PolyEco

Direct Digital Synthesis (DDS)
FM exciter/transmitter serie

User and maintenance manual

Version 1.2 – 06/2020

C E

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EU DECLARATION OF CONFORMITY (DoC)

In fulfillment of the official provisions:

2014/53/EU (RED)
2014/30/EU (Electromagnetic Compatibility)
2014/35/EU (Low Voltage)
2011/65/EU (RoHS Directive)

We undersigned Sielco Srl hereby declare, under Our sole responsibility, that the product:

PolyEco 1000

FM sound broadcast transmitter in the 87.5 to 108MHz VHF range belonging to the SIELCO PolyEco family, 1000W rated:

❖ *Conforms to the Safety Standard*
  EN 60215:89 +A1:92 + A2:94
  EN 62311 (2008)

❖ *Conforms to the basic series of Radio tests*
  ETSI EN 301 489-1 V2.1.1 (2017-02) and ETSI EN 301 489-1 V2.2.0 (2017-03, draft)

❖ *Conforms to the Specific Technical Standard:*
  ETSI EN 301 489-11 V1.3.1 (2006-05) and ETSI EN 301 489-53 V1.1.0 (2017, draft)
  ETSI EN 302 018-1 V 2.1.1 (2017-04)

The use of this equipment is restricted and subjected to local licensing by Telecom Authorities

Buccinasco, Nov. 04th 2019

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Preliminary notes

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IE	IT	LU	LV	NL	PL	PT	SE	SI	SK

The FM transmitters, subject of this manual, are devices whose use is restricted in Italy and in all EU countries and subject to a user license by the competent Telecommunications Authority

CE   This label indicates the express declaration by SIELCO that the product associated with this manual conforms to Directives 2014/30/EU (low voltage), 2014/53/EU (RED), 2014/35/EU (Electromagnetic Compatibility)

📄   *For more information on how Sielco guarantees compliance with CE regulations, consult Chap. 4.*

Contents

1 INTRODUCTION

Congratulations on your purchase! The **PolyEco** series of transmitters is equipped with the most modern technologies that allow maximum performance and minimum operating costs thanks to the new DDS technologies in full compliance with the technical regulations.

The term "Eco" is part of the DNA of the new Sielco digital transmitter family. In fact, it is used to define:

- **Eco**nomic - defines new standards in terms of reduced consumption and therefore high efficiency
- **Environmentally friendly** - 7 kg of materials are saved and RoHS compliant components have been used
- **Eco**-design - simplicity of construction that reduces assembly, production and packaging times
- **Eco**-sustainable - targeted project to replace old polluting transmitters with an alternative that is not only environmentally friendly, but also elegant and efficient

The transmitters of the PolyEco range are available from 30 W (for typical use as an exciter) up to 1,000 W, perfect for N + 1 systems and as a reserve. Here are the main cutting-edge features of the PolyEco Series:

- **Low performance costs.** The particular design care reduces internal losses by reaching an even higher yield than the popular PolyHedra series, reducing power consumption and the consequent operating costs.
- **Low dissipation**. The reduction of internal losses minimizes heat dissipation, consequently the PolyEco Series appliances can also cope with the most demanding environmental conditions.
- **Super-compact size and reduced weight** - The most powerful model is so compact that it can be entirely contained within a standard 19" 2-unit rack.
- **Entirely digital** – Since PolyEco is based on DDS technology, all modulation signals are digitally acquired. This allows for an improved and more precise filtering processes, providing at the same time higher spectral purity and better usage flexibility.
- **Easy to use and to configure.** Control interface with a large touch screen display and a single button. This allows you to easily set the functions of the appliance and view its operating parameters in the blink of an eye.
- **Highly customizable, with many interfaces provided as standard** – PolyEco integrates a great number of standard interfaces (Ethernet, USB, etc.) that make it suitable for any application. In addition, it is designed for easy expandability with additional interfaces through customizable, easy-to-use software expansion packages in order to meet the user's needs.
- **Modulating signal exchanger provided as standard** – If the main signal isn't available, an automatic switch to the reserve one is performed in order to maintain uninterrupted modulation.
- **Integrated MicroSD mass storage** – (available soon) inside PolyEco you can insert a MicroSD card that allows the backup of audio files and transmitter configurations.
- **Sturdy modular construction**. Reliable modular construction minimizes and facilitates maintenance operations. In addition, it ensures a greater average time between failures, as well as ease of maintenance.
- **Constant nominal RF output power over the full FM range, particularly stable against time.** The output power may be varied from a minimum level and the nominal value, with the operating frequency including the full FM range, without adjusting other parameters.
- **RF output stage has a reverse intermodulation figure lower than the standard bipolar construction**, so low as to approach that of tube equipment, due to the LDMos design.
- **Stable, reliable power supply.** The entire line of transmitters integrates the use of power sources with active power factor correction (PFC), as required in recent regulations. As such, impact on the electrical power source is minimal, resulting in greater reliability of the entire device.
- **Easy diagnostics and easy-to-read parameters**, thanks to a comprehensive metering and alarms section on the LCD display. All parameters and alarms are easily accessible remotely via the remote-control input, which allows the user to change from stand-by to "on air" in a fraction of a second. Upon request, an external controller can be provided for long-range use of the device from an office or from other service points.
- **Compliance with the strictest regulations.** This device was designed in full compliance with CCIR, FFC, and other strict international regulations, as well as the recent, strict EC anti-magnetic noise requirements. In addition, this device complies with EC and ETSI EN 301 489-1 V2.2.0, EN 301 489-53 V1.1.0 and EN 302 018-1 V 2.1.1 standards.
- **AES / EBU in Wide mode**. In addition to the normal narrowband AES / EBU, you can also use the Wide mode which uses 192 kHz broadband sampling. This allows you to use an AES / EBU digital composite stream compatible with the most popular new digital compressors using a frequency up to 57 kHz that also supports RDS.

And that's not all: Sielco products provide greater value added and incomparable quality. For further details, refer to Chap. 4.

Please note that the manufacturer, in its continuous attempt to further improve the quality this product, reserves the right to change its technical features without prior notice.

Warning! Before initiating operations, it is essential to read this entire manual – with particular reference to Chap. 3 – in order to avoid damage to objects or people.

2 LIST OF SYMBOLS

REFER TO DOCUMENTATION

~ ALTERNATING VOLTAGE

I MAINS SWITCH ON

O MAINS SWITCH OFF

DANGER, RADIO FREQUENCY HIGH VOLTAGE

This product bears the selective sorting symbol for waste electrical and electronic equipment (WEEE). This means that this product must be handled to the local collecting points or given back to retailer when you buy a new product, in a ratio of one to one pursuant to European Directive 2012/19/EU in order to be recycled or dismantled to minimize its impact on the environment. For further information, please contact your local or regional authorities. Electronic products not included in the selective sorting process are potentially dangerous for the environment and human health due to the presence of hazardous substances Unlawful disposal of the product carries a fine according to the legislation currently in force.

3 SAFETY FIRST!

3.1 Symbols used

For quick reference, we used symbols that attract immediate attention, and which simply and efficiently advise and inform the user.

The symbol of the open hand stresses a description of the highest importance concerning technical assistance, dangerous situations, safety warnings, advice, and/or information of the highest importance. Where such symbol is not heeded, serious problems/consequences may arise.

The written notebook represents practical, important advice that we recommend be followed in order to obtain the best possible performance from the device.

The display messages (menu, options, etc.) are written `in this font` (Courier New).

Important sentences and words are underlined.

For ease of reference, cross references to sections, chapters, page numbers, diagrams, etc. may be indicated using the ⚑ symbol. For example: "⚑ 3.1" means "refer to section 3.1"

3.2 General warnings

Before connecting or using this device, carefully read all instructions contained in this manual, in the order in which they are written. Cross references to sections and chapters were created exclusively for ease of use. Keep this manual in a safe place for future reference.

IMPORTANT: Improper use or installation of this device could cause serious damage to objects and people alike. Therefore, it is essential to rely on an installer who has been previously authorized or approved by Sielco, or by our local representative, and that both the user and the installer read the entire manual before carrying out any operation.

All warnings included in this manual must be strictly followed to avoid damages to both the device and the operator. Read and follow all instructions indicated on warning labels or affixed to the device and its accessories.

The PolyEco Series family of transmitters and amplifiers has characteristics common to all its models. However, each version is characterized by different transmission power and specific features, offered as standard or optional, that make it unique. For this reason, it is important to verify the exact model of your device, as explained in detail later in this manual.

Depending on the model used, the device may be of a weight such as not to permit it to be moved by a single person and without the proper equipment. In this case, the transmitter should only be moved exclusively with the proper equipment and having taken the proper precautions. The same is true for various internal parts. In case of doubt, contact Sielco.

Do not turn on the device without having duly wired and connected it, as explained in Chap. 7.

Always follow the laws and regulations stipulated regarding the use of broadcast transmitters, as in effect in the geographical area in which you are operating.

This manual describes in detail the menus that appear on the LCD display: as the software is continually updated, some of the screens shown in the chapters below may be different from those that appear on your device. In case of doubt, contact Sielco.

3.2.a General safety recommendations

When connecting the equipment to the power supply, please follow these important recommendations:

- **This product/system is intended to operate from a power source that will not apply more than 10% of the specified voltage between the supply conductors or between supply conductors and ground. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation and to electrical shocks.**

- **This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired socket before connecting to the product input or output terminals.**

- **Upon loss of the protective-ground connection, all accessible conductive parts (including parts that may appear to be insulating) can render an electric shock.**

- **To avoid fire hazard, use only fuses of correct type, voltage rating, and current rating. Refer to qualified service personnel for fuse replacement.**

- **To avoid explosion, do not operate this equipment in an explosive atmosphere.**

- **To avoid personal injury, do not remove covers or panels. Do not operate the system without the covers and panels properly installed.**

3.2.b   Good practices

In maintaining the equipment covered in this manual, please keep in mind the following, standard good practices:

- **When connecting any instrument (wattmeter, spectrum analyzer, etc.) to a high frequency output, use the appropriate attenuator or dummy load to protect the final stages of the amplifiers and the instrument input.**
- **When inserting or removing printed circuit boards (PCBs), cable connectors, or fuses, always turn off power from the affected portion of the equipment. After power is removed, allow sufficient time for the power supplies to bleed down before reinserting PCBs.**
- **When troubleshooting, remember that FETs and other metal-oxide semiconductor (MOS) devices may appear defective because of leakage between traces or component leads on the printed circuit board. Clean the printed circuit board and recheck the MOS device before assuming it is defective.**
- **When replacing MOS devices, follow standard practices to avoid damage caused by static charges and soldering.**
- **When removing components from PCBs (particularly ICs), use care to avoid damaging PCB traces.**

3.2.c   First aid in case of electrical shock

If someone seems unable to free himself under electric shock contact, turn the power off before rendering aid. A muscular spasm or unconsciousness can make a victim unable to free himself from the electrical power.

If power cannot be turned off immediately, very carefully use a non-conducting material (such as wood, insulating material, or clothing) to pull the victim free of the power. Carefully avoid touching the victim or his clothing until free of power.

DO NOT TOUCH VICTIM OR HIS CLOTHING

BEFORE POWER IS DISCONNECTED OR YOU

CAN BECOME A SHOCK VICTIM YOURSELF

3.2.d   Emergency resuscitation technique

Step 1

Check the victim for responsiveness. If there is <u>no response</u>, immediately call for medical assistance, and then return to the person**.**

Step 2

Position the person flat on their back. Kneel by their side and place one hand on the forehead and the other under the chin. Tilt the head back and lift the chin until teeth almost touch. Look and listen for breathing.

Step 3

If not breathing normally, pinch the nose and cover the mouth with yours. Give two full breaths. The person's chest will rise if you are giving enough air.

Step 4

Put the fingertips of your hand on the Adam's apple, slide them into the groove next to the windpipe. Feel for a pulse. If you cannot feel a pulse or are unsure, move on to the next step.

Step 5

Position your hands in the center of the chest between the nipples. Place one hand on top of the other.

Step 6

Push down firmly two inches. Push on chest 15 times.

CONTINUE WITH TWO BREATHS AND 15 PUMPS UNTIL HELP ARRIVES

3.2.e   Treatment for burns

- **Continue treating victim for electrical shock.**
- **Check for points of entry and exit of current.**
- **Cover burned surface with a clean dressing.**
- **Remove all clothing from the injured area, but cut around any clothing that adheres to the skin and leave it in place. Keep the patient covered, except the injured part, since there is a tendency to chill.**
- **Splint all fractures. Violent muscle contractions caused by the electricity may result in fractures.**
- **Never permit burned surfaces to be in contact with each other, such as: areas between the fingers or toes, the ears and the side of the head, the under surface of the arm and the chest wall, the folds of the groin, and similar places.**
- **Transport to a medical facility.**

3.3   Safety warnings

3.3.a   Introduction

The equipment or the system that this manual is referred to is developed, produced and tested following the relevant safety standards EN 602125. The following safety instructions advice the operator about the dangerous operation concerning the equipment. The user must read the safety instructions contained in the manual and they must follow them. As mentioned on the safety rules qualified technical staff only can operate this equipment. Sielco srl declines any responsibility for damages caused by an improper use or improper setting up performed by inexperienced staff, not qualified or operating with instruments or tools not in compliance with safety set of rules.

The staff in charge, besides being technically qualified, must be trained in first aid in case of emergency or accident (reanimation, heart massage, mouth to mouth respiration, etc.).

Before going on with the operations to be performed, it is necessary to know the position of the general electric switch and the one of the extinguishers, which have to be used very quickly if necessary.

3.3.b   Checking of safety conditions

The following connections and verifications must be observed to guarantee the safety for the personnel:
- Correct connection with the antenna cable

- Correct connection with a mains line cable

- Correct connection with a ground cable (EARTH CONNECTION)

- Verification of the ambient (where the equipment is installed) compliance with the specification declared by the manufacturer: altitude, humidity, temperature.

3.3.c   AC / DC Line warning

This equipment works with dangerous high voltages and currents. Any voltage present inside this equipment can be potentially dangerous for personnel. The technical staff designed for the service and repair operations must be qualified and they must take the appropriate safety measures stated in safety rules.

3.3.d   Service and operational warning

The technical staff in charge of the service operations on the inside of the equipment with any cover removed must check that the mains line is disconnected. After the service operation is completed, the covers must be correctly mounted before the connection with the mains line. The high voltage is present on the mains stage of the equipment also when the mains switch is in the OFF positions and the mains line cable is connected.

If it is really necessary, and after authorization of Sielco srl, very qualified technical staff only can work on or with live parts. In this special case special safety precautions must be taken. Sielco srl declines any responsibility if any safety rule is not respected. The replacement of the accessible fuse must be made with the transmitters turned off and using a fuse with the identical characteristics only as specified by the manufacturer.

Care must be taken when the equipment is switched on, as dangerous R.F. high voltages are available both at the RF output and inside the equipment.

The electromagnetic fields generated nearby an antenna and/or nearby its connecting cables may cause risks of fire, electric shock or burns.

Before working inside the equipment, disconnect the power supply through an external switching breaker (⌑ Chapter 7).

The switches embedded in the unit do not guarantee complete separation from the mains: some circuits are stay live.

High earth leakage currents! Before connecting the power supply, a good ground connection must be provided.

4   SIELCO PRODUCTS AND VALUE ADDED

4.1   Full conformity to EC regulations

As is well known, broadcast devices must conform to strict regulations in terms of quality, safety, and electromagnetic compatibility. The latter aspect is of particular importance, as it ensures that the transmitter does not interfere with other devices and that it is not interfered with. In ensuring electromagnetic compatibility, a number of extremely precise measurements are taken that are often performed by people using inappropriate or uncertified devices; therefore, any results obtained under such conditions are unreliable. For example, if a user is not equipped with an extremely expensive, large anechoic room duly certified by a competent body, measurements may be rendered entirely useless.

Sielco is particularly careful about guaranteeing its clients conformity to regulations. To this end, after having taken measurements during the research phase, Sielco uses a certified laboratory and an international certification body (for this product family it is TUV) to certify the full conformity of its products based on measurements taken according to regulations.

4.2   Quality in series manufacturing

A famous ad running since the 1980's guarantees "reliable quality over time". In order to ensure that each device produced in the series conforms to testing and validation regulations, Sielco has established specific procedures to maintain the required quality standard.

4.3   Savings on all fronts

Choosing a product merely because it costs less than another one doesn't make sense if its performance costs are high. For this reason, Sielco has undertaken to ensure that its products provide maximum return on the investment made in purchasing them. In particular, the PolyEco Series transmitters are distinguished by the following features:

- **Savings in electrical consumption** – the high yield allows for significant savings in terms of electrical energy consumed. In terms of the RF power supplied, a smaller electrical bill "reimburses" the user a portion of the purchase cost – month after month. This may seem insignificant, but if you compare our 5 kW transmitter to the average comparable product available on the market, the savings in electricity consumption cover the full cost of the device within just over three years.

- **Economy of space** – the exceptional compactness of PolyEco transmitters significantly reduces bulk, and therefore the rental on locations in which the transmitters are installed.

- **Lower transportation costs** – the light weight of PolyEco transmitters also results in lower transportation costs – an aspect that considerably lowers the total "keys in hand" cost.

- **Less maintenance** – the high energy yield also means less heat dissipation and less wear on components, minimizing service calls and their associated expenses.

5   IDENTIFYING YOUR MODEL

The PolyEco Series family of transmitters has characteristics common to all its models (for example the command menu, the primary controls, the primary connection inputs, etc.). However, each model is distinguished by a different transmission power. For this reason, it is important to verify the exact model of your device as follows.

In the upper section of each screen appears the indication of the model in use, as in the following example where the **Home** screen is shown.
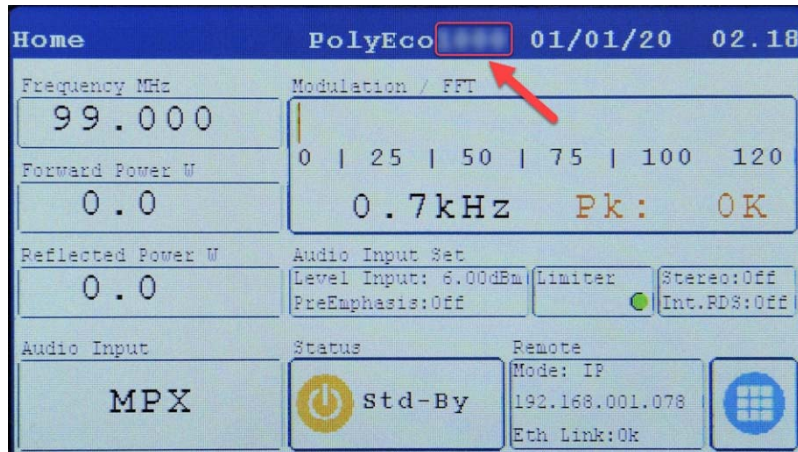
The models available at the date of writing of this manual are as follows:

Model name	Rated power	Antenna connector	Power supply connector
PolyEco 50	Up to 50 W	N	IEC C14
PolyEco 100	Up to 100 W	N	IEC C14
PolyEco 300	Up to 300 W	N	IEC C14
PolyEco 500	Up to 500 W	7/16"	EN 61984:2009-06
PolyEco 1000	Up to 1,000 W	7/16"	EN 61984:2009-06

For further details on the **Home** screen ↳ 11.1.

🖐 **To make sure that the output power is suited to application being considered, please verify the exact model of your device.**

6 EQUIPMENT DESCRIPTION, COMMANDS AND INPUTS

The primary commands and connections for the PolyEco Series are common to all the models. This section allows you to identify the locations of available commands and inputs.

6.1 Location of parts

Front
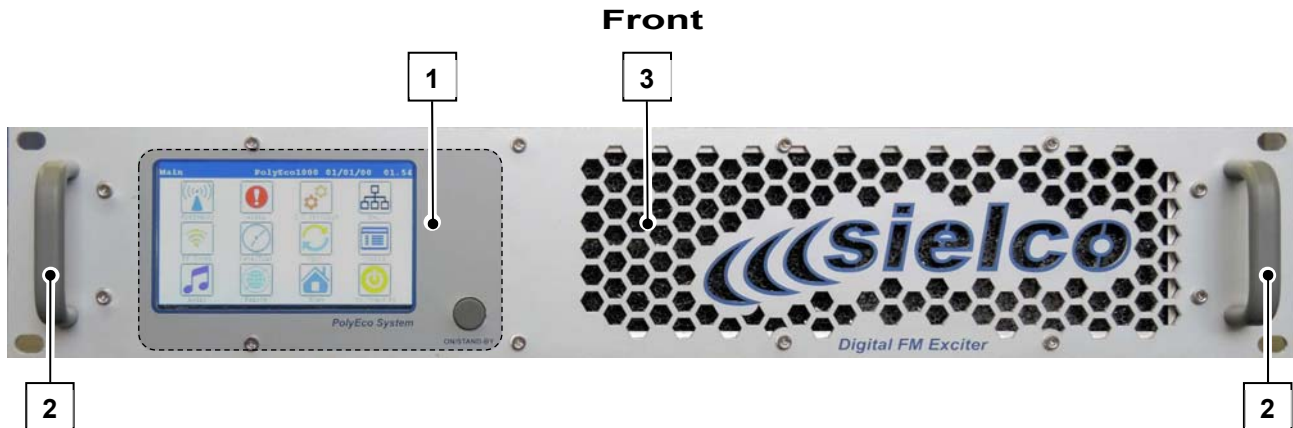
Dimensions (L x H x D): 483 x 88 x 440 mm – weight 10 kg max.

