

# EXC(RFB)xxGX



## FM super-compact transmitter series User and maintenance manual

Version 1.0 – 01/2019





## CE CONFORMITY DECLARATION

In fulfillment of the official provisions:

2014/53/EU (RED)  
2014/35/EU (Electromagnetic Compatibility)  
2014/30/EU (Low Voltage)

We Hereby declare, under Our responsibility, that the products:

Analogical FM broadcast transmitter in the VHF models:

*EXC10GT, EXC30GT, EXC50GX, EXC100GX, EXC120GX, EXC150GX, EXC250GX,  
EXC300GX, EXC500GX, EXC600GX, EXC1000GX, EXC1600GX, EXC2000GX,  
EXC3000GX, EXC3500GX, EXC5000GX*

whose power is indicated by the numeral part in the model denomination

- ❖ **Conform to the Safety Standard**  
*EN 60215:89 +A1:92 + A2: 94*  
*EN 62311 (2008)*
- ❖ **Conforms to the basic series of Radio tests (art. 3.2 1999/05/CE)**  
**Defined inside the Technical Standard:**  
*ETSI EN 301 489-1 V2.2.0*  
*ETSI EN 301 489-53 V1.1.0*
- ❖ **Conforms with the Specific Technical Standard:**  
*ETSI EN 302 018-1 V 2.1.1*

Buccinasco, June 28<sup>th</sup> 2018

Stamp and signature

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## Preliminary notes

We used the utmost care in making a complete manual with detailed, precise, and updated information; however, the contents herein cannot be regarded as binding towards our company.

SIELCO, in their constant commitment to improve the quality of their products, reserve the right to vary the device's technical features without prior notice. For updates, please visit our web-site [www.sielco.org](http://www.sielco.org) or contact our local dealer or agent.

The manufacturer will not be held responsible for any consequences caused by errors or improper handling and over which he has no direct control.

The described options may vary from model to model to meet the specific requirements of our customers.

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



 For further information about how SIELCO ensures compliance with EC regulations, refer to Chap. 4.

 **CE Conformity declaration here enclosed comprises all the models in the actual EXCxxGT/GX family. Specific declarations for each model may be requested to SIELCO in any moment.**

## Summary

<b>1</b>	<b>INTRODUCTION .....</b>	<b>6</b>
<b>2</b>	<b>USED SYMBOLS.....</b>	<b>7</b>
<b>3</b>	<b>SAFETY FIRST! .....</b>	<b>8</b>
3.1	Symbols used .....	8
3.2	Warnings .....	8
3.3	Warning instruction.....	11
<b>4</b>	<b>SIELCO PRODUCTS AND ADDED VALUE.....</b>	<b>12</b>
4.1	Full conformity to EC regulations .....	12
4.2	Quality in series manufacturing .....	12
4.3	Overdesigning for performance.....	12
4.4	Savings on all fronts .....	12
<b>5</b>	<b>IDENTIFYING YOUR MODEL.....</b>	<b>13</b>
5.1	Dual identification .....	13
5.2	Default screen .....	13
5.3	External cabinet.....	13
<b>6</b>	<b>EQUIPMENT DESCRIPTION, COMMANDS AND INPUTS .....</b>	<b>14</b>
6.1	Location of parts .....	14
6.2	List of commands and inputs.....	19
<b>7</b>	<b>INSTALLATION .....</b>	<b>21</b>
7.1	Check the supplied parts .....	21
7.2	General safety rules .....	21
7.3	Placement of the device .....	21
7.4	Wiring the device .....	22
<b>8</b>	<b>AUDIO OPERATING MODES AND ASSOCIATED LF CONNECTIONS .....</b>	<b>26</b>
8.1	Mono transmission from a mono signal .....	26
8.2	Mono transmission from a stereo signal .....	26
8.3	Stereo transmission from a stereo signal using the internal stereo encoder .....	26
8.4	Monophonic or stereophonic transmission from a multiplex signal.....	26
8.5	Connection to LEFT, RIGHT, or MPX modulation connectors.....	26
8.6	Connection of the AES/EBU digital audio input (OPTIONAL).....	27
8.7	Connection to MPX input.....	29
8.8	Changing the input impedance.....	29
8.9	Operating with the RDS and SCA encoders .....	30
8.10	Operating with internal RDS Generator board (optional) .....	30
8.11	Operating with remote control with Ethernet/GSM adapter board (optional) .....	32
<b>9</b>	<b>MENU AND NAVIGATION COMMANDS .....</b>	<b>33</b>
9.1	Multifunction knob .....	33
9.2	ESCAPE button .....	33
9.3	Navigating the commands menu.....	34
9.4	Additional commands in the SETUP menu .....	34
<b>10</b>	<b>BASIC OPERATIONS .....</b>	<b>36</b>
10.1	Initial start-up and basic adjustments.....	36
10.2	Changing from stand-by to full operation .....	40
10.3	Changing from full operation to stand-by and vice-versa.....	41
10.4	Turning off the transmitter .....	41
<b>11</b>	<b>MENUS DESCRIPTION .....</b>	<b>42</b>
11.1	Default screen .....	42
11.2	VIEW menu.....	42
11.3	SETUP menu.....	46
11.4	Hidden or Factory menus (under level 3 password) .....	57
11.5	Output power reduction by remote input parallel connector .....	58

