairs. And above all in the case of incorrect intervention on the general temperature regulator.

In this regard, KW declines any responsibility for electrical faults that have a certain or presumed probable cause in the incorrect installation of the appliance, specifically in connection to the laboratory's electrical network.

This also applies in cases where the safety standards are not met in the destination environment of the equipment.

The warranty is void in the event of breakdowns and / or malfunctions attributable to the case in which air exchange is not guaranteed in the location.

For KW Apparecchi Scientifici

User/customer signature _____

Failure to comply with the information described in this publication will result in the immediate forfeiture of the granted guarantee and the assumption by the purchaser of all civil and criminal liability in the event of injury to property and / or persons.

22. Instructions for transport and packaging

The product is packed in KW Apparecchi Scientifici to guarantee its integrity during transport.

The packaging is customized for the various models while ensuring protection of the surfaces by means of cardboard and/or polystyrene coating, corners and a wrapping with stretch film of polyethylene and strap.

If the appliance is not equipped with wheels, it is placed on a pallet that facilitates its movement by means of mechanical aids (transpallet, forklift). If there are wheels, they are used for handling.

In no case are sockets and eyebolts provided because it is not allowed to move in a different way from the aforementioned.

The transport takes place with an authorized courier trained on loading, transport and unloading procedures, in particular on the need to always keep the appliance in a vertical position.

At the time of installation by the user, the device is moved in the manner described above, unpacked and positioned flat (level). The packaging materials are collected by the courier himself.

In the event that it is necessary to transport the instrument, the original packaging (or equivalent) must be requested from KW APPARECCHI SCIENTIFICI SRL. KW is not liable for any damage resulting from the transport of the instrument in unsuitable packaging.

23.Temperature recorder

Before you can use the tool, you need to:

- Remove the protective cap from the nib by gently lifting the pen holder shaft and sliding it downwards;
- Check the position of the diagram by making sure that the tip of the pen begins to trace at the time the recording starts here. To do this, just rotate the diagram after loosening the stop that fixes it on the diagram holder disc and slightly lifting the pen holder rod;
- Check that the trace is legible and if not, increase the pressure of the nib on the disc through the knurled screw located at the beginning of the pen holder shaft.

NIB REPLACEMENT

- Gently remove the nib from the pen holder shaft;
- Insert the new nib making sure that the pen holder shaft enters the guide located on the top of the nib;
- Push the nib until the shaft touches the extreme edge.

For correct operation, the nibs used must be original.

CORRECTION OF THE CALIBRATION

- If the instrument requires small calibration adjustments, carry out the following operations:
- Equip yourself with a sample thermometer with which to compare the reading of the recorder (carry out the comparison if possible by immersing the sensitive parts of the two instruments in a reference bath at a temperature included in the measurement range of the recorder, to reproduce the same conditions for both);
- Wait for the reading of the instruments to stabilize;
- Act on the micrometric screw placed on the pen holder rod, using the plastic key supplied with the instrument, until the nib is in correspondence with the value measured by the sample thermometer;
- If necessary, repeat the previous operations by changing the temperature of the reference bath;
- If the necessary conditions cannot be obtained or the instrument always indicates the start of scale value, this must be sent to KW for a more detailed check.

VERSION WITH QUARTZ CLOCK

These watchmakers work with 1.5V type a batteries and the duration of the charge is approximately one year.

Operation is continuous from the moment the battery is inserted; if you do not want to register, you need to put the cap back on the nib or raise the pen holder shaft through the knurled screw until there is contact between the diagram and the nib.

DIAGRAM REPLACEMENT

- Move the diagram stop lever located in the center of the disc outwards and then lift it until it is perpendicular to the disc itself;
- Raise the pen holder rod and pull the diagram upwards;
- Position the new diagram based on the start time of recording, making sure that it fits into the clock lever and into the special tabs located at the ends of the diagram holder disc;
- Gently lower the pen holder shaft.

BATTERY REPLACEMENT

- Remove the diagram by repeating the operations described above;
- Remove the old battery from the battery holder and insert the new one (1.5V alkaline type AA) paying attention to the polarity.