[1] **Control panel** – allows you to set the functions of the equipment, and view and set its operating parameters. It's composed of the following parts:

- **LCD touch screen display** – graphic touch screen that allows you to view the operating parameters of the equipment and set them.
- **ON/STAND-BY button** – allows you to start the equipment (ON - set it into operating mode) or put it in the standby state (STAND-BY).

📄 *For more information on the use of the navigation commands in the menu ⏎ 9.1.*

[2] **[Handles** – allow the user to easily pick up the device to remove it from or insert it into a mobile rack.

[3] **Front ventilation grid** – allows the device to draw in cool air.

Rear

Equipment with power up to 300 W
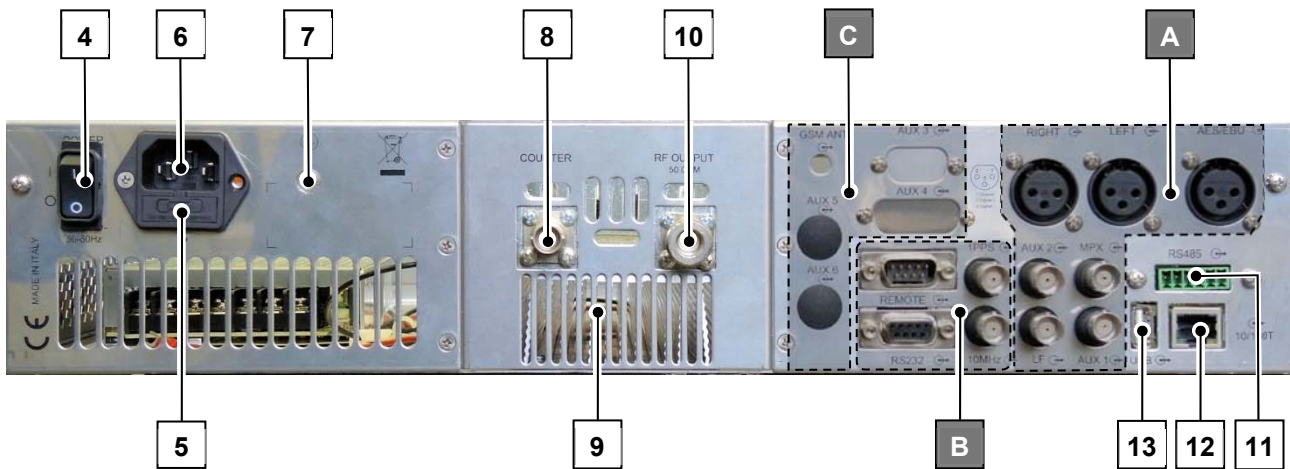
Equipment with power over 300 W
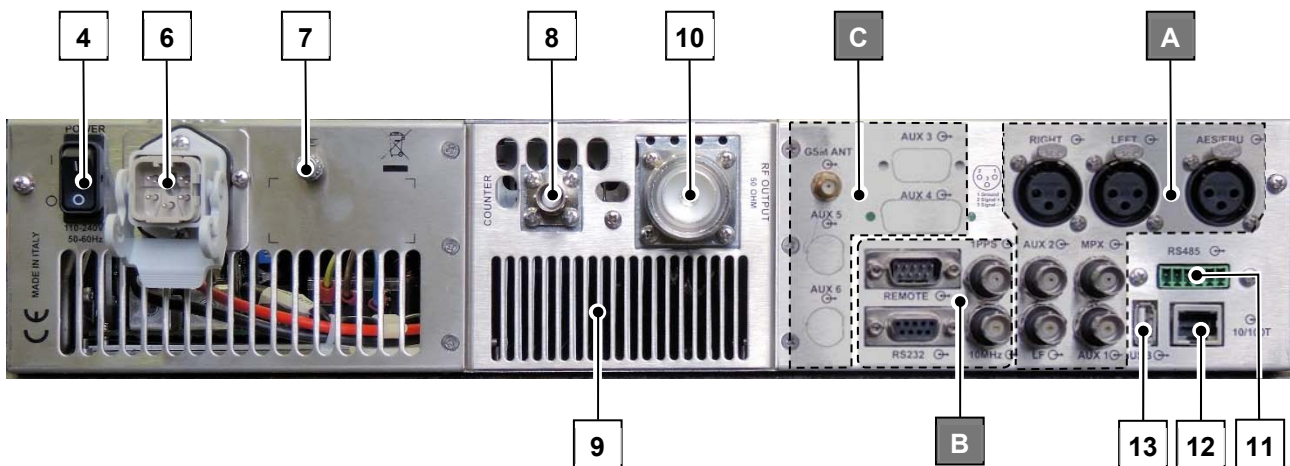
📄 *For further information about settings and configuration of the various interfaces 🗐 11.*

[4] **General power switch (POWER ON)** – General power switch (POWER ON) – allows the user to turn the general system power on and off.

[5] **Fuse holder** – protective fuse holder for the power supply socket (only in the equipment with power up to 300 W).

[6] **Power socket** – (EC14 in models up to 300 W, EN 61984:2009-06 in the ones with higher rated power) used to connect the device to a mains supply.

[7] **Ground connection** – used to ground the device, to ensure safe operation.

[8] **COUNTER** output – BNC-type connector that allows picking up low level R.F. signal, useful for the connection to external measurement instruments. Output level varies, according to model, between 0 dBm and +15 dBm.

[9] **Ventilation grid** – for heat dissipation or, on models with forced air circulation, for expelling air brought in through the front ventilation grill to cool the device.

[10] **RF OUTPUT socket** – an antenna suitable for FM broadcasting capable of supporting the transmitter's rated power must be connected to this socket (N in models up to 300 W, 7/16 "in higher power versions).

[11] **RS485 serial port (only on some models)** – this RS 485 serial port allows the user to connect multiple transmitters in series, each of which is identified via a previously assigned logical address.

[12] **10/100 T socket**) – input for LAN connection using 10/100 Base-TX standard Ethernet.

[13] **USB socket** –multifunction USB socket.

In addition to these connectors, the areas **A**, **B** and **C** are provided with additional connectors described in the following paragraphs).

6.1.a   A AREA - Modulation inputs and low frequency sample output

[14] **RIGHT** – balanced input (female XLR) for modulation of the right audio channel. This input can also accept a mono signal for monophonic transmissions.

[15] **LEFT** – balanced input (female XLR) for modulation of the left audio channel.

[16] **AES/EBU** – input (female XLR) for AES/EBU digital standard.

[17] **AUX 1** – (BNC-type unbalanced connector with grounding shield) auxiliary modulating channel input (RDS/SCA) at low frequency on a 20-100 kHz band for connection to an RDS encoder.

[18] **AUX 2** – (BNC-type unbalanced connector with grounding shield) auxiliary modulating channel input (RDS/SCA) at low frequency on a 20-100 kHz band for connection to an RDS encoder.

[19] **MPX** – (BNC-type unbalanced connector with grounding shield) externally created broadband stereo composite modulating signal input.

[20] **LF** – (BNC female type) low frequency signal output socket.
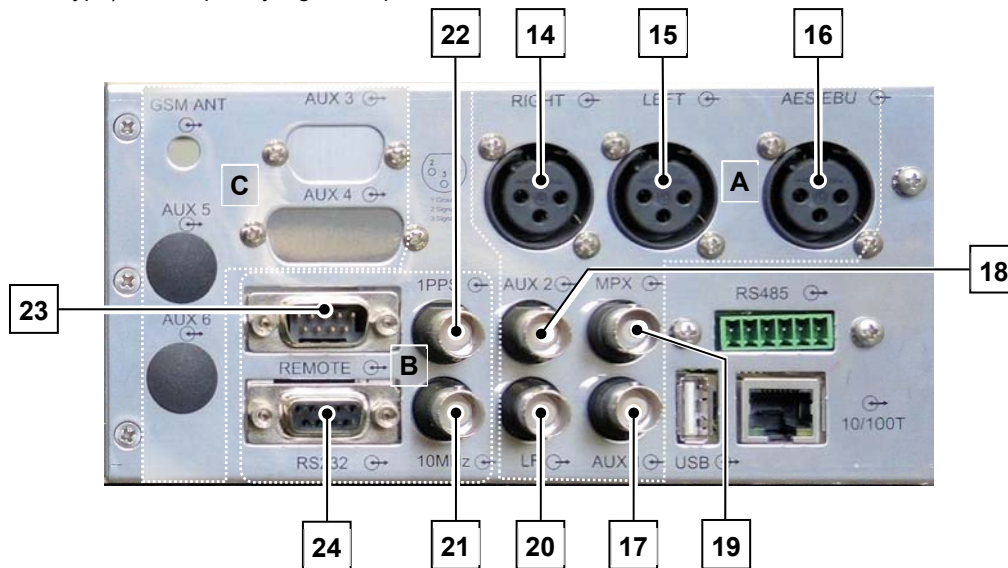
6.1.b   B AREA - connectors for references and remote controls

[21] **10 MHz input** – used for external synchronization with 10 MHz signal.

[22] **1PPS input** – used for external synchronization with 1 PPS signal.

[23] **REMOTE control input** – this 9-pin SUBD connector allows the user to remotely control the device or to perform other functions via a suitable interface. The connection standard guarantees compatibility with previous generation Sielco devices. For connections to this input ⌕ 7.4.d.

[24] **RS232 serial programming port** – this female RS 232 Sub-D9 port with inverted cable allows the user to control the transmitter via a computer or an external point-to-point control device. For details ⌕ par. 7.4.e.

6.1.c   C AREA – Slots for auxiliary sockets

In these slots it is possible to install optional auxiliary connection sockets (e.g. relay connection to the output, antenna for remote control via GSM cellular networks, etc.).

7 INSTALLATION

✋ **Warning! To ensure safe performance, it is absolutely essential that all the instructions outlined in this chapter be complied with.**

7.1 Check the supplied parts

Before using your transmitter, ensure that the following parts are included in the package:

- The transmitter
- This user manual
- A power cable equipped with suitable connector

If any parts are either missing or damaged, contact your supplier at once.

7.2 General safety rules

✋ **Warning! In order to prevent serious damage to objects or people, the following rules must be strictly followed.**

- Although no special instruments are required in most cases, the device should be installed by skilled personnel only. To make best use of the device and prevent damage to the unit, it is necessary to comply with the instructions outlined in this manual. Should doubts or technical problems arise during the installation procedure, it is strongly recommended that you contact Sielco or a local agent/dealer.
- Should technical problems or doubts of any kind arise during installation, Sielco would be happy to provide qualified technical assistance. Technical intervention by personnel not authorized by Sielco should not be performed.
- As a rule, the user should not access the inside of the device. Tampering with the factory settings renders our warranty null and void, and may also affect the device's performance, causing costly damage.
- No adjustments or internal calibrations are required for normal operations. The device must be properly grounded and must be used with all the covers closed in order to prevent electrical shocks and to fully comply with EC, EMI, and other safety regulations.
- Never touch the inside of the device without first disconnecting it from the mains. AC, DC, and radiofrequency voltages are present inside the device and can be dangerous when the covers are removed.
- Do not operate the device without the covers properly screwed into place. Using an open transmitter may be dangerous to objects or people. In addition, if the top cover is removed, this may cause the device or other electronic measurement instrument to perform incorrectly due to the elevated RF fields.

7.3 Placement of the device

7.3.a Choosing the proper room and placement

- Install the device in a dry, sheltered, well-ventilated room away from dust, moisture, insects, and rodents (mice).
- Room size should be such that the device can be placed in an upright position, and that technical personnel can easily perform routine or extraordinary maintenance. Evaluate the minimum size according to the power supplied by your model, taking into account that a volume of 2.5 x 2.2 m in height is required for a transmitter with 1 kW of power, and that no other transmission or auxiliary devices should be present in the vicinity.
- Place the equipment as close as possible to the antenna, in order to prevent excessive power loss in the cables. If this is not feasible, use antenna cables with low loss and suitable cross-section.
- Vents in the walls and any other openings must be fitted with metal gratings to keep rodents and insects out, and must be equipped with a dust filter. Make absolutely sure that no water can seep through the vents, the air exhaust duct, or the antenna-cable grommet. Also confirm that the floor is not at risk of flooding during heavy rainfall.

7.3.b Climatic conditions

- In order to achieve optimum performance in terms of power, life span, etc., the ideal room temperature should range between 0 °C and +35 °C. As a general rule, the useful life span of the device may be halved by a 10 °C increase in room temperature, should the temperature exceed 30 °C. The pre-set over-temperature alarm will activate when the limit of 45 °C is exceeded. It is advisable to hang a minimum/maximum thermometer on the wall to indicate variations in temperature.
- The room must be ventilated to ensure that the temperature never exceeds 35 °C. Such conditions can NOT generally be met when the exhaust cooling air is not pushed outside and is instead fed back into the room. This also occurs if more than one device is installed in the same location. An efficient ventilation system with air exchange is thus required in the room. For your reference, the air flow rate required for proper functioning of a 1 kW transmitter must be at least 500 cubic meters per hour. Evaluate this element in proportion to the power supplied by the model you are installing.
- If the device is placed on a rack, the rear door of the rack can't usually be secured. If the system must be completely enclosed, a ventilation and air removal system must be created. To encourage air flow, a flange can be installed at the ventilation outflow,

to which a hot air discharge conduit can be connected to the exterior. In this case, it is important to remember that the transmitter's internal fans are low pressure units and that it is fundamental for an exhaust fan to be installed on the air discharge conduit.

- The best solution is to keep the room at 20-25 °C. Thermal insulation and effective ventilation via a fan controlled by a thermostat generally represent the most advantageous solution.

- Excessive concentrations of moisture and/or dust in the air or in the room may cause a condensation build-up in the transmitter. If the system is periodically switched on and off, this can trigger destructive electric arcs and short circuits, and thus cause damage that is not covered by warranty.

7.3.c   Electrical conditions

- The mains capacity must be proportionately designed to adequately support the device's power consumption (including a sufficient safety margin).

- For devices with power between 30 and 300 W, the voltage supply range is 185 - 265 V_{AC} (nominal voltage single-phase 230 V_{AC}).

- Mains fluctuations and electrical discharges due to weather or nearby industrial machinery may cause significant trouble, especially in mountain areas and in locations close to industrial areas.

- In such cases, it is advisable, if not indispensable, to install a protector, an insulating transformer, or possibly an electromechanical mains voltage regulator. Upon request, Sielco can provide all of these accessories.

- Even though the mains regulator allows for a wide incoming voltage range, it is important to avoid operating using high impedance mains lines in proximity to the lowest permitted AC limit: if the line falls below a given value while fully loaded, the control circuit for the lowest AC limit may trigger a very dangerous oscillating on/off cycle. In such cases, we recommend using a stabilizer on the external line.

📓 *Since the total cost of the system, inclusive of broadcasting equipment, antenna system, and installation, is rather high, a certain percentage of the budget should be set aside for purchasing and installing suitable protection and conditioning facilities. Depending on the location, the percentage of the total cost should be approximately 10-20% of the total amount. However, such additional costs will be amortized very quickly since the device operates under ideal conditions; as such, its useful life will increase and, in particular, the incidence of accidental breakdowns due to ambient or mains trouble will be reduced.*

7.4   Wiring the device

This section describes the minimum connections required to place the transmitter in operation.

7.4.a   Connection to the antenna

Connect the **RF OUT** connector to the antenna or to the next RF amplifier via a high-quality 50 ohm shielded coaxial cable equipped with the appropriate connectors.

It is indispensable that only low-loss cables be used when connecting directly to the antenna: in such cases, Celflex or another similar ½" cable is recommended. Larger cables must be connected using flexible terminal ends of smaller section, in order to avoid mechanical stress on the output connector.

✋ **It is very important to ensure that the antenna, cables, and connectors have the correct impedance and are appropriate to the transmitter's nominal power level.**

✋ **The antenna must be suitable for FM broadcasting and able to resonate at the operating frequency with the minimum possible SWR.**

✋ **The antenna must be grounded via a copper braid of suitable cross-section to prevent lightening or static electricity from reaching the amplifier through the antenna cable.**

7.4.b   Connection to main modulation signals

📓 *For further details ⏎ Chapter 8*

Connect the **L/R, MPX**, **AUX**, **RDS**, **AES/ABU**, etc. modulation inputs based on your desired operating mode and the type of source being used (mono, stereo, or multiplex signal).

7.4.c   Connection to the mains

1) Verify that the rear power switch is turned off; if it is not off, turn it off now.
2) Ground the system.
3) According to your model, connect the power cable or the device's cable to a suitable single-phase input (230 V_{AC} nominal voltage).

✋ **Before connecting the power, ensure that it is appropriate and is able to support the consumption required by the transmitter model you intend to use.**

✋ **The power supplied by the mains input must satisfy the requirements outlined in par. 7.3.c.**

✋ **In order to ensure proper operation and comply with safety regulations, proper grounding is required. Use the yellow/green lead in the power cable. The cable neutral lead is blue. <u>Never connect the earth to the mains neutral lead.</u>**

✋ **Use only the power supply cable supplied with the transmitter. For cable extensions, sections of sufficient and appropriate length are recommended.**

✋ **Never turn the device on without an antenna connection, even when in stand-by.**

7.4.d   Parallel port for REMOTE control (optional)

Where necessary, connections can be made to the **REMOTE** parallel port. Various lines are located in this port for simple, direct control of the transmitter via a male DB9 connector.
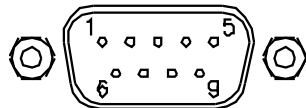
Connection of the pins is outlined in the following table:

N.	Connection	Notes
1, 5 and 8	ground	
2	"on the air" signal	+12 V with 10 kohm indicates that the transmitter provides considerable RF power, but not necessarily the correct level
3	direct power	A signal proportional to the direct power is present and is of a pseudo-quadratic type proportion. The variation field ranges between 0 and 5 V_{dc} with an impedance of 1 kohm. On the 1 kW 5 V model, this equals 1500 W
6	disable RF	This line's grounding deactivates the RF output. The maximum signal level is approximately + 10 V /1 mA
7	alarm	A low logic signal indicates an alarm. Normal function is indicated by the presence of + 12 V on 10 kohm. The maximum absorption capacity for the external current is limited to 10 mA

7.4.e   Connection to the RS232 port

Where necessary, connections can be made to the **RS232** port. This port manages Tx, Rx, and related return data signals via a RS232 standard without any "handshake" signal.

The above signals are inversely connected to the port; as such, a simple pin-to-pin type serial cable is sufficient, directly connected to suitable connectors, usually a female DB9 or DB25 on the PC port and a male DB9 connector to the transmitter. The applicable communication software is also required.
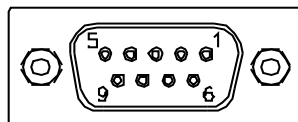
✋ **Never connect the cable if the PC or transmitter are turned on.**

8 AUDIO OPERATING MODES AND ASSOCIATED BF CONNECTIONS

This section describes how to select the various available operating modes, and how to make audio connections according to your requirements.

The transmitter is equipped with numerous characteristics specific to high-fidelity systems; as such, it should be connected to modulating signals with the same care as a Hi-Fi system, avoiding ground loops as much as possible. Under these conditions, you will obtain optimal performance.

According to the operating mode and type of modulation source available, you can connect to the modulation inputs in various ways:

* Monophonic transmission from an audio signal, via the main mono channel
* Monophonic transmission from a stereophonic audio signal, using the internal stereo encoder
* Stereophonic transmission from a stereophonic audio signal, using the internal stereo encoder
* Monophonic or stereophonic transmission from an external encoder or radio link receiver.

The device is also able to transmit an auxiliary signal (RDS or SCA), connected to the rear **AUX** input as described below.

📄 *For details about the software settings related to modulation* 📑 *10.1.c and 10.1.g.*

8.1 Mono transmission from a mono signal

1) Connect the **RIGHT** connector to the monophonic audio signal. Connection to the **LEFT** input is not necessary.
2) Using the `Audio` menu, disable the stereo mode.
3) Confirm or change pre-emphasis according to the local standard.

8.2 Mono transmission from a stereo signal

1) Connect the **RIGHT** connector to the right audio channel.
2) Connect the **LEFT** connector to the left audio channel.
3) Using the `Audio` menu, disable the stereo mode.
4) Using the `Audio`, confirm or change pre-emphasis according to the local standard.

8.3 Stereo transmission from a stereo signal using the internal stereo encoder

Follow the steps outlined above, making sure to enable the stereo mode.

8.4 Monophonic or stereophonic transmission from a multiplex signal

If you wish to use a multiplex signal (MPX) originating, for example, from an external encoder or a radio link receiver, follow the steps below:

1) Connect the multiplex signal to the **MPX** connector. The multiplex signal is already pre-emphasized; as such, using the MPX input, the filtering and stereo encoding stages are skipped and the signal will not be further pre-emphasized.
2) Using the `Audio` menu, set the modulation mode to **MPX**.

📄 *If the cable delivering the signal to the MPX connector is only a few meters long, a 50 ohm (RG58) cable can be used; If the distance is greater, a 75 ohm (RG59) or 92 ohm (RG62) cable should be used.*

8.5 Connection to LEFT, RIGHT, or MPX modulation connectors

The PolyEco Series supports both balanced and unbalanced audio signals according to the connection that is made in the three **XLR**, **LEFT** and **RIGHT** connector contacts. The input impedance for these contacts is pre-set at the factory at 10 kohm resistivity (5 kohm for unbalanced connections), which can be decreased to 600 ohm if necessary, as explained further ahead.

Normally, an **XLR** audio input with balanced connection is used for connection to the balanced output of a professional mixer. Alternatively, an unbalanced connection can be used, and is useful for output connections on inexpensive devices, without a perceptible degradation in the audio signal.