<b>12 RFB-GX AMPLIFIER'S SERIES .....</b>	<b>61</b>
12.1 Configuration of the equipment .....	61
12.2 Connecting amplifier and transmitter through the RS485 port.....	63
12.3 Impostazioni indirizzi porta RS485.....	64
<b>13 MAINTENANCE, SOFTWARE UPGRADE AND WARRANTY .....</b>	<b>65</b>
13.1 Maintenance .....	65
13.2 Software upgrade .....	65
13.3 Warranty .....	66
<b>14 TROUBLESHOOTING .....</b>	<b>67</b>
14.1 Error messages .....	67
<b>15 CIRCUIT DESCRIPTION .....</b>	<b>69</b>
<b>16 TECHNICAL FEATURES .....</b>	<b>70</b>
<b>17 OPTIONALS .....</b>	<b>71</b>


## 1 INTRODUCTION

Congratulations on your purchase! The **EXC(RFB/TX)xxGX** transmitter/amplifier series is equipped with the most modern technology available, to provide you with maximum performance at minimal performance cost, while fully conforming to technical regulations. Flexibility, quality, compactness, and low electrical consumption make the devices in the EXC(RFB)xxGX series the best offered on the market today. The transmitter/amplifier in the EXC(RFB/TX)xxGX series are available ranging from 30 W (for common uses, such as an exciter) to 5 kW, ideal for N+1 systems and as a spare transmitter. These are just a few of the advanced characteristics that make the EXC(RFB/TX)xxGX series truly unique:

- **Super-compact size and reduced weight** – The most powerful model is so compact that it can be entirely contained within a standard 19" 4-unit rack.
- **Low performance costs.** The unique design reduces internal loss and allows the device to achieve an extremely high yield – typically greater than 80% - minimizing electrical consumption and thus decreasing performance costs.
- **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.
- **Easy to use and to configure.** All the transceivers use the same control interface, which is equipped with a large LCD screen, a multifunction knob, and few other buttons. This allows the user to easily set functions on the device, and to view the operating parameters in the blink of an eye.
- **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 operating frequency includes the full FM range, without retouching other parameters.
- **Power section entirely modular and highly reliable.** In the high-power versions, the stage of RF amplification is composed of multiple internal subcompact modules produced from the latest advances in technology and working in perfect synergy. Thanks to internal balancing circuits, when a failure occurs in one of the modules, the others are automatically rebalanced, allowing for transmission at reduced power. Each module is easily identifiable, inspected, and removable without the assistance of a welder, thanks to the reduced number of interconnections achieved using multi-polar connectors.
- **RF output stage has a reverse intermodulation figure lower than the standard bipolar construction.** Low enough to approach that of tube equipment, due to the MOS-FET design.
- **Low level of dissipation.** The reduction in internal loss and overall elevated yield minimize the dissipation of heat; as a result, the devices in the EXC(RFB)xxGX Series perform well even in challenging environmental conditions.
- **Stable, reliable power supply.** The entire line of transmitters integrates the use of power sources with active power factor correction (PCF), as stipulated in recent regulations. As such, impact on the electrical power source is minimal, resulting in greater reliability over 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 from remote posts 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 2014/30/EU (low voltage), 2014/53/EU (RED), 2014/35/EU (EMC) standards.