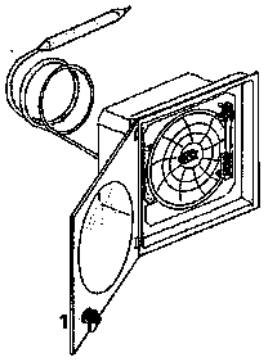
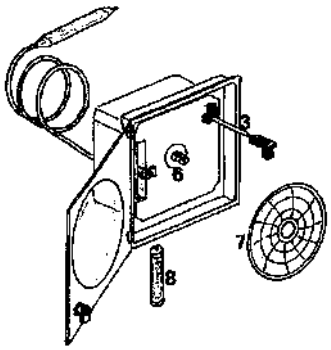
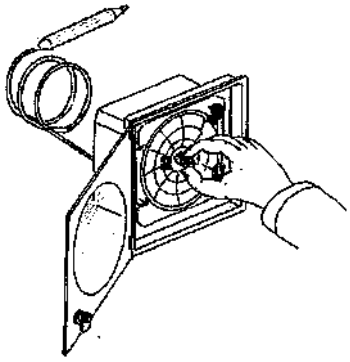
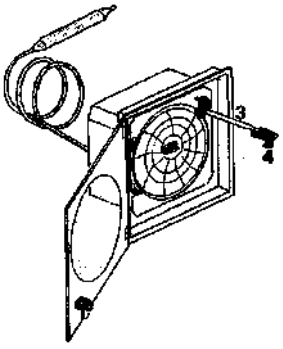
GENERAL DESCRIPTION

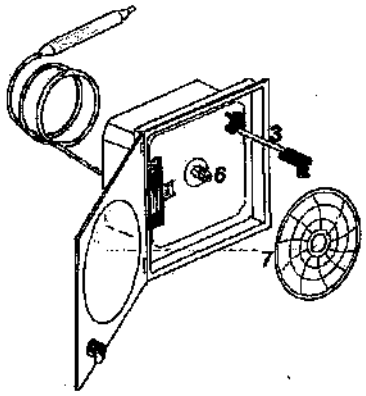
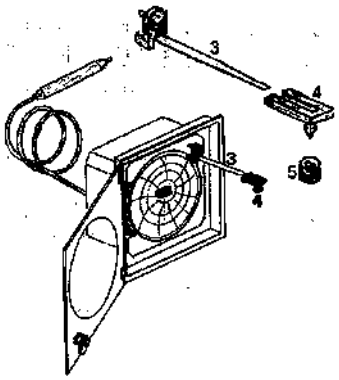
The RTD/Q type inert gas recorder, highly reliable, precise and economical, can be installed without limits of use in all industries and in particular, thanks to the absence of mercury, in the pharmaceutical, food and refrigeration industries in general. .

For a good functioning:

- Place the sensitive element in a suitable position to be sensitive to temperatures (no stagnant position);
- Place the recorder in a safe and accessible position;
- It is recommended to check the recorder and its functionality at least every 6 months;
- Regularly replace the paper and the nib;
- Replace alkaline batteries every 2 years.

PUT IN ACTION

1A) Open the lid using the key	
Install the battery (1,5V AAA size cell) **See paragraphs 1A-3A-4A-4B** **1B)** When installing, be careful not to reverse the polarity. Keep the red tape around the battery to facilitate its extraction. **1C)** Insert the card (7) **See paragraphs 4D-3C-3D**	
2A) Manually rotate the paper in correspondence with the recording start time and date, leveraging the retaining spring 2.	
3A) Rotate the steel nib by 90 ° 3. **3B)** Remove the nib head protection 4. **3C)** Lower the nib carefully **3D)** Close the cover with key 1.	

Paper replacement **See paragraphs 1A-3A** **4A)** Push the paper retainer spring 6 sideways and lift. **4C)** Insert the new diagram **4D)** Lower the retainer 6 and push it sideways into its original position **See paragraphs 3C-3D.**	
Replacement of the nib head **See paragraphs 1A-3A** **5A)** Extract the nib head taking care not to damage the nib arm 3. **5B)** Place the new head gently into the steel arm **See paragraphs 3C-3D.**	

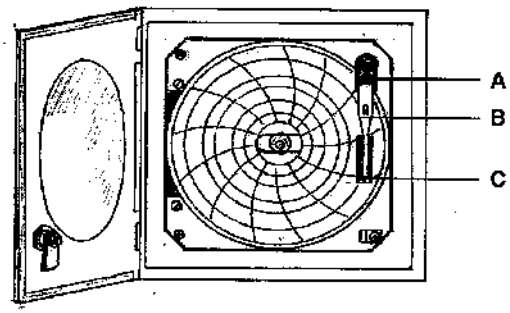
23.1 Verification of the temperature marked