Alternatively, to connect to the **LEFT** and **RIGHT** connectors, an externally created multiplex signal can be connected to the **MPX** connector. In this case, connection should not be made to the **LEFT** and **RIGHT** connectors.

8.5.a   Balanced connection to the LEFT A and RIGHT A connectors

The output for a mixer or any other audio processor that drives a transmitter with a balanced coaxial cable should be connected at pin 3 (+) and pin 2 (-). The cable shield, connected to the ground of the audio driver device, must be connected to pin 1.
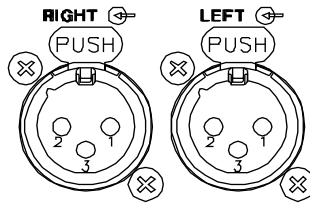
📄 *Balanced connection offers the greatest advantages. For example, cables connected to a source can greatly exceed 100 meters in length.*

8.5.b   Unbalanced connection to the LEFT and RIGHT connectors

For driving with an unbalanced signal, input pin 2 must be short-circuited with the ground and the shield to pin 1, while the signal must go to pin 3. In such case, the highest impedance selection will be 5 kohm rather than 10 kohm.

8.6   Connection of the AES/EBU A digital audio input

Two interface standards are commonly used for digital audio that differ for names and for the connectors but are mainly compatible for the signal protocol. They are:

- AES/EBU, defined by Audio Engineering Society and European Broadcast Union. This is the standard universally used on professional and broadcast equipment. Signal is carried on a balanced twisted shielded cable with 110 ohm impedance. The interface connector is usually a balanced 3-pin XLR type.

- S/PDIF, a consumer standard jointly set by Sony and Philips (Sony/Philips Digital Interface Format). It is very similar to AES/EBU and is mostly used on consumer equipment. The signal is carried on a 75 ohm unbalanced shielded cable and the interface connector is an RCA plug. EIAJ CP-1201: is the corresponding Japanese standard.

📄 *Adapters exist which permit to transform the RCA jack of S/PDIF to the balanced XLR connector of AES/EBU specifications.*

📄 *The latest AES3 standard is available from the Audio Engineering Society or ANSI at www.aes.org or www.ansi.org.*

📄 *The Japanese EIAJ CP-1201 standard is available from the Japanese Electronics Bureau. For further information, refer to "AN22 - Digital Audio interface overview" Application Note available on Cirrus Logic's website: www.cirrus.com.*
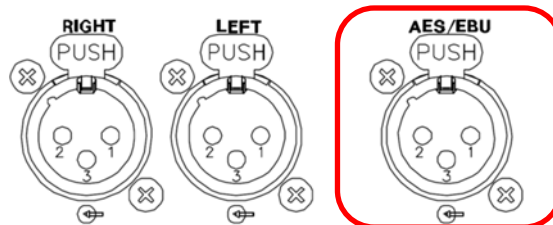
📄 *PolyEco, in addition to the normal AES / EBU mode, can also use the Wide mode which uses AES broadband sampling at 192 kHz. This allows you to use an AES / EBU digital composite stream compatible with the most popular new digital compressors using a frequency up to 57 kHz which also supports RDS*

8.6.a   Advantage to use the AES/EBU standard

The main advantage of digital process and transmission is its virtual insensitivity to external noise when properly managed. Analog to Digital conversion performs better than Digital to Analog conversion. However, these conversions will introduce small delays and subtle artifacts, so it is good practice to avoid multiple conversions from analog to digital signals or vice-versa.
In the case of broadcast analog FM transmission, the final D/A conversion may conveniently take place just before signal input to the transmitter or directly in the front-end modulation input of the transmitter itself.

8.7   Connection to MPX input

The MPX input permits to use an externally created stereo multiplex signal as modulation input. This may come from an external stereo encoder.
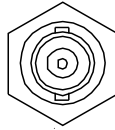
📄 *If the cable delivering the signal to the MPX connector is only a few meters long, a 50 ohm (RG58) cable can be used. If the distance is greater, a 75 ohm (RG59) or 92 ohm (RG62) cable should be used.*

8.8   Pre-emphasis

The low frequency audio signals of mono and stereo channels must be properly "pre-emphasized". The standard pre-emphasis is 50 or 75 µs, the first value usually being the one usually factory preset. Confirm that this value is appropriate in your country: it is the standard value for all countries in Europe, most of the Pacific regions, and some countries in South America. However, the North American FCC standards require 75 µs

If a change in the pre-emphasis is needed, use the `Audio` menu (📖 10.1.e).

8.9   Operating with the RDS and SCA encoders

In addition to the aforementioned operating modes, this device is able to transmit an auxiliary signal (RDS or SCA) connected to the rear **AUX1** terminal as follows:

1)   Connect the **AUX 1** terminal [17] to the RDS or SCA encoder output.
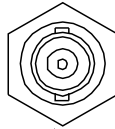
2)   Using the `Audio` menu, change the channel input sensitivity and, where necessary, the external generator level so as to obtain the required deviation. For RDS encoders, a reading of -11.5 dB or 2 kHz is the standard modulation value.

3)   Modulation and deviation can be viewed on the `Home` screen, in addition to any other multiplex signals available at that time.

📄 *If the cable delivering the signal to the AUX 1 terminal is only a few meters long, a 50 ohm (RG58) cable can be used. If the distance is greater, a 75 ohm (RG59) or 92 ohm (RG62) cable should be used. The same is valid for connection to the MODULATION MONITOR input.*

9   MENU AND NAVIGATION COMMANDS

To view the device operating parameters, and to set parameters according to your requirements, you will need to navigate the commands menu shown on the LCD touch screen display. The screen is also used to navigate the menu hierarchy.

9.1   Navigating the commands menu

Generally, you can navigate the commands menu as follows:

1) Within seconds after the equipment has been switched on, the **Home** screen is displayed, which summarizes the transmitter's main operating parameters.

2) In the **Home** screen, tap the [icon] icon on the touch screen (it is present in every screen) to reach the **Main** screen. From the latter you can access the various sections (in the example below **Frequency**) to inspect the current parameters values (usually in the upper section of the screen) or, if necessary, to change them.
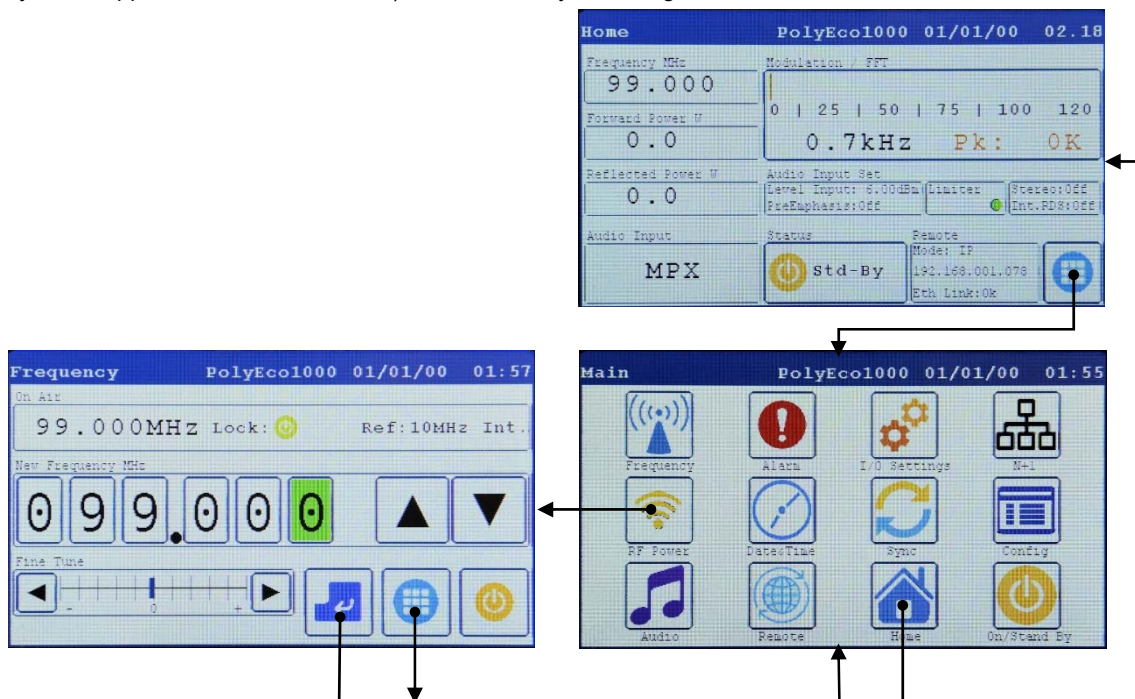
3) Parameters are usually modified by first touching the single values to select them (in the example, the **0** digit on the frequency has been selected) and then by using the ▲ (increase value) ▼ (decrease value) keys to change them.

4) To return to the **Main** screen from any section of the menu, you can perform one of the following operations:

• Tap the [icon] icon (Enter) to save the new settings entered in the current section.

• Tap the [icon] icon again to exit without saving the variations in the settings of the current section.

📄 *While in the* **Main** *screen, if no command is entered for two minutes, the device will automatically return to the* **Home** *screen.*

If, however you need to go back immediately to the **Home** *menu, tap the Home* [icon] *icon.*

9.2   Transmission and stand-by

Every screen includes the icon of the **Status** section, which is either green [icon] when the device is the transmitting state (**On Air**) or orange [icon] when the device is the stand-by (**Std-By**). To switch between states, you only need to tap the icon (or press the **ON/STANDBY** key), whose color will be updated accordingly:
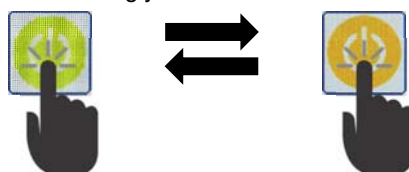
9.3   Identifying screens, date/time and alarms

The blue bar in the upper section of every screen shows in sequence <u>the screen name</u>, <u>the equipment model, the current date and time</u>. The example below shows the **Audio** screen from the **PolyEco1000** transmitter, taken on the day **01/01/2020** at **01:59**.
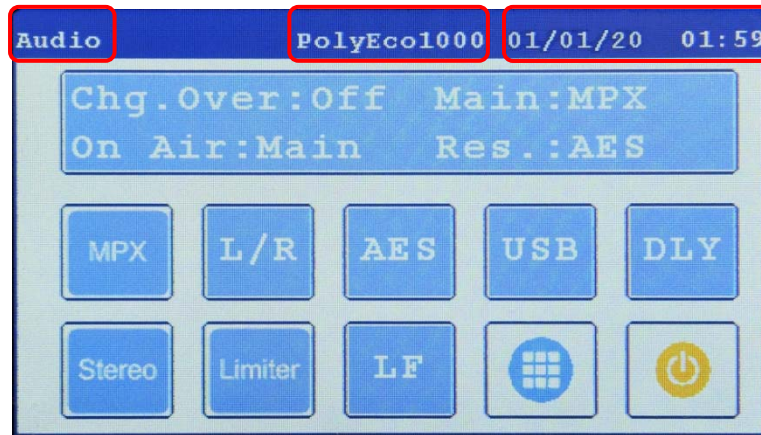
📄   *When an alarm event occurs, the blue bar starts flashing turning alternately red. While it is red, the active alarm is shown. For further details ↗ 11.6.*

10 BASIC OPERATIONS

✋ **Immediately following installation, the first time the device is turned on, it is absolutely fundamental that the instructions outlined in this chapter be followed. Failure to perform the adjustments and controls explained in this section could cause serious damage to the device or interference with other broadcasters or services that operate via radio; any such damage will be the sole responsibility of the user.**

10.1 Initial start-up and basic adjustments

The first time the device is turned on, it is important to perform basic adjustments (frequency, output power, modulation, etc.) and verify that they are functioning correctly (e.g. reflected power) via the command menu. This section explains how to perform these adjustments.

✋ **The transmitter stores in its memory the operating mode in which it was working before the power supply was turned off or a mains failure took place. Therefore, before continuing, it is important to ensure that it is connected to a load that is able to support the maximum deliverable power.**

✋ **Operating the transmitter without an antenna, or when the antenna is improperly connected, may cause damage that is not covered by the warranty, particularly during the final stage of transmission.**

✋ **If turning the transmitter on places it directly in operation (rather than on stand-by), we recommend that the ON/STAND-BY button be pressed to place the transmitter on stand-by while making adjustments.**

✋ **Proper adjustment of the parameters should be made so as to conform to local regulations; such conformity is the full responsibility of the user.**

📄 *For any questions regarding navigation of the command menu, 🖙 Chapter   .*

📄 *For further details on any screen described from this point onward, 🖙 Chapter 11.*

1) Ensure that all installation conditions are met, as described in Chapter 7, and that all the connections described in par. 7.4 have been made. You can connect a suitable dummy load to the transmitter's RF output instead of the antenna.

2) Turn on the device via the rear power switch. The Sielco logo (or possibly a different logo) will appear on the display for a few seconds.

After that, the `Home` screen (🖙 11.1) will be displayed, which indicates the values of the main equipment parameters: frequency (`Frequency`), output power (`Forward Power`), reflected power (`Reflected Power`), audio input type (`Audio Input`), instantaneous modulation (`Modulation / FFT`), etc.
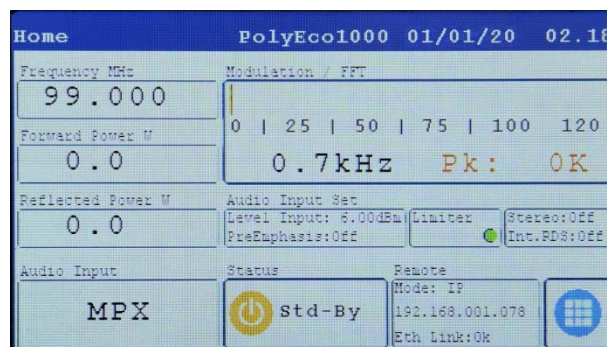
📄 *The name of all menu pages is always displayed in the left upper corner of the screen.*

3) At this point, two conditions are possible:

- **The transmitter begins to operate** (including possible powering up) – the **Status** icon lights up green ⏻ and the **On Air** message is displayed. In such case, it is recommended that the basic settings be made, switching the transmitter to stand-by mode. To do so, press the **ON/STAND-BY** button or touch the green **On Air icon** ⏻. Make sure the icon color turns to yellow ⏻ and the **Std-By** writing is displayed, then go directly to step 4).
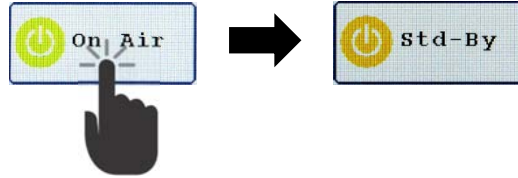
- **The transmitter goes to stand-by** - the **Status** icon lights up yellow ⏻ and the **Std-By** writing is displayed**.** In such case, proceed to the next step.

10.1.a   Operating frequency

4) Tap the ⊞ icon (in the lower right corner). The **Main** screen will be displayed:
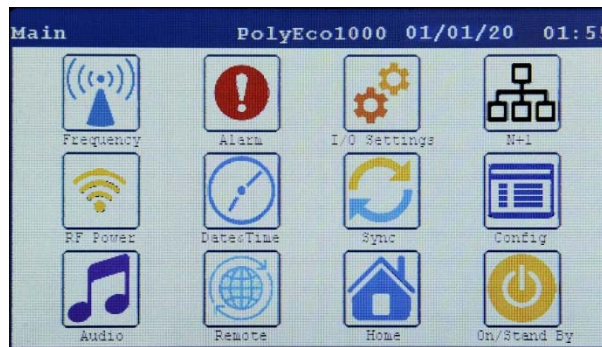
📄 *While in the* **Main** *screen, if no command is input for two minutes, the device will automatically return to the* **Home** *screen.*

5) Tap the **Frequency** ⏶ icon. The **Frequency** screen (↳ 11.3) will be displayed, whose upper section (**On Air**) shows the current values:
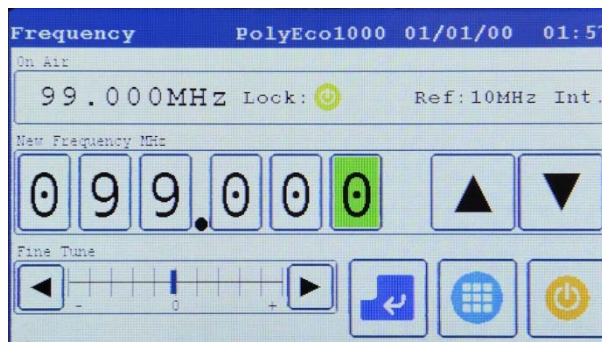
6) In the **New Frequency** section, touch the frequency digit you want to change and modify its value with the ▲ (increment) ▼ (decrement) keys.

7)   Change other digits as needed until the required frequency value is achieved.
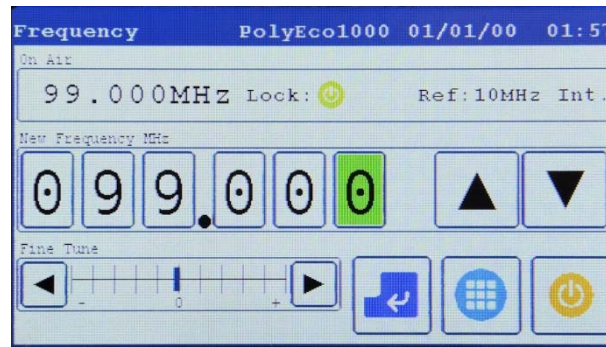
8)   If necessary, slight variations to the frequency value (a few kHz) can be provided with the `Fine Tune` command by touching the ◄ (fine decrement in the frequency) or ► (fine increment in the frequency) keys.

📄   *The variations introduced through the `Fine Tune` commands are not shown on the display and can be detected by an external frequency meter.*

9)   Once the desired frequency value has been reached, tap the [icon] (Enter) icon to confirm.

10)   Tap the [icon] icon to return to the `Main`.screen.

10.1.b   RF output power

11)   Tap the `RF Power` [icon] icon. The `Power Settings` (📖 0) screen will be displayed, whose upper section (`RF Power Out`) shows the current value:
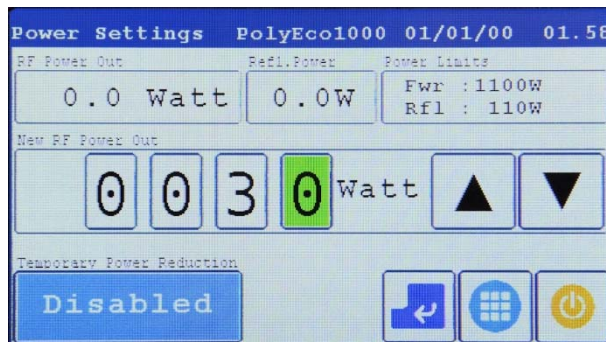
12)   In `New RF Power Out` section, touch the RF output power digit you want to change and modify its value with the ▲ (increment) ▼ (decrement) keys.

13)   Change other digits as needed until the required power value is achieved.

14)   Once the desired output power value has been reached, tap the [icon] (Enter) icon to confirm.

15)   Tap the [icon] icon to return to the `Main`.screen.

📄   *If the device is currently in operation (green [icon] icon displayed), the `RF Pow. out:` indicator will show the power currently supplied. Otherwise, with the device on stand-by (yellow [icon] icon displayed), the indicator will remain at `0.0W`.*

10.1.c   Modulation inputs and changeover

16)   Tap the `Audio` [icon]. Icon. The `Audio` screen (📖 11.5) will be displayed:
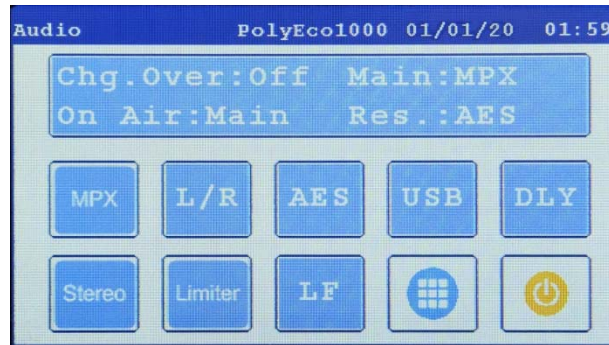
17) Verify that the large blue key is showing the modulation connectors corresponding to the **Main** section (in the example below **MPX**, i.e. the **MPX** connector) and the reserve section **Res.** (in the example, the **AES** connector). Also verify the desired input is currently selected next to **On Air** (in the example, **Main)** and that the modulation changeover **Chg.Over** is enabled/disabled according to the user's needs (in the example, **Off** = disabled).

In case all settings are already correctly configured, go directly to step 21).

18) Touch the large blue key. The **Mux** screen will be displayed.
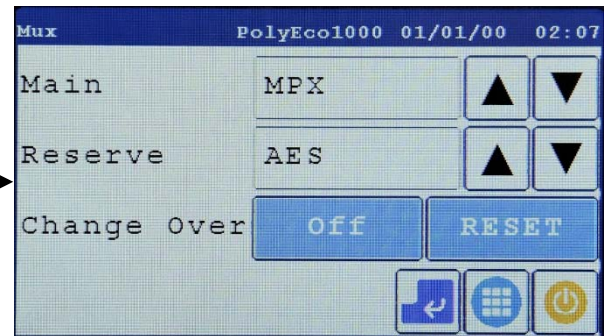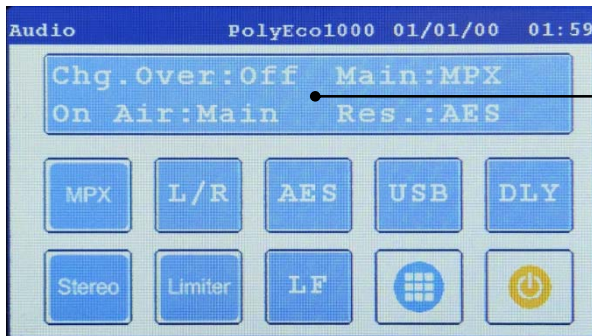
19) According to the user's needs, configure the following settings:

- Define the connector for the **Main** input with the ▲ ▼ keys (e.g. **L/R**, **AES/EBU**, **MPX**, none, etc.).
- Define the connector for the reserve input **Reserve** with the ▲ ▼ keys (e.g. **L/R**, **AES/EBU**, **MPX**, **Mute**, etc.).
- Enable or disable the modulation changeover by touching either the **On** (enabled) or **Off** (disabled) keys next to **Change Over**.