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 USED SYMBOLS



**CONSULT DOCUMENTATION**



**ALTERNATING VOLTAGE**



**MAINS SWITCH ON**



**MAINS SWITCH OFF**



**DANGER, HIGH RF VOLTAGE HAZARD**



As for 2012/19/EU requirements this equipment cannot be discharged in the environment at its end of life but must be given to the appropriate collection centers which will provide for recycling

## 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 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 Siel, 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 EXC(RFB)xxGT Series family of transmitters and amplifiers has characteristics common to all its models. However, each version is equipped with a different transmission power, and characteristics specific to the series or options 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 does not 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 than 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 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 no response, 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 (3-4cm). 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 Warning instruction

#### 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 advise 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 must 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 operating warnings

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 ADDED VALUE

### 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 (Nemko, TUV and others) 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 series conforms to testing and validation regulations, Sielco has set up specific procedures designed to maintain the required standard.

### 4.3 Overdesigning for performance

Sielco understands that, in order to guarantee extended performance times without servicing, the parts most subject to stress must be overdesigned. To this end, we have paid particular attention to creating the stages of RF power and the device's power supplies, designing them so they can provide and manage power levels much higher than the nominal values indicated in the specifications. People with experience in this field will gain a full appreciation of this aspect after having read through the entire manual.

### 4.4 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 EXC-RFBxxGX 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/amplifier 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 EXC(RFB)xxGX transmitters/amplifiers significantly reduces bulk, and therefore the rental on locations in which the transmitters are installed.
- **Lower transportation costs** – the light weight of EXC(RFB)xxGX transmitters/amplifiers 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 EXC(RFB)xxGX Series family of transmitters/amplifiers has characteristics common to all of the models (for example, the command menu, the primary controls, the primary connection inputs, etc.). However, the range of models is in continual evolution, and each model is distinguished by a different transmission power and by characteristics specific to the series, or by optional characteristics that make it unique. For this reason, it is important to verify the exact model of your device as follows.

This family is actually composed by many models whose numerals usually identifies nominal RF output power:

EXC30GT	EXC50GX	EXC100GX	EXC120GX	EXC150GX	EXC250GX	EXC300GX
EXC500GX	EXC600GX	EXC1000GX	EXC1600GX	EXC2000GX	EXC3000GX	EXC3500GX
EXC5000GX						

Some different power models may be derived by these, being their power limited by either hardware or software means

### 5.1 Dual identification

Each -GX family model may be recognized in two different ways:

Ciascun modello della famiglia GX può essere riconosciuto inequivocabilmente in due modi:

- By the default home screen as in the example below
- By an external label put on the rear panel which reports the model name in full and possibly in a supplementary label on the right side of the equipment

In addition, either the home screen and the rear panel label report the Serial Number of the equipment, while the manufacture address is only on the label

### 5.2 Default screen

Default screen immediately shows the equipment model as in the following picture:



As you may see this equipment is an EXC2000GX. For more details [Chap. 4.1](#).

 **To avoid possible misunderstandings on this Manual it is necessary to clearly identify your exact model**

### 5.3 External cabinet

Each model, according to its power level and other factors, may be produced in a specific 19" cabinet rack, which may have different commands and inputs arranged differently than on other models. To avoid misunderstandings regarding the location of these parts, refer to the following chapter, which illustrates the commands and inputs for each version.