NIB ARM CALIBRATION

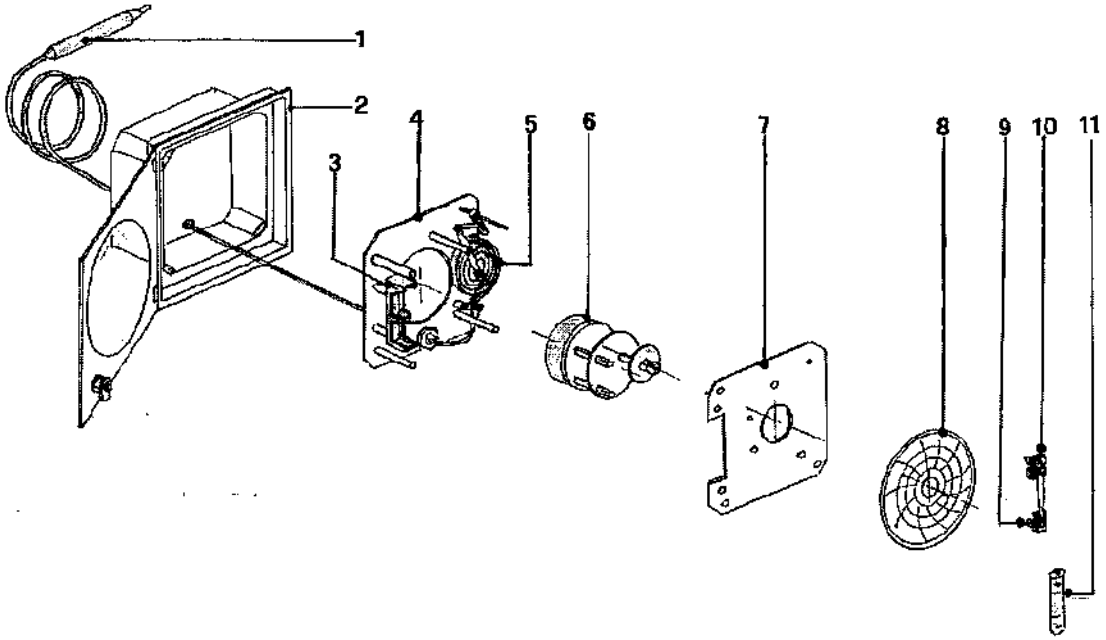
It is recommended to check the logger calibration at least every 6 months.

Insert the bulb in a container of water at 20 ° C +/- 1 ° C, together with a reference thermometer. Wait about 10 minutes and if the difference between the temperature measured by the two instruments is greater than +/- 2% proceed as follows:

- With a small screwdriver, through the adjustment screw A), move the head of the nib C) until it is exactly in the 20 °C line.

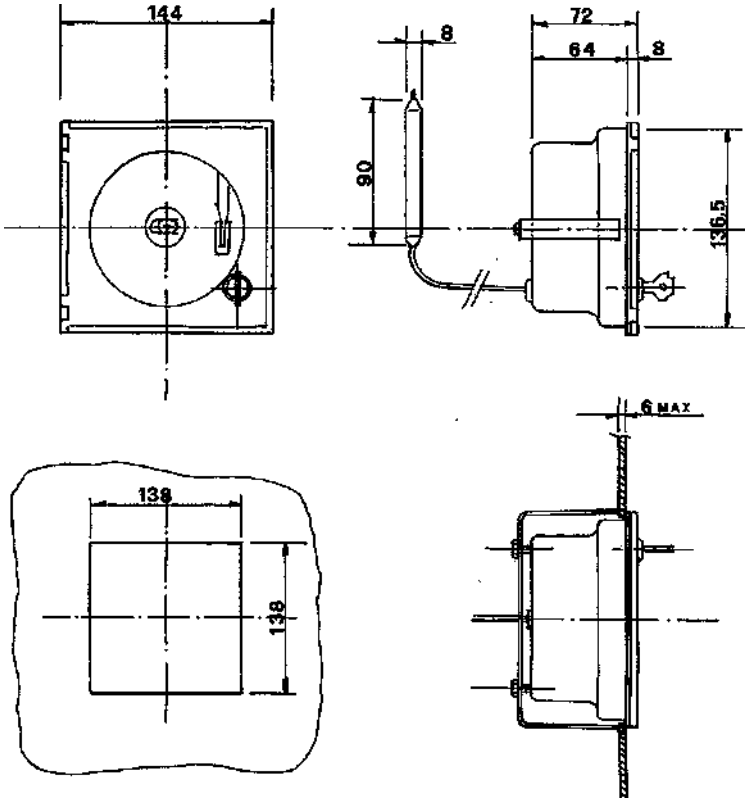


23.2 Exploded view and dimensions



LEGEND:

1 = BULB
2 = PROTECTIVE BOX
3 = BATTERY RETENTION
4 = MAIN PLATE
5 = SPRING
6 = MOVEMENT
7 = FRONT PLATE
8 = PAPER
9 = NIB HEAD
10 = ARM OF THE NIB
11 = LITHIUM BATTERY: 1.5 V. AAA size cell.



STANDARD EQUIPMENT:

n ° 1 ALKALINE BATERIA 1.5V AAA size
n ° 1 PACK OF N ° 52 WEEKLY RECORDING DISCS
n ° 1 NIB HEAD
n ° 1 PAIR OF KEYS

KW APPARECCHI SCIENTIFICI