In case a switch of the modulation signal has occurred due to lack of the main signal, when said signal becomes available again (for a preset time - 🖑 par.11.5.b), the system will revert automatically to the original condition. However, the **RESET** key allows the user to manually perform such operation.

20) Once the desired settings have been configured, tap the [icon] (Enter) icon to confirm.

21) Tap the [icon] icon to return to the **Audio** screen.

📄 *In case of lack of signal in the main modulation input, an alarm message will be generated.*

10.1.d   Modulation sensitivity of MPX or AUX inputs

22)   In the **Audio** screen, touch the **MPX** key. The **MPX** screen will appear:
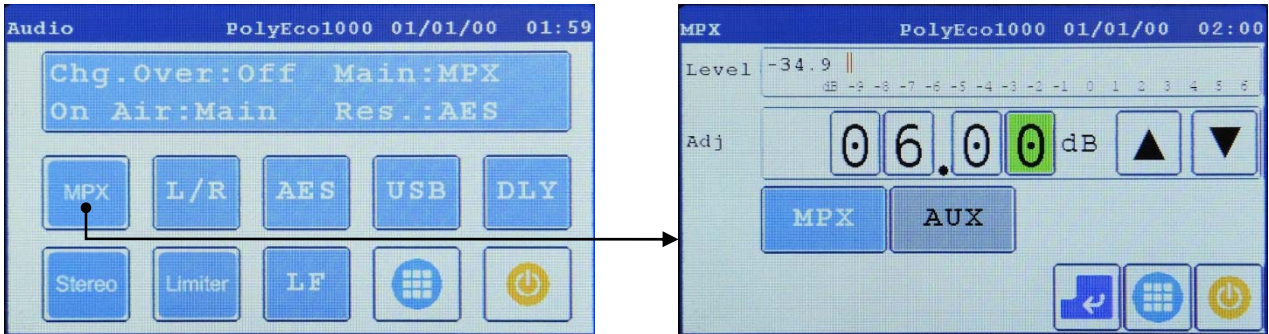
23)   According to the input to be verified, touch the **MPX** or **AUX** key (in the over stated example **MPX**).

24)   Verify the preset **MPX** input level and, if necessary, adjust its value with the ▲ ▼ keys (for all inputs from -6.00 to +12.00 dB, in 0.01 dB steps).

25)   Once the desired settings have been configured, tap the [icon] (Enter) icon to confirm.

26)   Tap the [icon] icon to return to the **Audio** screen.

10.1.e   Input sensitivity, impedance and pre-emphasis of L/R inputs

27)   In the **Audio** screen, touch the **L/R**. key. The **L/R**. screen will appear:
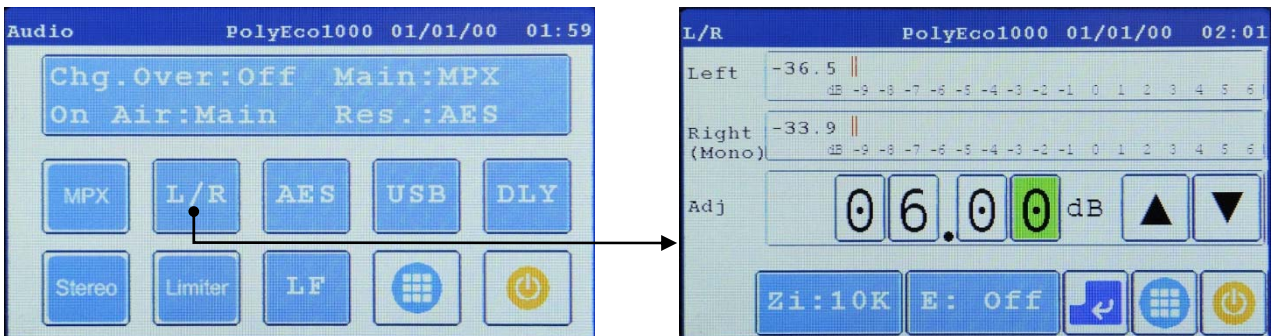
28)   Verify the preset **L/R** input level and, if necessary, adjust its value with the ▲ ▼ keys (for all inputs from -6.00 to +12.00 dB, in 0.01 dB steps).

29)   Verify the preset impedance level shown in the **Zi** key and, if necessary, adjust its value with the same key to get 10 kohm or 600 ohm (10 kohm in the example).

30)   Verify the preset pre-emphasis level shown in the **E** key and, if necessary, adjust its value with the same key to get 50, 75 microseconds or to exclude pre-emphasis (excluded in the example).

31)   Once the desired settings have been configured, tap the [icon] icon (Enter) to confirm.

32)   Tap the [icon] icon to return to the **Audio** screen.

10.1.f   Modulation sensitivity, mode and pre-emphasis of AES inputs

33)   In the **Audio** screen, touch the **AES** key. The **AES** screen will appear:
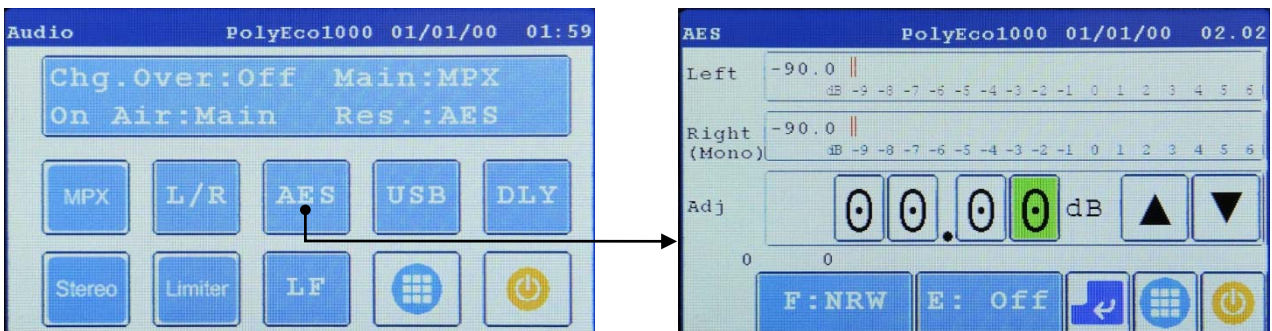
34) Perform the same checks/settings as described in the previous section for `L/R` inputs (they are identical, apart from the fact that there is no input impedance setting).

📄 *Using the `F` and `E` keys it is also possible to set the AES / EBU Narrow and Wide input mode and the preenphasys value respectively (☞ par.11.5.b).*

35) Once the desired settings have been configured, tap the 🔙 icon (Enter) to confirm.

36) Tap the ⊞ icon to return to the `Audio` screen.

10.1.g   Mono/stereo mode

If the L/R input is in use, perform the following operations:

37) In the `Audio` screen, touch the `Stereo` key. The `stereo` screen will appear:
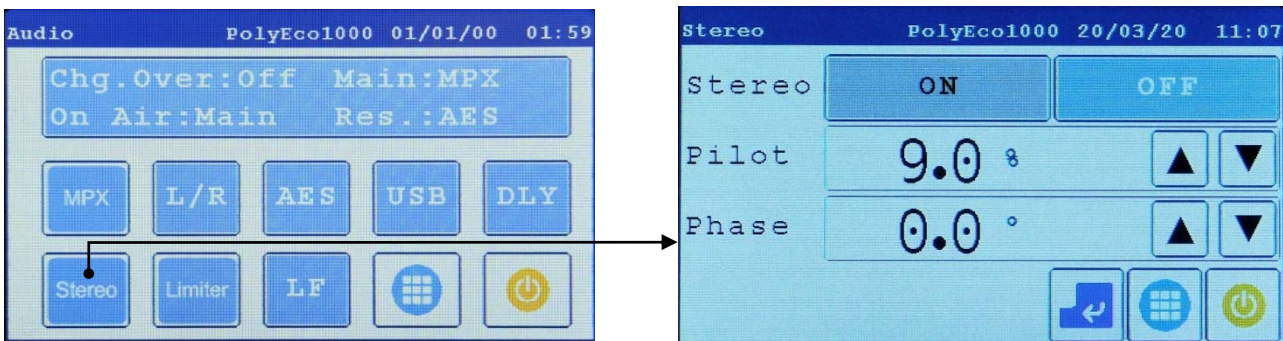
38) Verify the preset mode (stereo `ON` or `OFF`) and, if necessary, change it with the `ON` or `OFF` keys.

39) Verify the preset level of the `Pilot` stereo subcarrier and, if necessary, change it with the ▲ ▼ keys (the value is expressed as percentage with respect to audio modulation).

40) Verify whether the phase of the stereo subcarrier `Phase`, preset to 0 degrees, is correct and, if necessary, change it using the ▲ ▼keys (it varies between +10 and -10 degrees).

41) Once the desired settings have been configured, tap the 🔙 icon (Enter) to confirm.

42) Tap the ⊞ icon to return to the `Audio` screen.

10.1.h   Modulation limiter

43) In the `Audio` screen, touch the `Limiter`. key. The `Modulation` screen will appear:
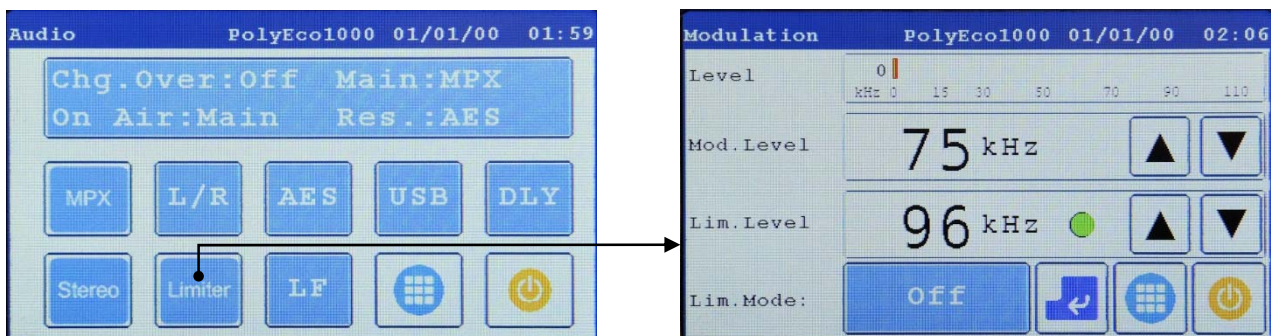
44) Verify the preset level of stereo modulation `Mod. Level` (shown in +/- kHz) and, if necessary, change it with the ▲ ▼ keys (the value is expressed in +/- kHz).

45) Verify the preset level of the stereo modulation limiter `Lim. Level` and, if necessary, change it with the ▲ ▼ keys (the value is expressed in +/- kHz).

46) Verify the preset intervention mode for the modulation limiter `Lim. Mode` (`ON` = signal is clipped above the set threshold; `Auto` = automatic, see note below) or `OFF` (= disabled) and, if necessary, change it by repeatedly touching the relevant key.

✋ **According to Italian law, the limiter must operate above 75 kHz.**

📄 *Next to the `Lim.Level` value, a simulated LED appears in green 🟢 or red 🔴, to indicate that the modulation value is exceeding the permitted limit.*

📄 *The `Auto` mode verifies for about a minute whether the modulation remains constantly above the value set in `Lim. Level`. If this is the case, the deviation value is gradually reduced by 2 kHz every 10 seconds until the maximum modulation value does not exceed the threshold set in `Lim. Level`.*

📄 *When `Lim. Mode` is set to `ON` and the limiter begins to intervene, the modulation distortion increases. Therefore, the modulation sensitivity should be adjusted so that the limiter intervenes sporadically. Using this approach, its operation is generally imperceptible.*

47) Once the desired settings have been configured, tap the [Enter icon] (Enter) icon to confirm.

48) Tap the [icon] icon to return to the **Audio** screen.

49) In the **Audio** screen, tap the [icon] icon to return to the **Main** screen.

10.1.i System date and time

Setting the date and time is important because it allows the transmitter to keep track of events (alarms, etc.) that occur while the transmitter is operating. Set the date and time as follows:

50) In the **Main** screen, tap the **Date&Time** [icon] icon. The **Date/Time** (📖 11.7) screen will appear, showing the system date and time along with the currently set time zone:
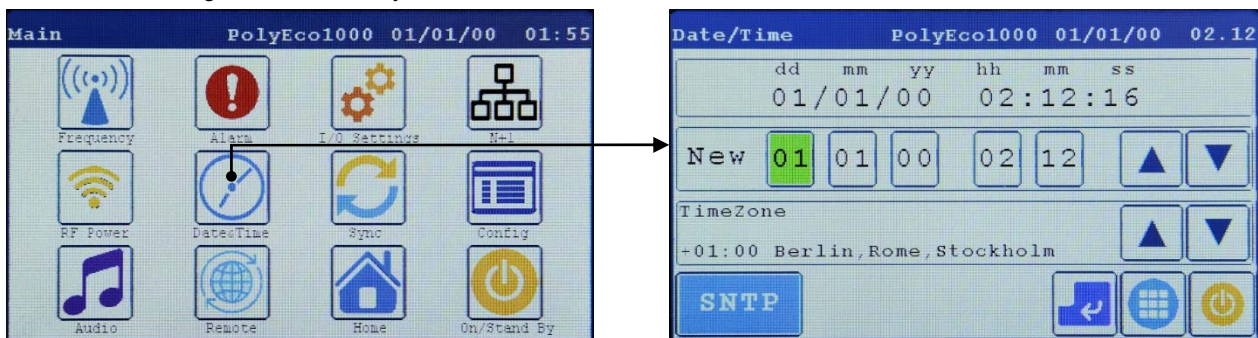
51) Verify the preset **TimeZone** and, if necessary, change it with the ▲ ▼ keys.

52) Verify the date (expressed in the day/month/year format **dd mm yy**) and, if necessary, adjust it by touching the various elements to select them and then using the ▲ ▼ keys to change their value.

53) Verify the time (expressed in the hours/minutes/seconds **hh mm ss**) and, if necessary, adjust it by touching the various elements to select them and then using the ▲ ▼ keys to change their value (in the example the hour value is being changed).

54) Once the desired settings have been configured, tap the [icon] icon (Enter) to confirm.

55) Tap the [icon] icon to return to the **Main** screen.

56) To go back to the **Home** menu, tap the [Home icon] **Home** icon in the **Main** screen.

10.2 Changing from stand-by to full operation

The transmitter is thus programmed with the basic parameters. You can now return to the **Main** screen by touching the [icon] icon in one of the screens (if you currently are in a second-level menu screen, you will have to touch the key twice). Of course, you may now need to adjust other parameters, according to your requirements. For further information regarding the parameters that can be set, refer to Chapter 11.

Once you are sure that you've correctly programmed all the parameters, you can place the transmitter in full operation in two ways:

- by pressing the **ON/STAND-BY** key,
- by tapping the [icon] icon present in any screen (make sure the icon turns <u>green</u> [icon]).
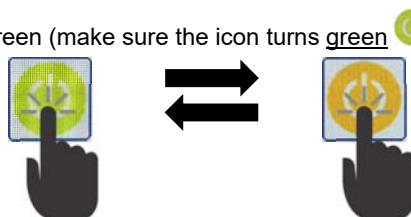
✋ **If the screen bar is flashing in red, it means that an alarm event has occurred. When this happens, check the type of alarm on the display, refer to the error table in section 14.1, and take appropriate action to resolve the problem.**

10.2.a   Checking parameters

We recommend that all the operating parameters be verified the first time that the transmitter is placed in full operation, via the `Home` menu.
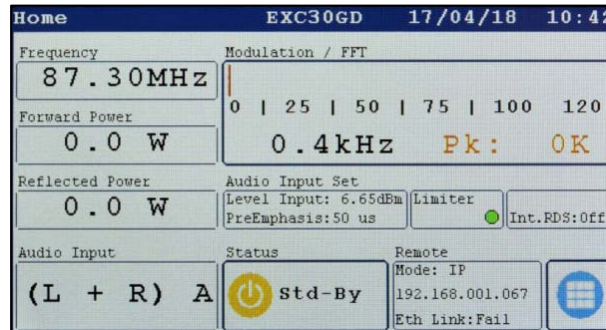
    Check that all parameters displayed have correct values, particularly:

- Operating frequency, displayed in the `Frequency` field
- Direct power and reflected power, displayed in the `Forward Power` and `Reflected Power` fields rispectively
- Modulation, displayed in the `Modulation / FFT` field
- Modulation input and pre-emphasis settings, displayed in the `Audio Input set` field
- Error messages possibly displayed in the upper section of the screen, flashing in red

In addition, a spectrum analysis must be performed to ensure that no spurious emissions are generated due to internal or external reasons (e.g. inverse intermodulation in the final stage).

✋ **If the reflected power exceeds 10% of the direct power, you will not be able to increase the output power beyond a certain value due to an excessive SWR (standing wave ratio). Where this occurs, the antenna system must be checked with a view to minimizing the reflected power.**

✋ **If any error messages appear in the upper section of the screen, flashing in red, it means that an alarm event has occurred. When this happens, check the type of alarm on the display, refer to the error table in section 14.1 and take appropriate action to resolve the problem.**

Sielco hopes you enjoy working with your device, and would like to remind you that they are always available for further information or to resolve specific problems.

10.3   Changing from full operation to stand-by and vice-versa

During normal operation, you can place the transmitter in stand-by by pressing the **ON/STAND-BY** button or by tapping the ⏻ icon, present in all screens. Such a transition is indicated by the icon turning from green to yellow ⏻.
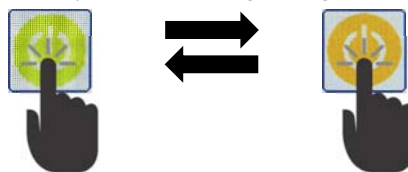
To perform the reverse operation, press the **ON/STAND-BY** button again or tap the ⏻ icon, which will turn green ⏻.

10.4   Turning off the transmitter

To completely deactivate the device (for maintenance, etc.), we recommend that you first put it into on stand-by, as described above, and then completely turn off the device via the general power switch.

11 DESCRIPTION OF THE MENUS

11.1 Default screen (Home)

As soon as the device is turned on, the default **Home** screen will appear on the display. The main purpose of this screen is to display the following basic operating parameters:
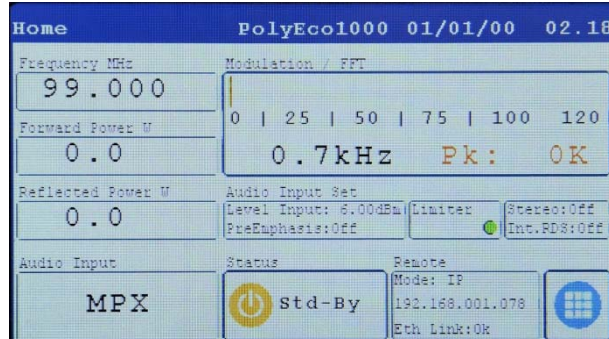
- **Frequency**: operating frequency expressed in MHz

- **Forward Power**: direct power delivered

- **Reflected Power**: reflected power

- **Audio Input**: audio inputs in use

- **Modulation/FFT**: modulation bar indicator with capability to display FFT function (Fast Fourier Transform, that is spectral analysis of each audio input, ⮡ next section)

- **Audio Input Set**: parameter settings concerning sensitivity (in dBm), pre-emphasis type (in microseconds), modulation limiter, and possible RDS activation

- **Remote**: indicates a number of parameters concerning remote connection (e.g. mode, device's IP address, etc.)

Two more commands are also available:

- The **Status** icon, which indicates whether the equipment is in stand-by mode 🟡 or transmission 🟢 mode, as well as allows to switch between the two modes.

- The 🔲 icon, which allows the user to move to the **Main** screen.

11.1.a FFT function(Fast Fourier Transform)

This function can perform a spectral analysis of the modulating signal. By touching the **Modulation/FFT** bar indicator in the screen shown above in this page, the modulation analysis of the modulating signal is displayed.
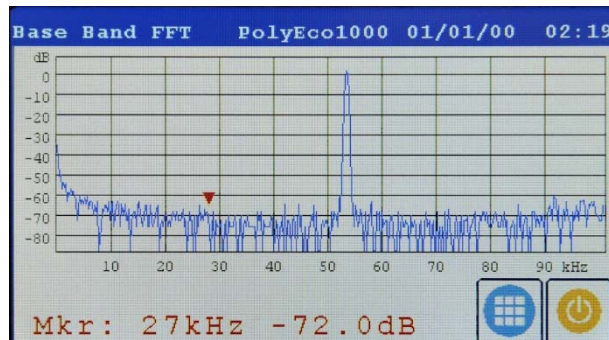
By touching to diagram, it is also possible to move the marker (red triangle) in order to measure the levels at a point other than the carrier frequency. The measured level is displayed in the lower section of the screen (in the example, **Mkr: 27 kHz – 72.0 dB** indicates that at 27 kHz the level is -72.0 dB). This feature can be used to check the modulating signal purity.

11.2 Main screen

The **Main** screen gives access to all the submenus used to set and verify the value of the parameters described in the next sections of this manual.
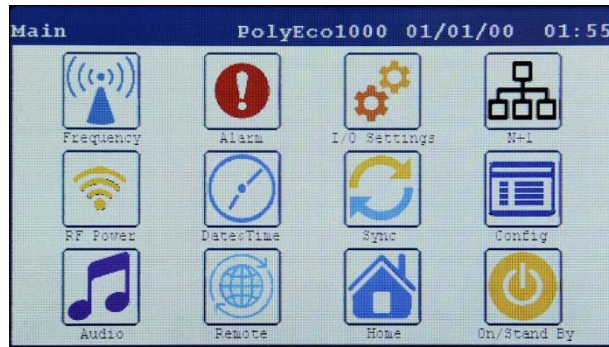
Each icon allows the user to access a particular section where you can configure a specific set of parameters.

The only exceptions are:

- The (**Home)** icon, used to return to the **Home** screen.
- The **On/Stand By** icon, which allows switching between the transmitting state and the stand-by state or vice-versa.

11.3 **Frequency** menu

This menu is used to define the transmitter's operating frequency. To access this menu, tap the (**Frequency**) icon in the **Main** screen.
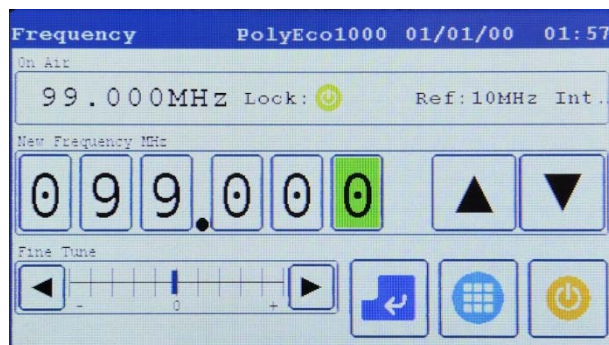
The upper **On Air** section indicates:

- The current operating frequency in MHz (99.000 MHz in the example)
- Whether the synthesizer is locked (**Lock**) and, therefore, whether the frequency value displayed is a reliable reading (in such a case a green icon appears on the screen, as shown in the figure above, otherwise the icon turns red)
- The frequency reference currently in use (**Ref**), either internal or external (in the example, a 10 MHz internal reference is shown)

To set a new operating frequency, use the **New Frequency** section using the ▲ (increase) e ▼ (decrease) keys as described in par. 10.1.a.

You can also make slight frequency corrections (a few kHz) can be provided with the **Fine Tune** command by touching the ◄ (fine decrement in the frequency) or ► (fine increment in the frequency) keys.

11.4 `RF Power` menu

This menu allows the user to read and set the transmission power as well as to read the reflected power and a few other related parameters. To access this menu, tap the [icon] (`RF Power`) icon in the `Main` screen.
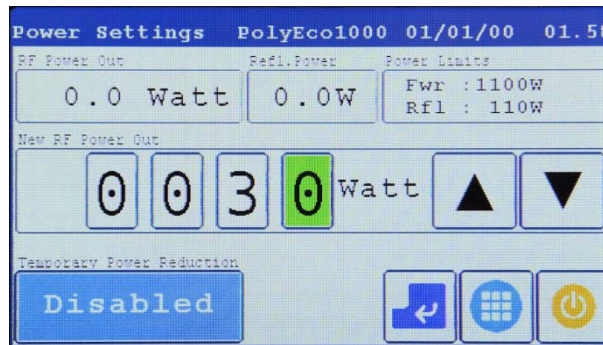
The upper section of the screen is divided in three subsections as follows:

- `RF Power Out` indicates the current transmission power
- `Refl. Power` indicates the measured reflected power
- `Power Limits` indicates, according to the model, the maximum settable value for direct power (`Fwr`) and the maximum acceptable level for reflected power (`Rfl`) (above which the equipment begins to reduce the output power).

To set a different transmission power, use the `New Power Out` section (⇨ 10.1.b).

In addition, the `Temporary Power Reduction` section shows whether a temporary power reduction scheduled at specified times (e.g. at night-time hours) is activated (`Enabled`) or deactivated (`Disabled`). To change this setting, tap the `Temporary Power Reduction` section icon: the following screen will be displayed:
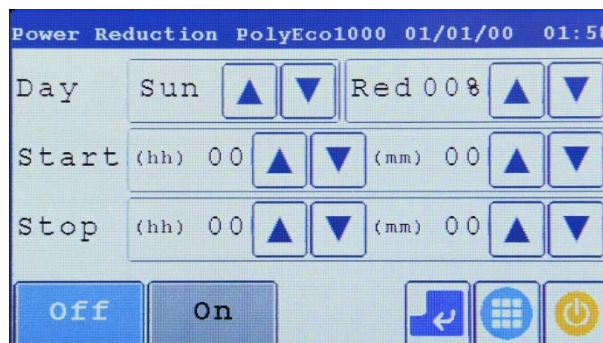
In this screen you can configure the following parameters, that have independent settings for each day of the week:

- `Day` – the day of the week when, if desired, the power reduction will take place.
- `Red 00%` - power reduction, expressed as percentage
- `Start (hh) (mm)` – time of day when the power reduction will start
- `Stop (hh) (mm)` – time of day when normal power will be restored
- `Off` or `On` to activate or deactivate the power reduction

Proceed as follows:

1) Use the ▲ ▼ keys of the `Day` field to select the desired day.
2) Use the ▲ ▼ keys of the `Red%` field to select the percentage of reduction of the power to apply on the selected day.
3) Use the ▲ ▼ keys of the `Start (hh) (mm)` field to select the start time for the power reduction on the selected day.
4) Use the ▲ ▼ keys of the `Stop (hh) (mm)` field to select the time when normal power will be restored on the selected day.
5) If you want to select another day when an automatic power reduction is to be performed, go back to step 1).
6) Enable the power reduction on the selected days by pressing the `On` key.

📄 *To keep the power unchanged during a specific day, leave the* `Start` *and* `Stop` *settings on* `00 00`*.*

11.5 `Audio` **menu**

This menu allows the user to control the audio section of the transmitter. To access this menu, tap the [icon] (`Audio`) icon in the `Main` screen.
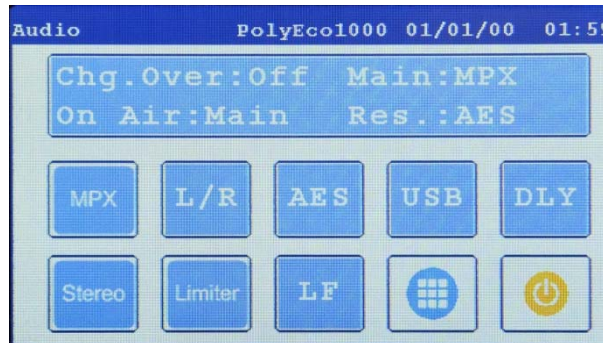
The equipment is provided with two independent audio input sections (a main section `Main` and a reserve section `Res.`), with the possibility of enabling an automatic switch to the reserve section in case of failure of the main input source.

11.5.a Main parameters settings

The large blue key in the upper section of the screen shows the following information:
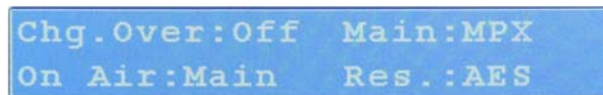
- `Main` – input connector assigned to the main input (`MPX` in the example)
- `Res.` – input connector assigned to the reserve input (`AES` in the example)
- `Chg. Over` – indicates whether the automatic switching function is enabled (`Off` = disabled in the example)
- `On Air` – currently selected audio input (`Main` in the example)

To set the audio parameters, touch the blue key. The `Mux` screen will be shown:
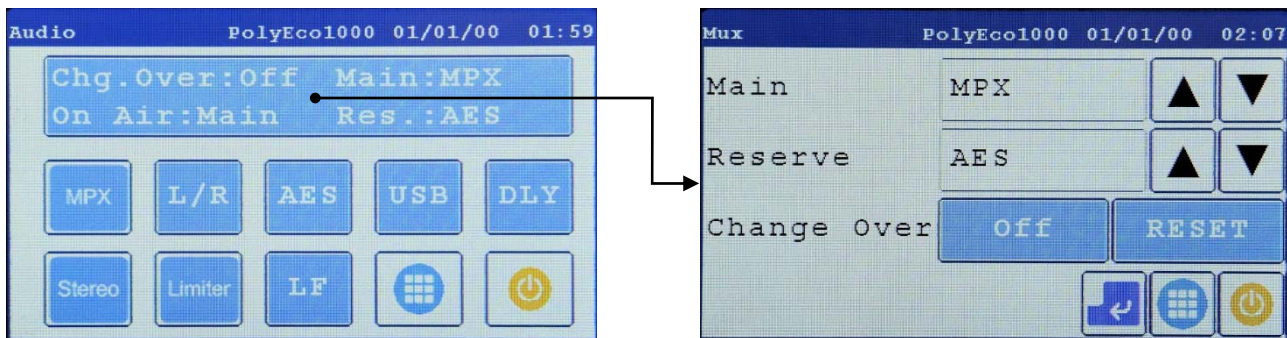
With it you can make the following settings:

- Defining the connector for the main input `Main` using the ▲ ▼ keys (e.g. `L/R`, `AES/EBU`, `MPX`, none, etc.) available to the right of `Main`.
- Defining the connector for the reserve input `Reserve` using the ▲ ▼ keys (e.g. `L/R`, `AES/EBU`, `MPX`, `Mute`, etc.) available to the right of `Reserve`.
- Enabling or disabling the modulation change over tapping the `On` (enabled) or `Off` (disabled) keys available after `Change Over`.
- Manually restoring the main modulation source (`Main`) if the latter was automatically exchanged from the change over with the reserve (`Reserve`) due to the lack of the main signal.

📄 *If after the exchange of the main modulation signal with the backup one, the main signal becomes available again (for a predefined time) PolyEco will automatically restore the main signal (see following paragraph). However, with the **RESET** key it is possible to do it manually before the set time.*

📄 *All audio inputs, both active and inactive, are constantly monitored by the system and can be selected at any time.*

11.5.b Modulation input parameters settings

Each of the small blue keys [MPX] [L/R] [AES] (**MPX**, **L/R** and **AES**) represents a modulation input. You can change the parameters of each input by touching the relevant key as below described.

MPX input key (➩ 0)

By touching the **MPX** button, the **MPX** screen appears which allows you to adjust the modulation sensitivity of both the **MPX** input and the **AUX** input by touching the respective buttons.
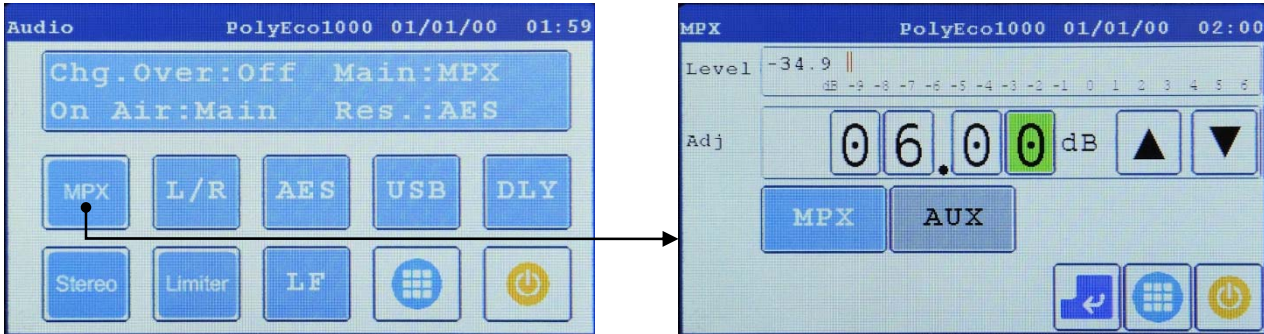
The **Level** bar shows the input level referred to the set value. In the above case, when the **Level** bar shows **0**, it means that the input level is 6.00 dB.

L/R Input key (➩par. 10.1.e)

Touching the **L/R** key, the **L/R** input setting screen will appear, allowing you to view the left and right channels:
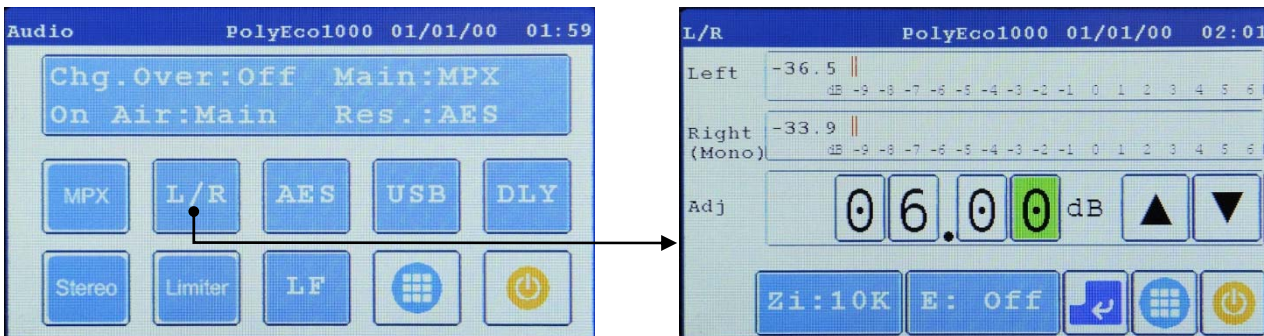
From this screen you can also:

- Check the preset input impedance and change it by touching the **Zi** button to get 10 kOhm or 600 Ohm (in the example 10 kOhm).
- Check the preset pre-emphasis and eventually change it by touching the **E** key to get 50, 75 microseconds or **Off** to exclude it (in the example **Off**).

11.5.c AES input key (➩par. 10.1.f)

By touching the **AES** key it is possible to set the **AES** parameters (➩par. 10.1.g) via the **AES** screen:
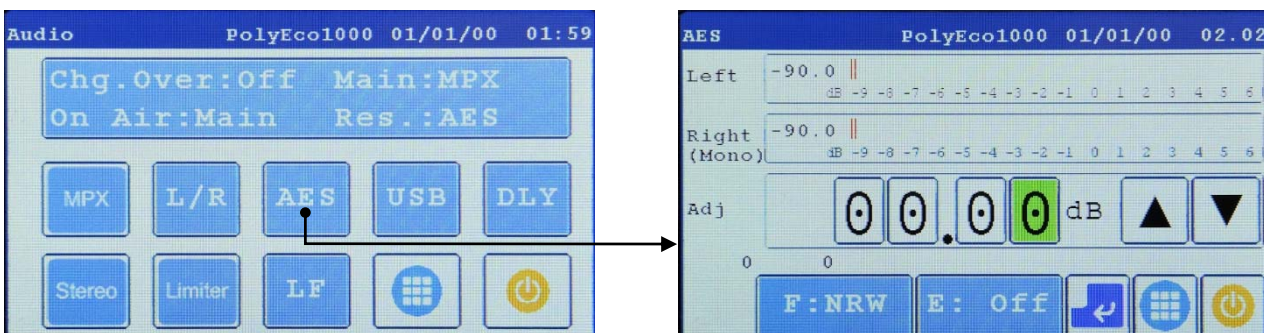
In this screen it is possible to carry out the same checks/settings described in the previous paragraph, which can be carried out in this case on the AES/EBU signal which must be entered in the connector **AES/EBU**.

In addition to the pre-emphasis button `E`, there is also the button `F` which allows you to choose the following two input modes:

- **NRW** (narrow) – the AES/EBU signal is limited to the normal signal containing the left/right channels with a maximum frequency of 15,000 Hz.
- **WIDE** – activating this command, `AES WIDE INPUT` appears on the screen (see following image). In this condition, 192 kHz AES broadband sampling is used, which allows you to use an AES/EBU digital composite stream compatible with the new popular digital compressors using a frequency up to 57 kHz that also supports RDS.
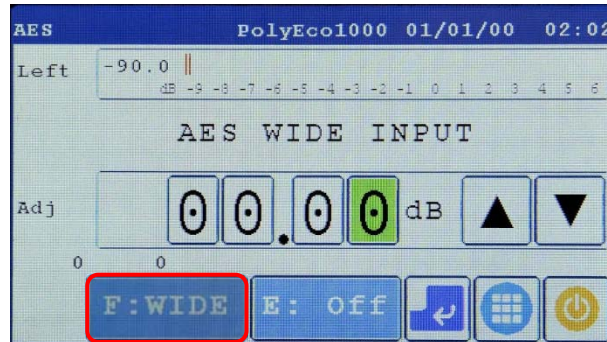
📄 *If you are using **WIDE** mode, enter the signal only on the left channel stream.*

11.5.d Stereo/mono settings

By touching the `Stereo` button it is possible to select the `Stereo` screen which allows you to select the stereo (ON) or monophonic (OFF) mode and change the modulation percentage of the subcarrier and the phase of the stereo pilot subcarrier using the ▲ ▼ buttons (📖par. 10.1.g).
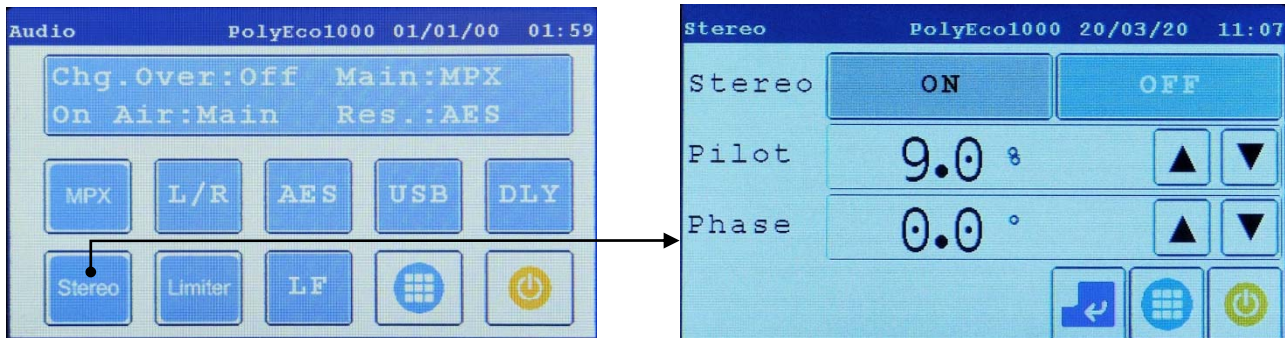
📄 *If monophonic modulation is needed, only enter the audio signal on the connector XLR **LEFT**.*

11.5.e Modulation limiter settings

By touching the `Limiter` key you can select the `Modulation` screen which allows you to select the modulation level and limit its maximum value using the respective ▲ ▼ keys (📖par. 10.1.g).

It is also possible to activate/deactivate the modulation limiter via the `On`/`Off` button (📖 par. 10.1.h).
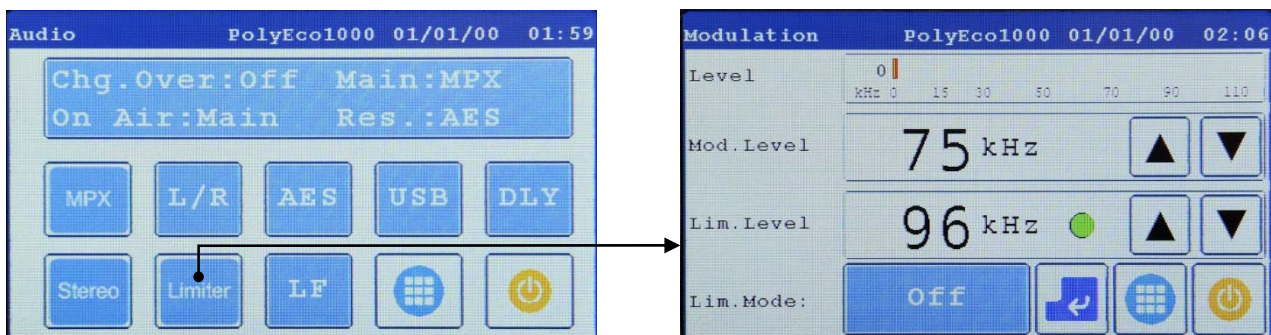
11.5.f   Monitor output setting

Touching the **LF** key you can access the screen **Base Band Out**:
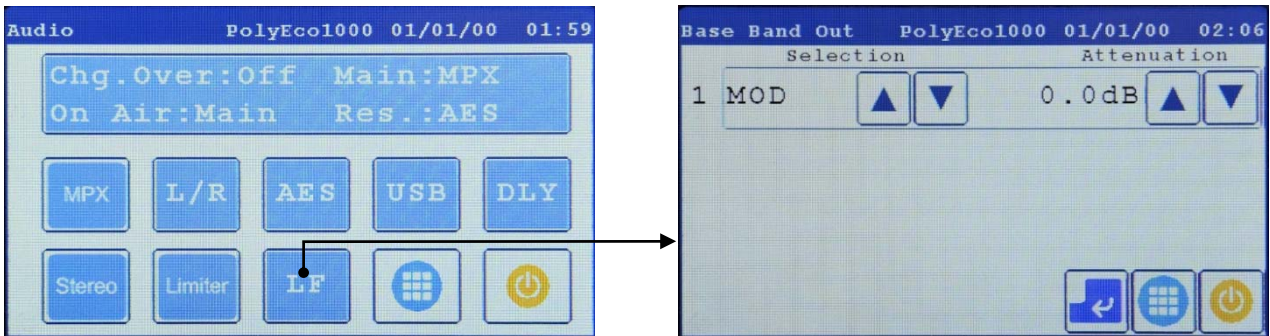
With it, you can define which modulating audio signals (both from internal and external sources) should be output from the **LF** output connector for its use with an external device or control (via an external instrument) and eventually attenuate them to adapt them to these uses.

In the left area **Selection** it is possible to choose which signal is to be output from the connector using the ▲ ▼ keys, then set its attenuation in dB in the right area **Attenuation** (up to 12.0 dB in 0.1 dB steps) using the ▲ ▼ keys. It is also possible to decide whether the stereo signal at the output of the connector should be generated by the stereo L/R signal or by the AES/EBU signal using the **L/R** and **AES** keys
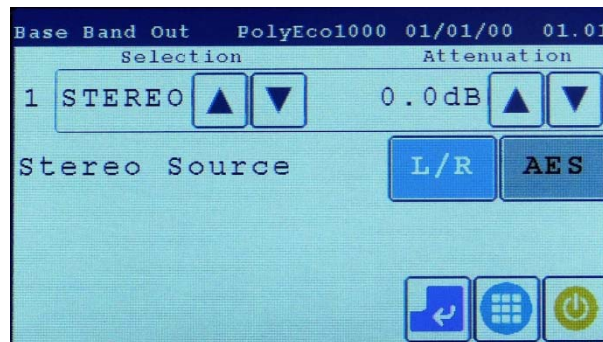
Once you have obtained the desired settings, touch the icon ⏎ (Enter) to confirm them, then touch the icon ⊞ to return to the **Audio** screen.

11.5.g   Selection of audio files from USBs

Touching the **USB** key, you select the USB menu which allows you to use an audio file (MP3 format at 48 kHz) saved in an external USB memory drive (stick) connected to the USB socket and use it as a backup modulation source (therefore also manageable via internal changeover). The name of the USB file is shown when the USB key is pressed. You can also adjust the modulation level of the USB file using the ◄ (level decrease) or ► (level increase) icons of the **Level** slider.
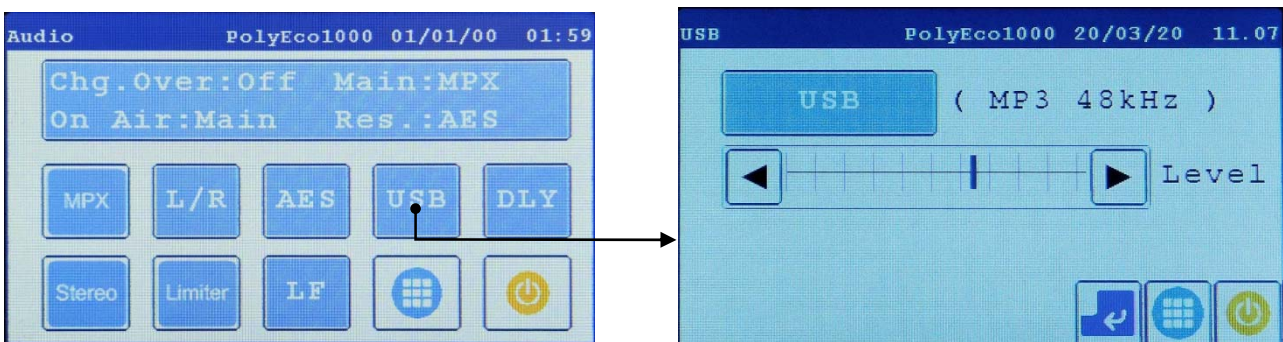
11.5.h Audio delay setting

By touching the **DLY** key, the **Audio Delay** menu appears, which allows the user to set the audio delay value (in milliseconds) for the synchronization systems:
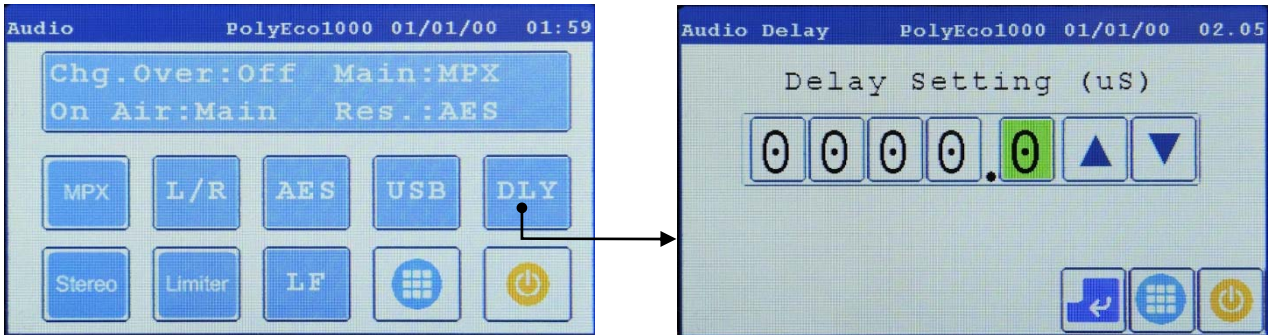
Touch each digit of the delay value and use the ▲ (increment) and ▼ (decrement) keys to change it. Once the desired value has been set, tap the [⏎] (Enter) icon to confirm, then tap the [⊞] icon to return to the **Audio** screen.

11.6 **Alarm** menu

This menu allows the user to manage alarm conditions. To access the menu, tap the [❗] (**Alarm**) icon in the **Main** screen.
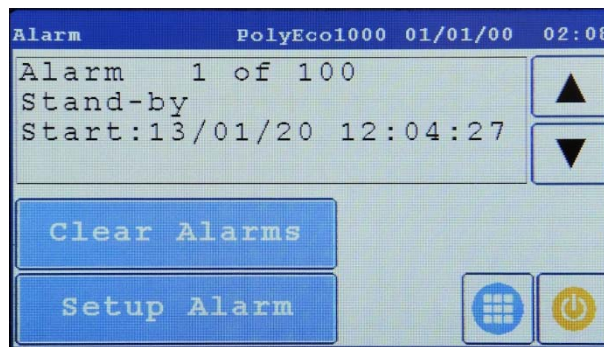
This menu allows you to see the alarms generated by the system (up to 100 alarms), which are listed with a progressive order number. Use the ▲ ▼ keys to scroll through the alarm list. For each alarm, the record shows the order number (e.g. **1 of 14**), the alarm type (e.g. **stand-by**), the date and time when the alarm started (**Start**) and the date and time when the alarm ended (**End**).

📄 *You can access and download the alarm list also via remote Web connection.*

The following operations are possible on the screen:

- Clear all alarms using the **Clear Alarms** key.
- View the settings of the various alarms and change them using the **Setup Alarm** key which allows you to access the **Alarm Setup 1** screen described below

11.6.a Alarm Setup 1 screen

This screen displays a list of the types of detectable alarms of which it is possible to configure the related parameters, for example the level of intervention.

📄 *Some alarms also include a prealarm which occurs with a different threshold level.*

11.6.b AUDIO button (Audio Alarm screen)

Pressing the **AUDIO** button will display the **Audio Alarm** screen

In it you can define the following:

- The minimum audio level (with respect to the set value) of the main modulating signal below which the alarm must be sent. To set the value, use the ▲ ▼ keys of the **Audio Alarm** section

- The delay time after which, if the audio level of the main signal does not return above the minimum value, it is in fact considered invalid and therefore will be exchanged by the changeover with the reserve signal (if the changeover has been enabled). To set the value, use the ▲ ▼ keys of the **Delay** section. It is also possible to set **OFF** to deactivate the audio alarm.

- If the main signal has been exchanged for the reserve signal, with the keys ▲ ▼ of the **Retry** section it is possible to set a time after which the main signal is restored if it returns above the minimum threshold

In the example above, the **Audio Alarm** will be activated if the main signal level decreases by 25 dB (compared to the one set) for 10 seconds. In this condition, if changeover has been activated, the main signal is exchanged for the reserve signal. In addition, the main signal will be restored if it goes back to levels above -25 dB for 5 seconds.

11.6.c HI VSWR button (VSWR Alarm screen)

Pressing the **HI VSWR** button you access the **VSWR Alarm** screen where you can set the **Refl.Pw Alr** reflected power alarm using the ▲ ▼ keys if the latter reaches or exceeds the set value. In the following example, the reflected power alarm is activated in the event that the latter reaches or exceeds the value of 10.0 W:
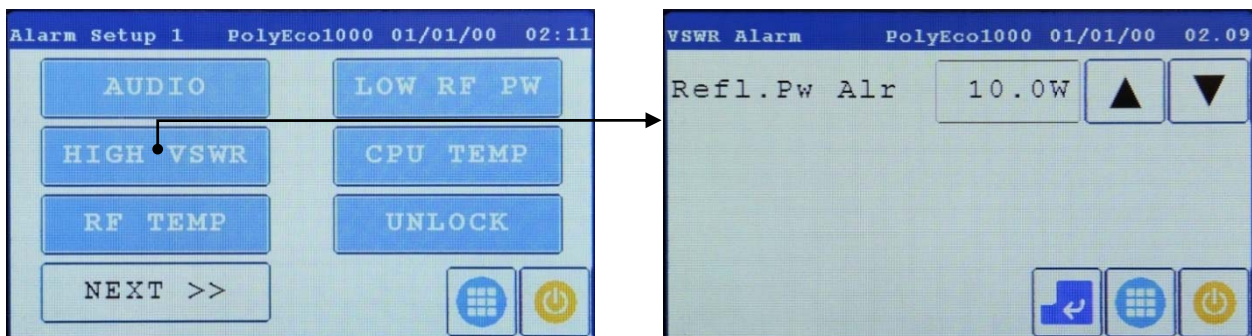
11.6.d RF TEMP button (T.RF Alarm screen)

By pressing the **RF TEMP** button you access the **T.RF Alarm** screen where you can set the **PreAlarm Temp** pre-alarm using the ▲ ▼ keys and the excessive temperature alarm **Alarm Temp** of the RF power module with simultaneous reduction in power. In the following example, the pre-alarm is activated if the temperature reaches 65 ° C and the alarm if it reaches 75 ° C.
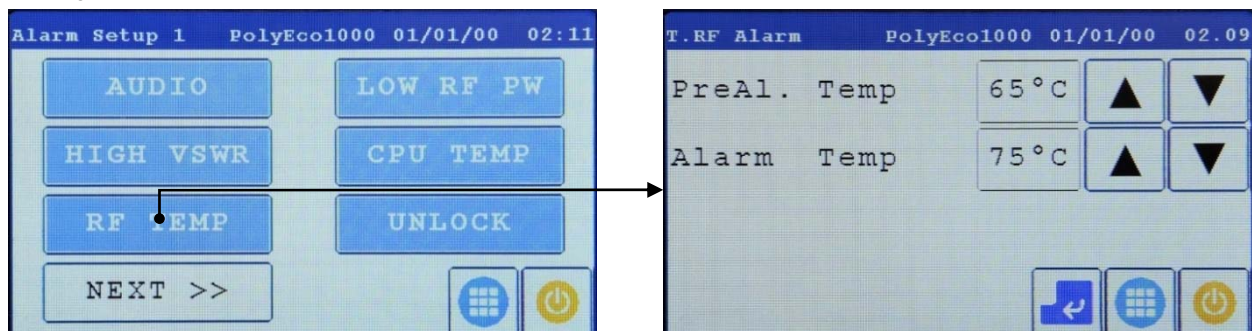
11.6.e   LOW RF PW button (DIR Alarm screen)

Pressing the `LOW RF PW` button accesses the `Dir Alarm` screen where it is possible to set a pre-alarm (`PreAl.Low Pw`) and a low power alarm (`Alarm Low Pw`) supplied by the RF power module using the ▲ ▼ keys. In the following example, a pre-alarm is activated if the power drops below 80% and an alarm if it drops below 50%.
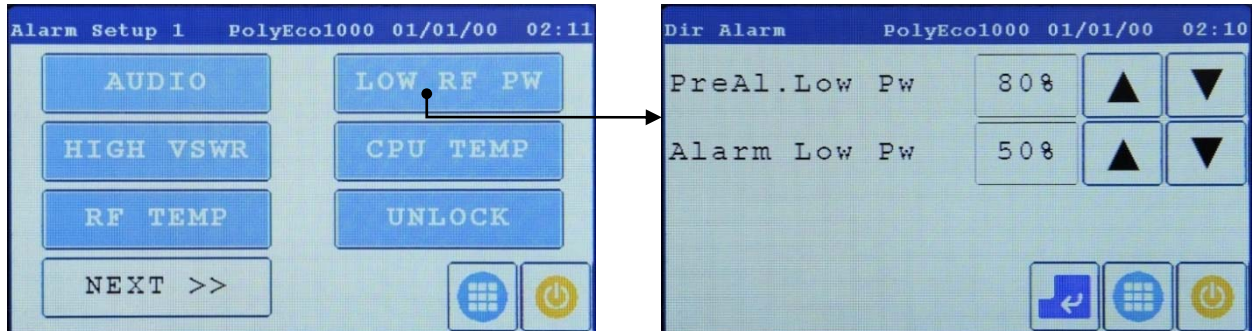
11.6.f   CPU TEMP button (TCpu Alarm screen)

Pressing the `CPU TEMP` button accesses the `TCpu Alarm` screen where it is possible to set a pre-alarm and an excessive temperature alarm of the CPU unit using the ▲ ▼ keys. In the following example, a pre-alarm is activated if the temperature reaches 60 ° C and an alarm if it reaches 70 ° C.
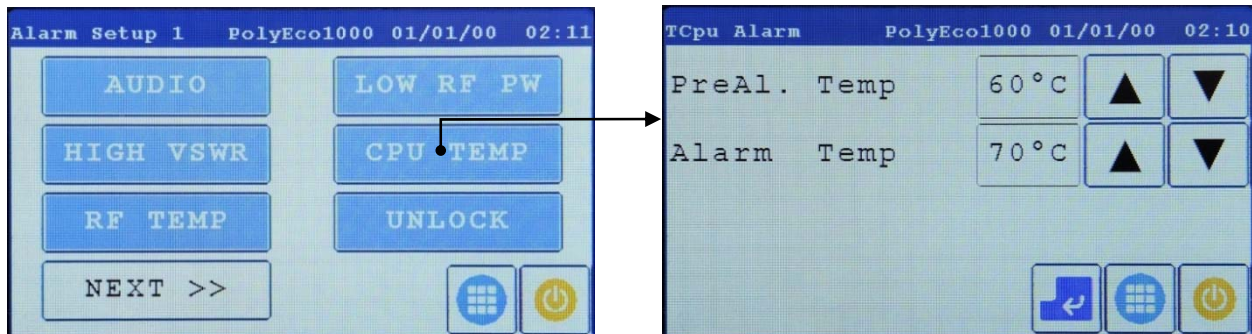
11.6.g   UNLOCK button (Unlock Alarm screen)

Pressing the `UNLOCK` button accesses the `Unlock Alarm` screen where you can set an alarm using the ▲ ▼ buttons if the internal frequency synthesizer unlocks for a certain time. In the example below, an alarm is activated if the synthesizer remains unlocked for 5 seconds.
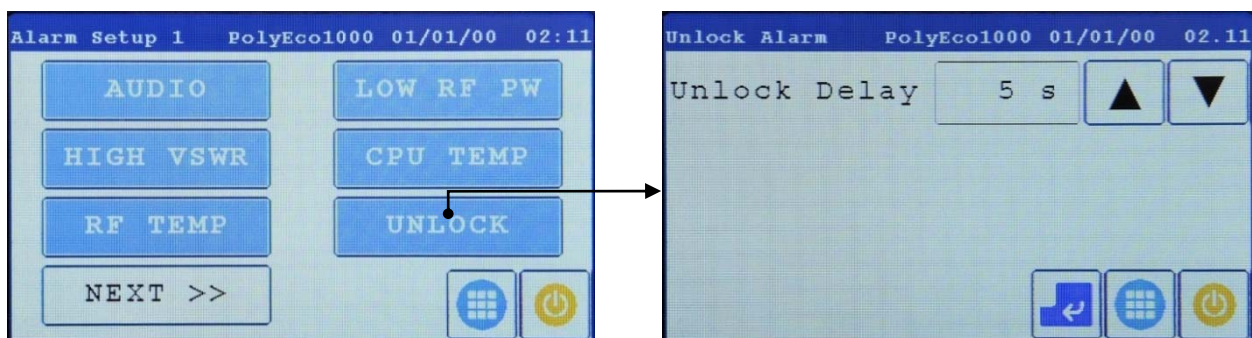
11.6.h   NEXT button (Alarm Setup 2 screen)

Pressing the **NEXT>>** button you access the **Alarm Setup 2** screen which allows access to further alarms.
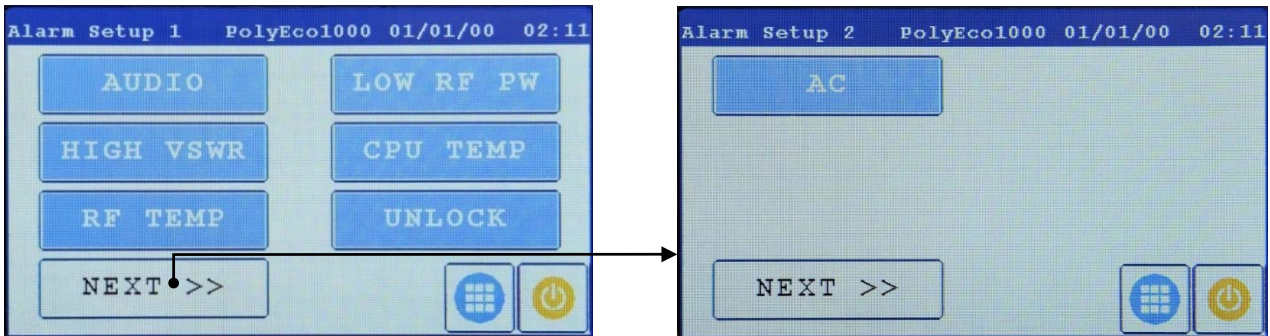
In it you can touch the **AC** key to access the **AC Alarm** screen. With it, it is possible to activate/deactivate the **AC Fail** alarm that is emitted if the battery of the optional GSM remote control module is discharged.

11.7 Date&Time menu

This menu allows the user to display and change the system date and time. To access this menu, tap the 🔲 (**Date&Time**) icon in the **Main** screen.

The date is expressed in a **dd mm yy** (day month year) format, whereas the time is displayed as **hh mm ss** (hours minutes seconds). To change each of the parameters (e.g. the day), touch its value to select the desired field and use the ▲ ▼ keys to enter the new value.

It is also possible to set the correct time zone (**TimeZone**). When the time zone is changed with the ▲ ▼ keys in the **Timezone** area, the time value previously set will be automatically adjusted accordingly.

In addition, using the **SNTP** button, you can access the **Sntp** screen which allows you to activate/deactivate the synchronization of the device's clock with an Internet server and configure its IP address using the ▲ ▼ keys.
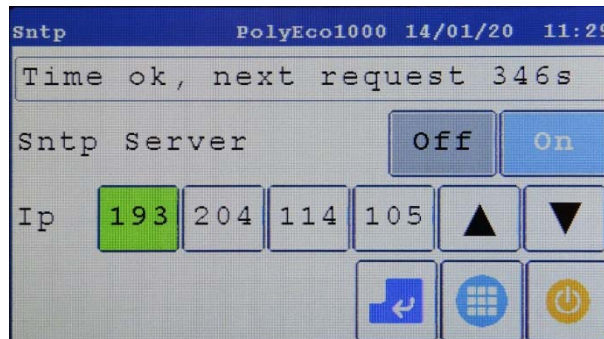
📄 *The upper part of the screen informs if the synchronization is properly carried out. In the above example, it was successful.*

Once the desired value has been set, tap the 🔲 (Enter) icon to confirm, then tap the 🔲 icon to return to the **Main** screen.

11.8 Remote menu

This menu allows the user to set the parameters for remote access/control via GSM, LAN or RS-485 port. To access this menu, tap

the (**Remote**) icon in the **Main** screen.
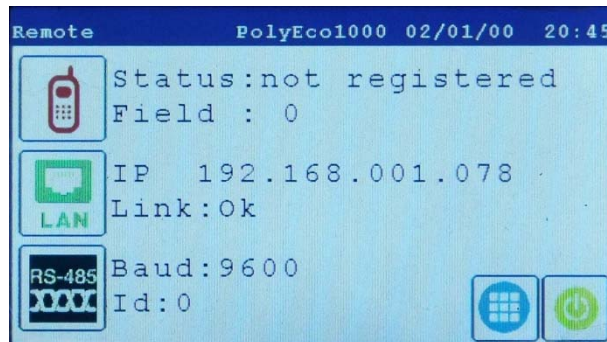
To access the various available settings, tap the relevant icon.

📄 *The LAN and RS-485 interfaces are provided as standard and the relevant settings are therefore always available. Instead, the GSM settings are only available if the optional GSM card has been installed.*

11.8.a Remote access via optional GSM card

By touching the icon, the **Gsm** screen will be displayed, containing the following settings:
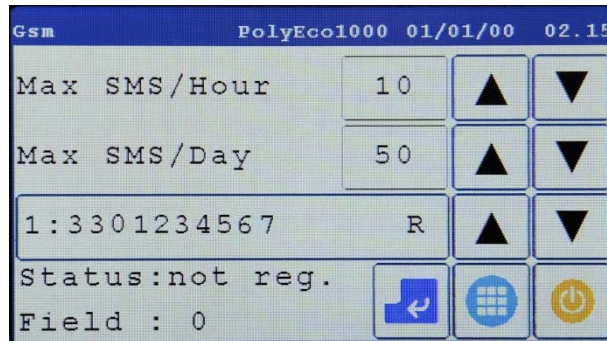
- **Max SMS / Hour** – maximum number of remote control SMS messages that can be sent in one hour
- **Max SMS / Day** - maximum number of remote control SMS messages that can be sent each day
- Telephone numbers to which SMS's can be sent (up to 5 numbers) as per the following screen
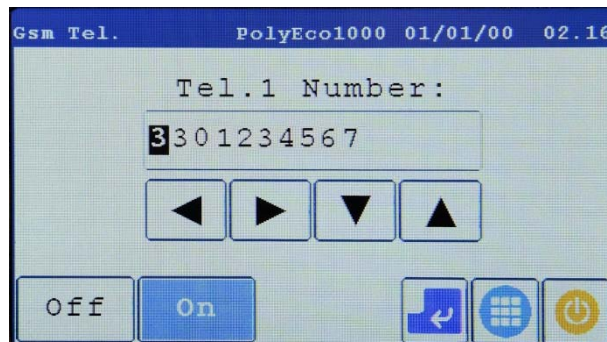
Fields **Status** and **Field** respectively indicate whether the device is registered on a network and the intensity of the field received by the latter (from 0 to 25).

Each number can receive messages (i.e. consult the device parameters) or even make settings.

11.8.b   Remote access via LAN

By touching the [icon] icon, the **Lan** screen will be displayed, which shows in its upper section, in the **MAC** field, the device MAC address:
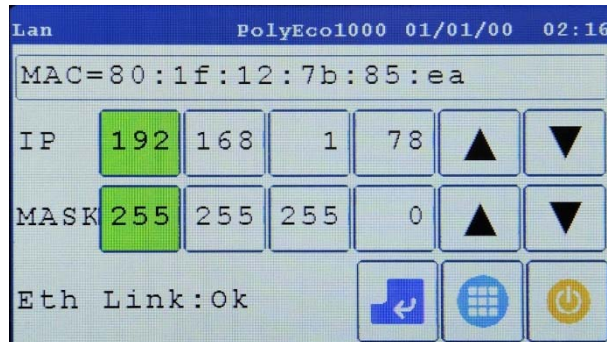
The following settings can be configured:

- **IP** – device's IP address
- **MASK** – device's subnet mask

In addition, the **Eth Link** field indicates whether the network connection is currently active (**OK**) or not (**Fail**).

11.8.c   Remote access via RS-485 port

By touching the [icon] icon, the **485** screen will be displayed, which ensures compatibility even with previous models equipped with RS-485 serial port.
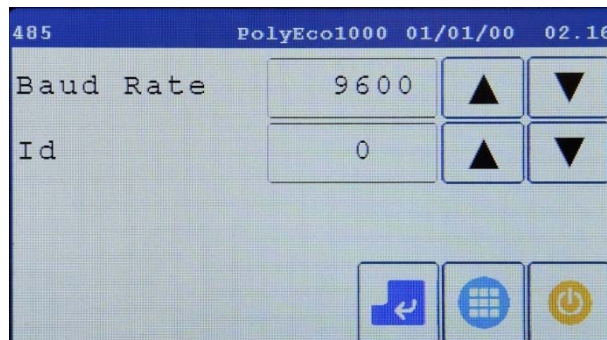
The following settings can be configured:

- **Baud Rate** – specifies the port communication speed
- **Id** – specifies the port address

11.9   I/O Settings menu

This menu allows the user to specify the behavior of the input and output contacts of the **REMOTE** control connector (🖹 6.1.b - [23]).

To access this menu, tap the [icon] (**I/O Settings**) icon in the **Main** screen.
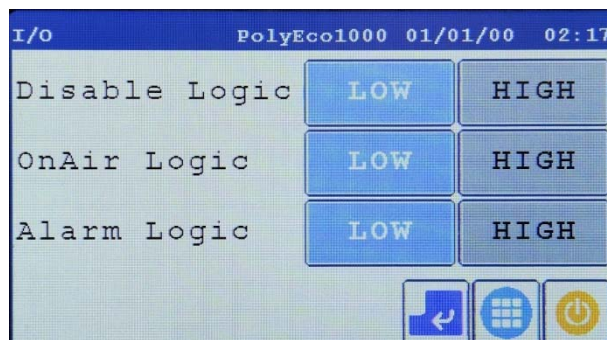
- **Disable logic** – defines whether activation/deactivation of the device is performed through the specific input by a **LOW** or a **HIGH** logic level
- **OnAir logic** – defines whether the specific output that indicates the transmitter status should be **LOW** or **HIGH** while the device is transmitting
- **Alarm logic** – defines whether the specific output that notifies an alarm event should be **LOW** or **HIGH** during an alarm condition

To configure these settings, touch the appropriate [LOW] or [HIGH] key according to the circumstances.

11.10 Sync menu

This menu allows the user to specify the frequency reference used by the device. To access this menu, tap the (**Sync**) icon in the **Main** screen.
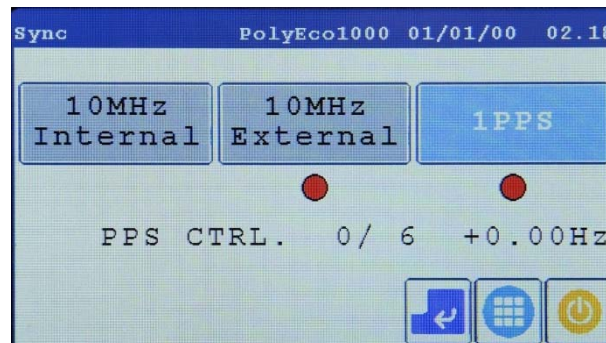
By touching the appropriate key, one of the following settings can be selected:

- **10MHz Internal** – internal 10 MHz reference
- **10MHz External** – external 10 MHz reference
- **1PPS** – external 1 PPS reference (6.1.b - [22])

In addition, the **PPS CTRL.** field. shows the number of synchronization attempts (**0/6**, **1/6**, etc.) and the frequency difference of the signal from the theoretical one.

📄 *The presence of the correct external reference signals is indicated by a virtual green LED* ⬤ *under the relevant key. Otherwise, such LED will light up red* ⬤ *.*

11.11 N+1 menu

With this menu the equipment can be configured as part of a N+1 system. To access this menu, tap the (**N+1**) icon in the **Main** screen.
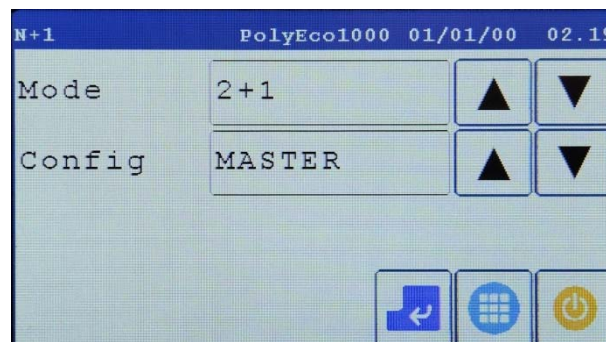
The following settings can be configured:

- **Mode** – can be set to **OFF** (the device is not part of any system), **1+1**, **2+1** or **3+1**
- **Config** – can be set to **MASTER** (master machine), **SLAVE1**, **SLAVE2** or **SLAVE3**

In the example above, the transmitter is set as the master of a configuration **2+1**.

11.12 `Config` menu

This menu contains a variety of configurations and settings: restoring of the factory default settings, access password setting, control of the internal RDS generator, internal voltage measurement, etc.

To access this menu, tap the [icon] (`Config`) icon in the **Main** screen.
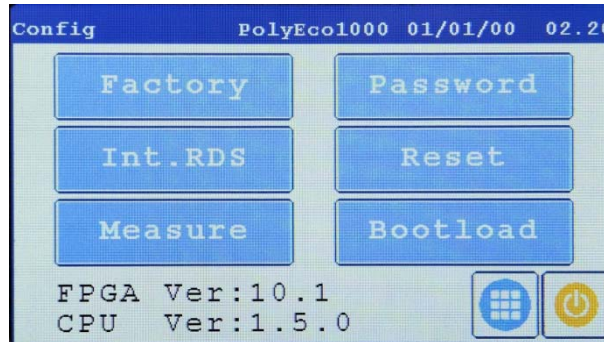
The firmware version of the FPGA and CPU can be viewed in the lower part. In addition, the following settings are available and can be called up by touching the respective button:

- **Factory** – service menu accessible only from Sielco
- **Password** – password management (11.12.a)
- **Int.RDS** – basic configuration of the internal RDS (11.12.b)
- **Reset** – hard reset which restores the parameter settings to the factory default values and deletes all the settings and data contained therein, to be used in case of persistent blocking of the machine
- **Measure** – allows performing a number of measurements (11.12.c)
- **Bootload** – menu used for firmware updates via LAN (11.12.d)

11.12.a `Password` menu

Used to activate and set the passwords used to protect access to the menus.
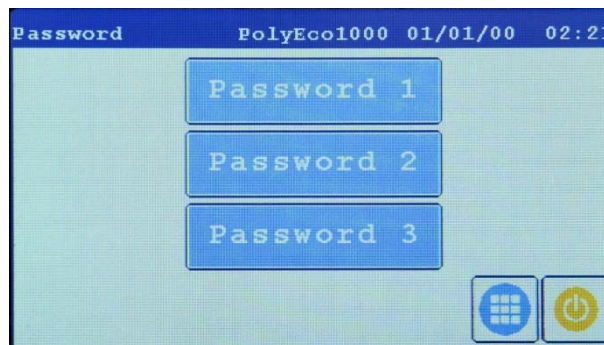
Three passwords are available:

- **Password 1** (level 1 password setting)
- **Password 2** (level 2 password setting)
- **Password 3** (level 3 password setting)

📄 *In order to gain confidence with the password settings menu and with its operation, we recommend that the password be set as* 0 0 0 0 *(four zeros) the first time.*

PASSWORD 1 (level 1 password)

To grant access to the **Main** menu while not allowing changes in the parameter's values, activate/set the **Password 1**. The **Home** menu, on the other hand, will remain accessible at any time.

Once password 1 is activated, said password will be requested whenever someone attempts to access the **Main** menu, which will be only available for consultation, without permission to change parameters. However, it is always permitted to put the machine into stand-by state or transmitting one.

PASSWORD 2 (level 2 password)

To grant access to the **Main** menu with permission to change its parameters values, activate/set the **Password 2**.

Once password 2 is activated, said password will be requested whenever someone access the `Main` menu and tries to modify a parameter. The `Home` menu, on the other hand, will remain accessible at any time.

PASSWORD 3 (level 3 password)

This is a default factory password, always active, which allows activating/changing level 1 and level 2 passwords within the `Password` submenu, even in case the user has activated and then forgotten such passwords. It also permits to change level 3 password itself, modifying its default factory value.

11.12.b `Int.RDS` menu

Although the device comes with an internal RDS generator, it can also use an external source. The following settings can be configured:
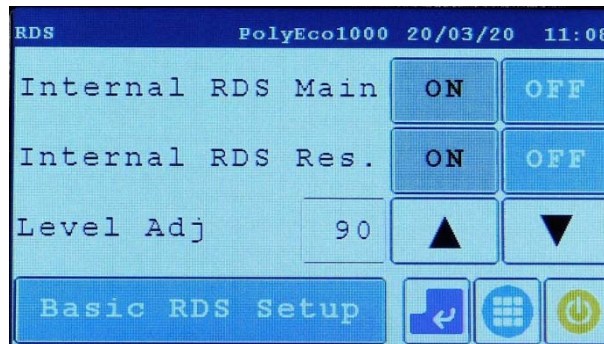
- `Internal RDS Main` – can be set to `ON` (internal RDS generator is active) or `OFF` (generator not active)
- `Internal RDS Res.` – allows you to decide whether, in case of exchange of the main modulation signal with the secondary one, the RDS signal should also be used by the latter (`ON`) or not used (`OFF`)
- `Level Adj` – set the modulation level of the output RDS signal (the higher the number the more the carrier level increases) using the keys using the ▲ ▼ keys.
- `Setup` – allows you to set the identification of the radio station as shown in the following screen
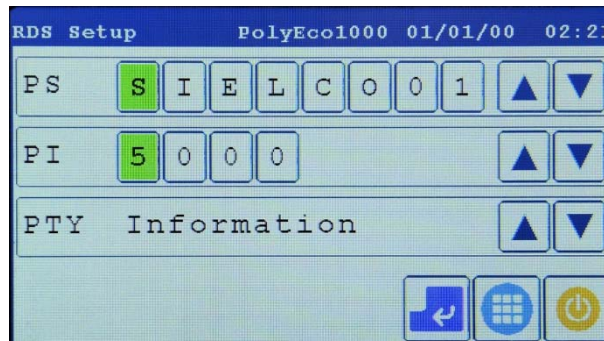
11.12.c `Measure` menu

This menu allows measuring the main parameters of the device. The following settings can be configured:
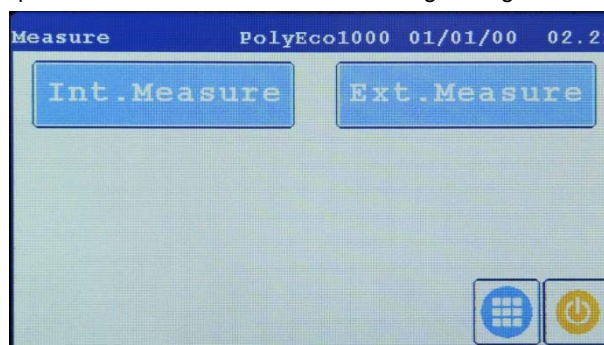
- `Int.Measure` – displays a series of measurements related to internal machine parameters (temperatures, voltages, ALC, etc.)
- `Ext. Measure` – summarizes values external to the machine (voltages, temperatures, open/closed contacts, etc). This information can also be sent remotely through the **REMOTE** connector or other optional ones.

The following screen shows an example of the information provided by the **Int.Measure** menu:
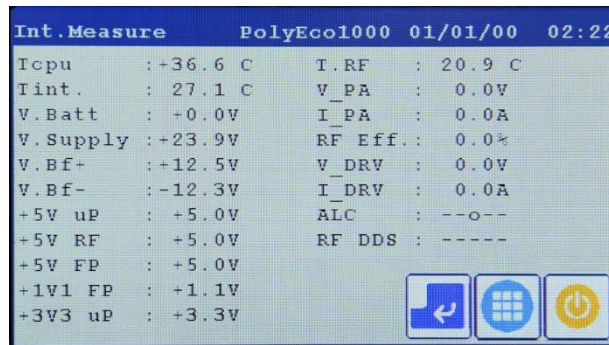
The following screen shows an example of the information provided by the **Ext.Measure** menu:
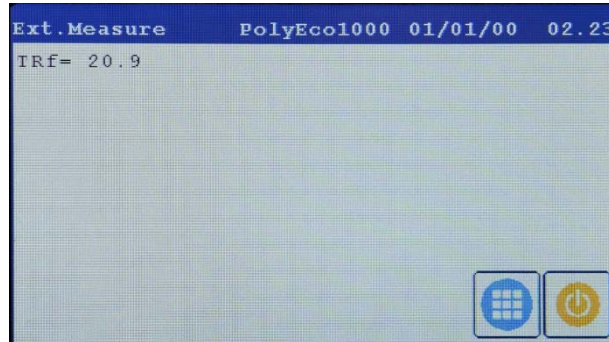
11.12.d Bootload menu

This menu is used to update the firmware via LAN. By accessing the menu, the following screen is displayed:
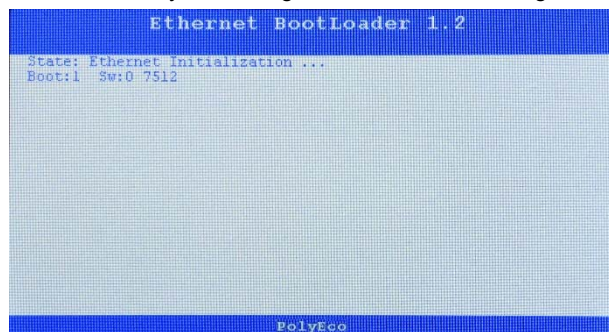

After a few seconds, the machine IP address is displayed. The updating process can then be performed through a standard Web browser. Enter the machine IP address to load the firmware update page in the browser. To perform this operation, Login and Password provided by Sielco are required.

11.13 Home menu

In no command is entered for two minutes, the system will automatically return to the **Home** screen. However, this operation can be manually performed by tapping the icon.

11.14 ON/Stand By menu

This command, available in all the screens, allows the user to put the transmitter into the operating (**On Air**) state or into the Standby (**Std-By**) one by simply touching the relevant key.
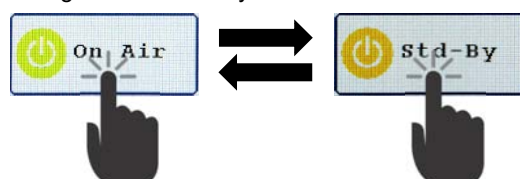
12 REMOTE CONTROL VIA INTERNET WEB SERVER

If automatic remote control of a large network is not required, remote control via the Internet Web server is especially indicated for manual checking/control. In this case the control program on the remote terminal is represented by the Internet browser (Chrome, Safari, Firefox, Microsoft Edge, Microsoft Internet Explorer and others) available on any PC and on most recent generation smartphones. Not all of these latter devices are able to correctly decode the Web page, but at least 80% of them are able to provide a fast and simple interface to control the device remotely

Once the equipment has been correctly configured on its own network and on a static address visible on the Internet, to perform remote control it is not necessary to install any other dedicated software on the remote device besides the Internet browser fitted as standard.

12.1 Initial access

To access the Web page of the equipment, it is necessary to **enter its IP address on the Web browser** as shown in the following figure, in this case http://95.228.99.139 which is, for example, the current public IP address of Sielco:
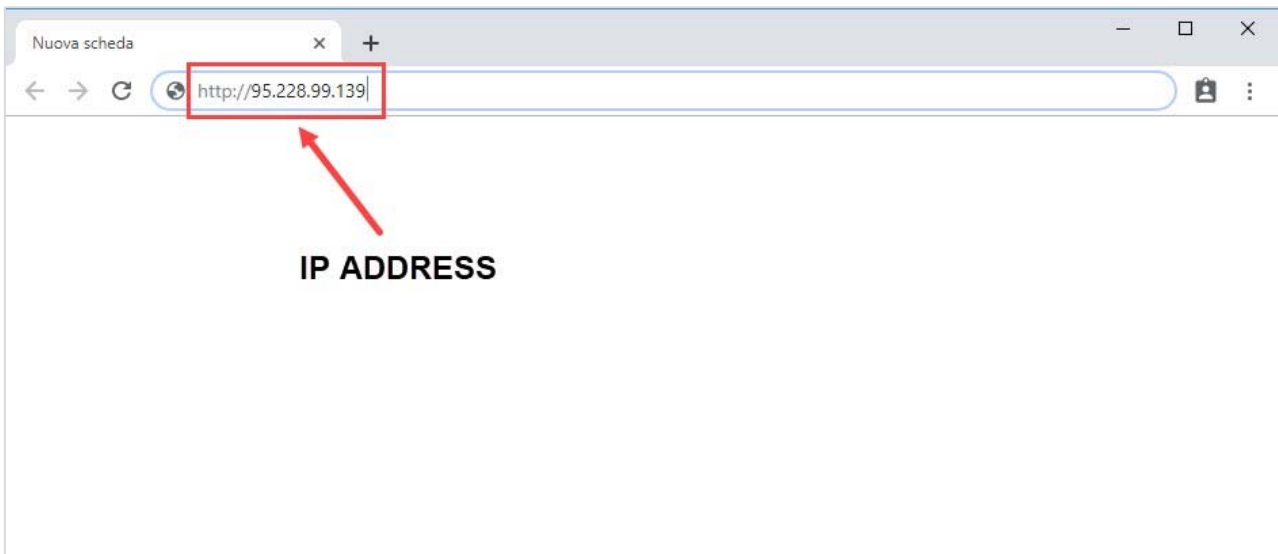
Once the search for the entered IP address has started (e.g. **Enter** key for PCs), the Web server integrated in the tab will show the login page described below.

12.2 Login Page

After performing the operations described in the previous paragraph, if the connection is active, the following Web page will appear, in which it will be necessary to enter the correct login credentials.

On this page you can read the CPU and FPGA firmware version, the date and time.

The factory settings for the first connection are:

User: **admin**
Password: **sielco1**

Then click on the **Login** button to access the following pages

📄 *These parameters are customizable by the user (ref. par.11.12.a).*

After logging in, a tab menu will be opened on which you can click to access the relative views or, if allowed, parameter changes.

📄 *It is not possible to change any parameter in the screens, except those relating to the settings (`Setup`) described in par. 12.2.e and following ones.*

12.2.a Status page

The first page that appears is the **Status** page where the main parameters are visible: the name and model of the equipment, its current status, operating frequency, etc.
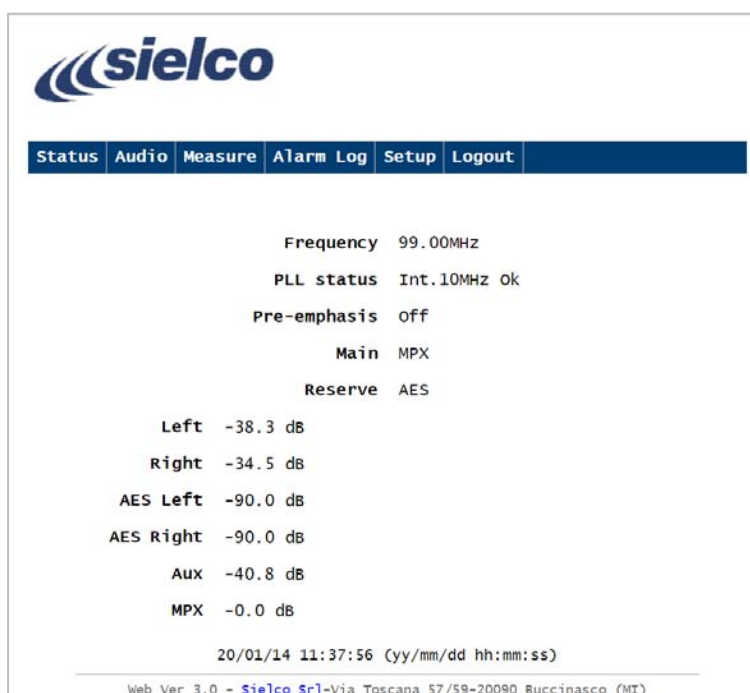
12.2.b Audio page

By clicking on **Audio**, beyond the frequency, the main parameters of real-time modulation will appear. The screen refresh occurs on average every 1-2 seconds
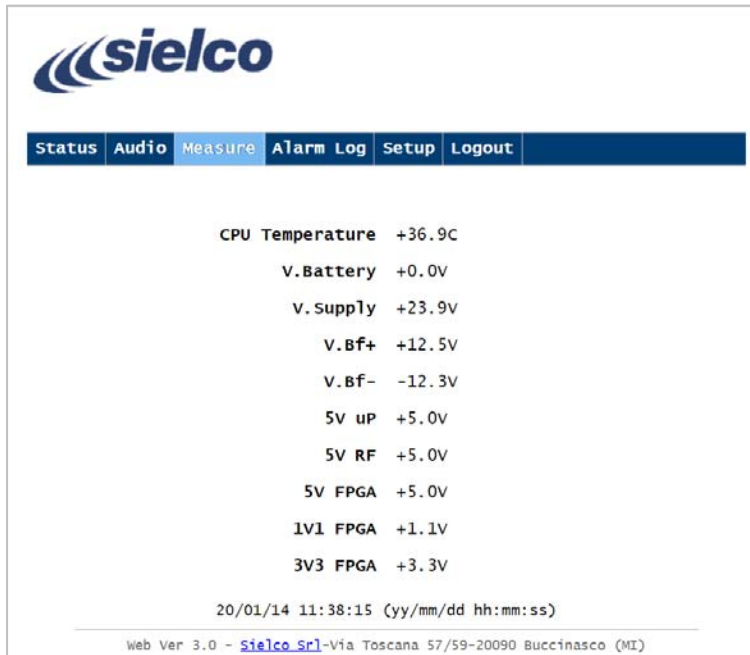
12.2.c   Measure page

By clicking on **Measure**, you can read the measurements of the main internal temperatures and voltages:

12.2.d   Alarm Log page (log of events and alarms)

This page shows the diary of alarms and events.

This page shows the alarms and some system events such as switching on and off and changing the setup parameters.

12.2.e   Accessing and use of the Setup menu

If the access authorization allows it (access with read/write right), it is possible to check and possibly change the device's setup parameters.

To enter the setup submenus, click on **Setup** and carry out the operations described in the following paragraphs.

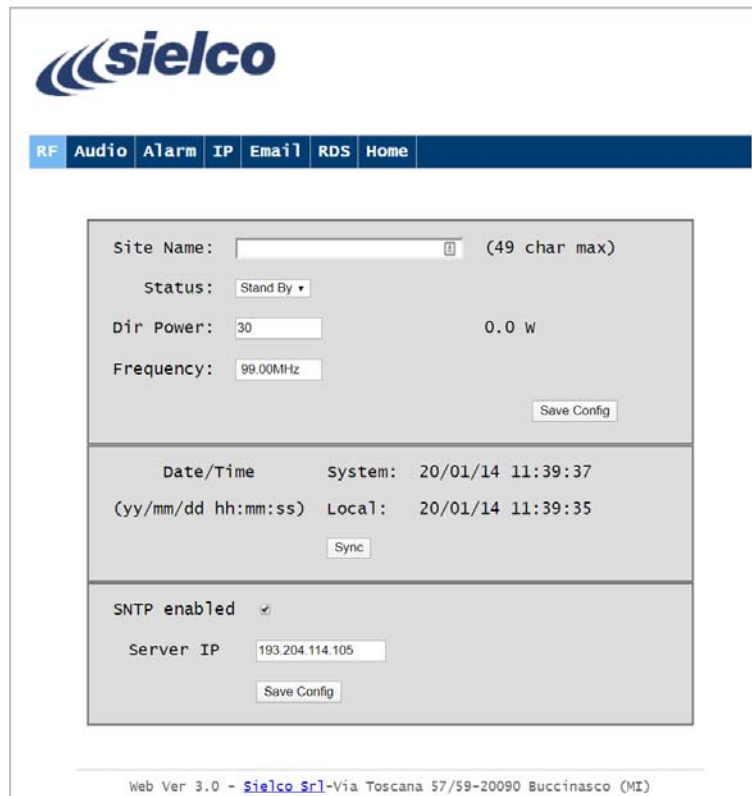The exit from the setup menu is described in par.12.2.k.

📄 *In all the Setup pages it is necessary to change only one parameter at a time, then click on the **Save Config** button. The system takes a few seconds to transmit the information but, above all, to update the screen information.*

✍ ***Pay the highest attention to the operations that are carried out and avoid granting this right to occasional users or those without adequate skills.***

✍ ***Changing the operating parameters such as power, frequency and modulation can have significant consequences both for the equipment and the plants and from a legal/regulatory point of view. Sielco declines any type of direct or indirect liability in this regard.***

12.2.f   Setup – RF menu

The first setup page is the one related to the RF parameters.

From the **RF** page it is possible to change the site name or the identification of the device (**Site Name:** field) and the main transmission parameters including, power and frequency. It is also possible

- Change the status from **On air** (active transmitter) to **Stand-by** and vice versa using the **Status** selector.
- Synchronize the time of the device with the one of the PC by clicking on the **Sync** button.
- Enable the connection to an Internet time reference via the SNTP protocol (in this case tick **SNTP enabled**) and change the IP address of the server in the IP Server field.

12.2.g Setup – Alarm (alarms) menu

From this screen it is possible to check and set the main alarms (low output power, high reflected power, lack of modulating signal, unlock of the synthesizer, etc.) with their thresholds and delay times.

📄 *By setting the low modulation alarm (**Audio Alarm**) with a delay (**Alarm Delay**) equal to 181 seconds, this alarm is disabled.*

12.2.h Setup – IP (IP parameters) menu

On this page you can check the local IP address set on the machine and reachable on the internal LAN. This address is not generally the one visible externally on the Internet because it is normally translated by the network modem/router and cannot be changed for security reasons (you would immediately lose access to the machine).

All other parameters (gateway, subnet mask and DNS) can be set as required on your network

Through the **Ping Test** command, it is possible to check the correct entry of the IP parameters (IP Address, Gateway and DNS) for which Ok or Fail appears.

📄 *The inconsiderate remote modification of the LAN access configuration parameters can have negative consequences on communication with the router/modem and remote access, with consequent immediate loss of the connection: therefore avoid changing these parameters remotely. However, the parameters can be modified and/or restored via direct access on the local LAN or directly to the network socket of the transmitter.*

📄 *The IP address is configured only by acting locally on the transmitter (see user manual)*

12.2.i   Setup – E-mail (e-mail server) menu

This is one of the most powerful functions of the Web server, through which it is possible to send alarm or information messages in case alarms or significant system events (status changes and / or setup) will occur.

The equipment can send e-mail messages up to 5 different and specifically configurable e-mail addresses.

The e-mail server relies on a functioning mailbox that must be configured externally for use. The access parameters must be stated on this screen.

The example on the side shows the typical configuration for a free mailbox through a third-party mail server (smtp2go) that supports SSL encryption or not. The parameters set in this case are:

Email server: mail.smtp2go.com

Server port: 2525

Use TSL/SSL: no

User email: test.sielco@gmail.com

User login: test.sielco@gmail.com
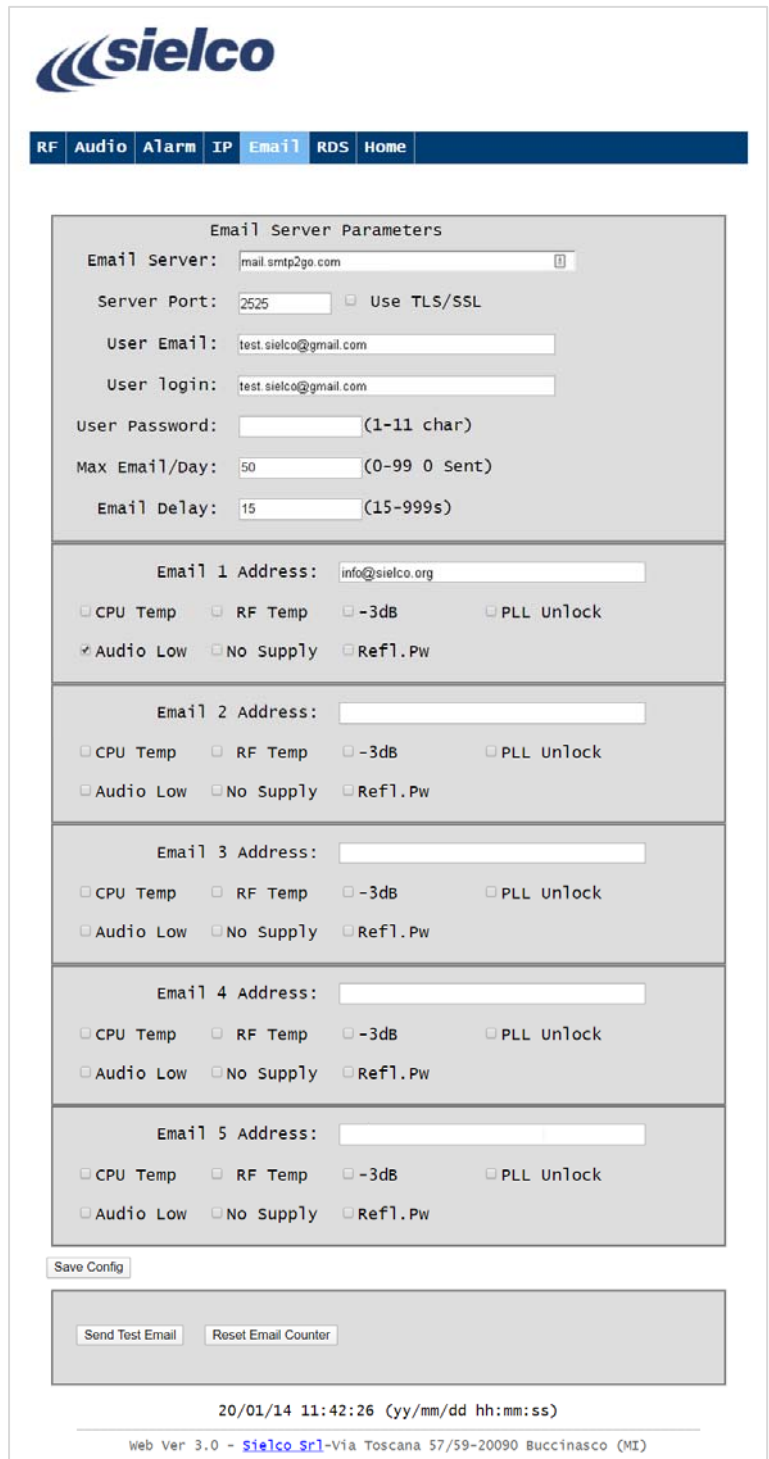
User password: **********

It is possible to limit the number of daily messages (50 in the example) and the minimum interval between one message and another (15 seconds) to a reasonable number. By pressing the **Reset Email Counter** button, the current daily account of messages already sent is reset.

Note that, although the example on the right does not include any password for access to the mail server, the latter was set during configuration and is absolutely necessary for access. The web server screen does not report it in any case in the clear for confidentiality reasons.

✋ *The email server supports passwords no longer than 11 characters long: longer passwords will not work!*

✋ *The mail server used must accept messages with or without SSL encryption. Some servers no longer support SSL encryption but only TLS encryption, e.g. Google mail.*

The email sent following an alarm is similar to the one stated below:

Info SIELCO

Da:	test.sielco@gmail.com
Inviato:	venerdì 23 maggio 2019 14.55
A:	Info
Oggetto:	Refl Power high

```
SIELCO RF Transmitter: Refl Power high

Date & Time: 23/05/14 14:55:06
Site : SIELCO Test Lab
Machine model:
Frequency: 99.00 MHz
PLL status: Lock
Forward Power: 4.2 W
Reflected Power: 4.2 W
CPU Temp: 36 Celsius
RF Temp: N.A.
VSupply +: +12.35V
VSupply -: -13.66V
VSupply2+: +27.84V
```

12.2.j   Setup – RDS menu

On this page you can set all the internal RDS parameters.

All other parameters (gateway, subnet mask and DNS) can be set as required on your network.

Using the **Save RDS Config** command it is possible to save the set RDS parameters.

12.2.k   Setup – Home (exit from setup menu) menu

To exit the setup functionality, click on **Home**: this will bring you back to the operating parameters display menu.
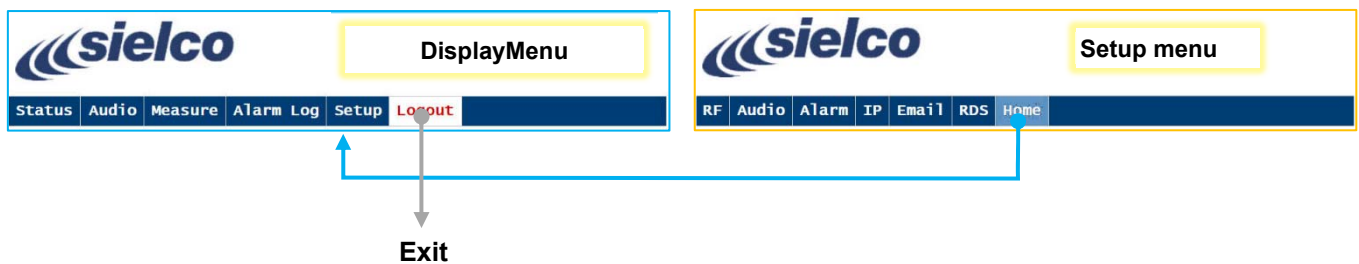
Similarly, to exit the Web server click on the **Logout** tab which will take you back to the initial login page (see par. 12.2). Alternatively, you can simply close the browser window.

13 MAINTENANCE, UPGRADE AND WARRANTY

13.1 Maintenance

✋ **Strictly follow the instructions outlined in this section**

13.1.a Clogging caused by dust

Since the transmitter is cooled by air, it is subject to clogging caused by dust. Because of the high-quality materials used in its manufacture, if it is installed as set forth according to the instructions in Chapter 7, it will not require special maintenance for quite some time.

Routine interventions are recommended every 6 months, especially to remove dust from the front filter and from inside. Note that 90% of the air circulates in the internal main ventilation duct and does not affect the components.

Access to the filter is facilitated by the special removable cover by unscrewing the 4 screws as shown in the following figure.

Then remove the filter, clean it and put it back in pace.
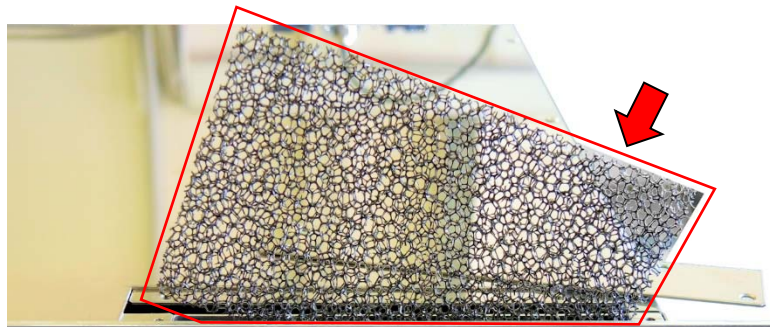
Restore the door and secure it with the 4 screws

13.1.b Ventilation fan

If the transmitter is equipped with forced air ventilation system, we recommend regular checking of the system regularly, especially in higher-temperature environments, replacing the components that are not in perfect condition. Always use the same fan type as originally installed.

13.1.c Periodic overhaul

After a few years of continuous service, it is advisable to have the device overhauled in the factory or in a specialized Sielco appointed laboratory, where its characteristics can be checked against the initial parameters. If necessary, regular maintenance operations can also be carried out at this time.

If the equipment has worked at high temperatures, above 30 ÷ 35 ° C, it is important to overhaul the power supply.

Never modify the original settings without utilizing the proper testing equipment and standard procedures, and without having received authorization by Sielco or an authorized representative

13.2   Software upgrade

The continuous evolution of performance of the equipment, adding of new features, etc., may require software upgrade of equipment. For further information on this aspect, please contact the manufacturer.

13.3   Warranty

Like all Sielco solid-state equipment, this transmitter series carries a one-year warranty on all its components, with the exception of the final RF power module, which may be damaged by faulty output connections.

📄   *Notes:*

• This warranty will become null and void if the device is tampered with or if failure is due to improper use or maintenance, or external causes such as a mains over-voltage.

• This warranty covers work performed exclusively on Sielco laboratories or those of Sielco authorized representatives.

• Products shall be delivered to the laboratory carriage pre-paid, and shall be returned by freight forward.

• This warranty does not cover any indirect damage caused by non-operation or faulty operation.

14 TROUBLESHOOTING

If all instructions provided in this manual are followed, the PolyEco series will guarantee several years of perfect service. However, should problems arise, refer to this chapter before contacting the local authorized assistance point.

14.1 Error messages

All alarms will be usually shown in any screen you are in, superimposed on the upper section of the screen (local content will be hidden), flashing in red.

This section lists the meaning of the main error messages that may appear flashing in red on the upper section of the screen, along with the possible actions to be taken to resolve the problem.

15 CIRCUIT DESCRIPTION

This section's sole purpose is to provide general explanations about the device operation in order to simplify the maintenance by skilled personnel authorized by Sielco. As already mentioned, no internal adjustments are required for normal operation. Tampering with the internal settings renders the warranty null and void and could seriously damage the equipment, compromising the guaranteed performance.

Several modules are highly specialized and difficult to repair even by skilled technicians and must therefore be replaced with new modules, and, if possible, sent to the manufacturer in order to verify the possibility of a repair.

Any inspection of the described modules must be carried out with the cover removed and, in many cases, with the equipment connected to the mains power supply. Although some energized parts are insulated and difficult to reach, this involves the risk of accidental contact with the mains voltage. In order to avoid this, use only insulated tools and never touch the power supply transformer, the main switch or the power sockets when the equipment is connected to the mains.

Do not operate the equipment without the covers properly screwed on. If the top cover is removed, malfunctioning of the equipment may occur, as well as of any other electronic measuring instrument, owing to the strong R.F. fields involved.

All modules can be accessed and easily replaced with little, if any, adjustment, usually with no soldering needed.

See general technical manual: 50 W to 1,6 kW FM super compact transmitters series. Electrical drawings and components.

16 MAIN TECHNICAL FEATURES

Frequency range		87.5 ÷ 108 MHz (different frequency ranges available on request)
Transmitter tuning steps		100 kHz - fine tuning: 10 Hz steps
Frequency precision		Error < 50 Hz unsynchronized, < 1 Hz synchronized
GPS synchronization	10 MHz / 1 PPS	External / Internal with digital PLL
Modulation	FM	DDS, Direct Digital Synthesis 256kF3E
MPX/L/R audio input level		-6 ÷ +15 dBu @ 75 kHz deviation, 0.1 dB steps
Aux channel input level (RDS/SCA)	SCA	-15 ÷ +6 dBu @ 7.5 kHz Aux channel input level
	RDS	-24 ÷ -3 dBu @ 2 kHz Aux channel input level
Modulation distortion	75 kHz dev.	≤ 0.02%
Mono S/N ratio	30 ÷ 20000 Hz	>80 dB, 83 dB typical
	CCIR	>72 dB, 76 dB typical
Stereo S/N ratio	30 ÷ 20000 Hz	>72 dB, 77 dB typical
	CCIR	>68 dB, 72 dB typical
Audio channels band width	30 ÷ 15000 Hz	± 0.1 dB
MPX input band width	30 ÷ 100000 Hz	± 0.1 dB
Pre-emphasis time constant		0 µS, 50 µS (CCIR), 75 µS (FCC)
Separate audio / BF channels		MPX, L, R, AES/EBU, Aux, SCA primary + reserve
Modulation delay		0.1 µs ÷ > 3 s, digitally programmable
Stereo encoding		According to ITU-R BS, 450-3, pilot frequency method
Stereo separation		> 55 dB
Pilot frequency		19 kHz ±0.1 Hz, adjustable amplitude 0 – 12%
RDS generator		In line with EN62106 PI, PS, ECC, PTY, TP/TA, AF, MS, DI, CT
Nominal RF output power		30 W
Output power ALC stability		±3%
Harmonics and spurious emissions		< 70 dB (harmonics), < 80 dBc (spurious)
RF output connector		N
Monitor and remote control ports		Analog MPX on BNC, parallel control on SubD9, serial RS232, RS485, 10/1000T, GSM, Web server, SNMP
Power supply		100 ÷ 250 V_{AC}, up to 1400 W at full power according to the model
Operating temperature range	Recommended	0 ÷ 35 °C
	Extreme	-10 ÷ +45 °C (50 °C with derating)
Relative humidity		up to 95%, not condensing
Dimensions (L x H x D)		483 x 88 x 440 mm
Reference regulation		ETSI EN 302 018 v2.1.1

📄   *The above details may be subject to changes without prior notice*

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