## 6 EQUIPMENT DESCRIPTION, COMMANDS AND INPUTS

The primary commands and connections for the EXC(RFB)xxGT Series are common to all the models. However, each version has been created with a different unit rack and may be equipped with different functions and connections. This section allows you to identify your device and the locations of its available commands and inputs.



In order to avoid misunderstandings when reading the user manual, it is important to confirm the exact model number of your device, as indicated on the main screen, and to remember this model number (see Chap. 4.1).

### 6.1 Location of parts

To identify the various parts of the transmitters according to the cabinet (in a 19" rack) on which they are mounted, refer to the image corresponding to your device, and to the numbered list in section 0.

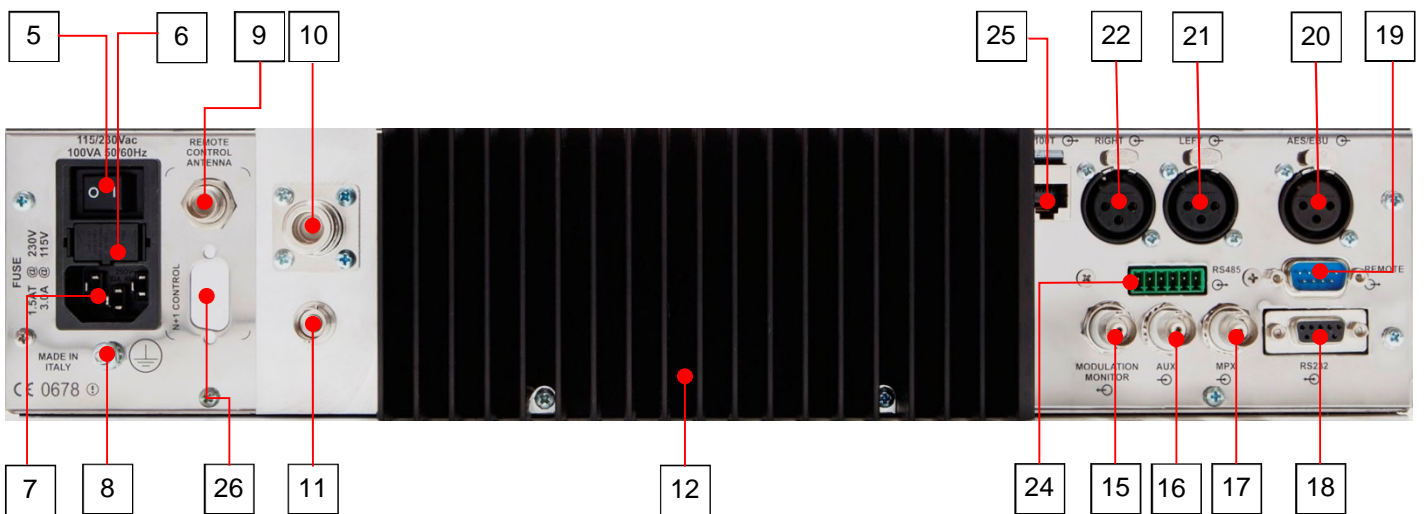
#### 6.1.a EXC30GT Transmitter

##### Front



- Dimensions (LxHxD): 483 x 88 x 334 mm
- Weight: 7 kg
- Output connector: N

##### Rear



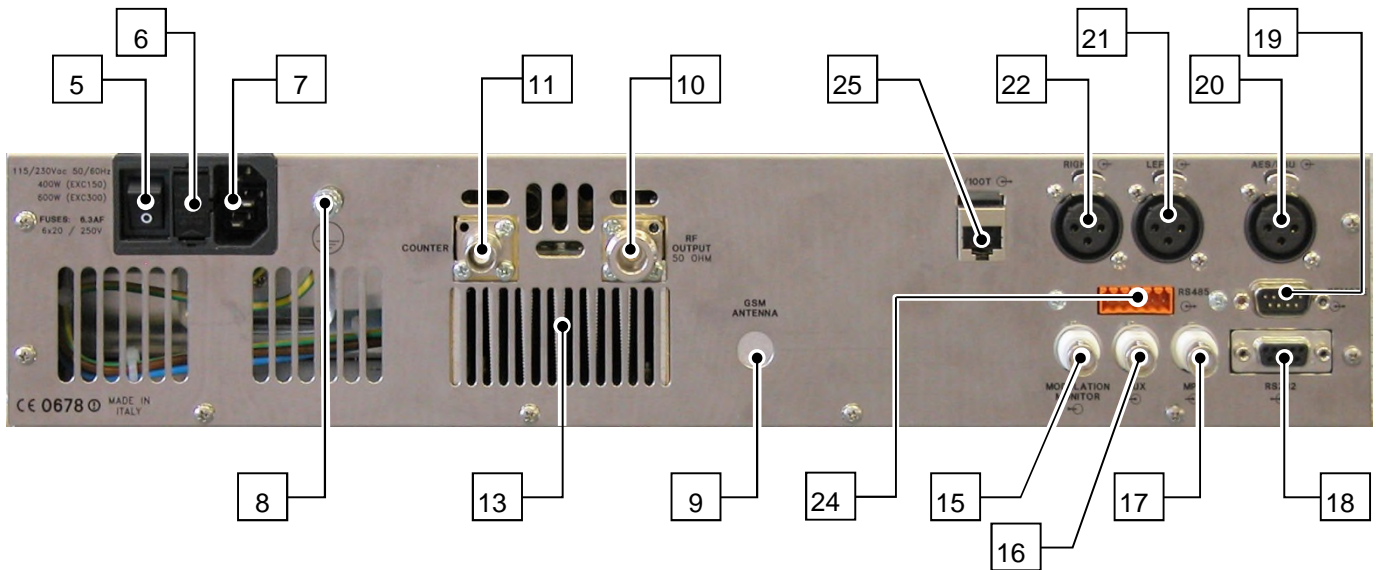
6.1.b EXC100-300GX Transmitters

Front



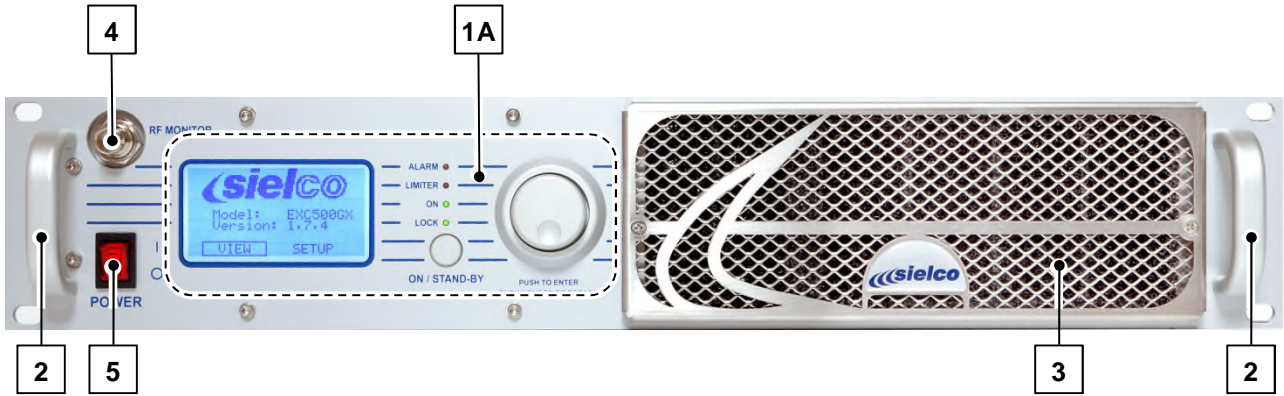
- Dimensions (LxHxD): 483 x 88 x 395 mm
- Weight: 8 kg
- Output connector: N

Rear



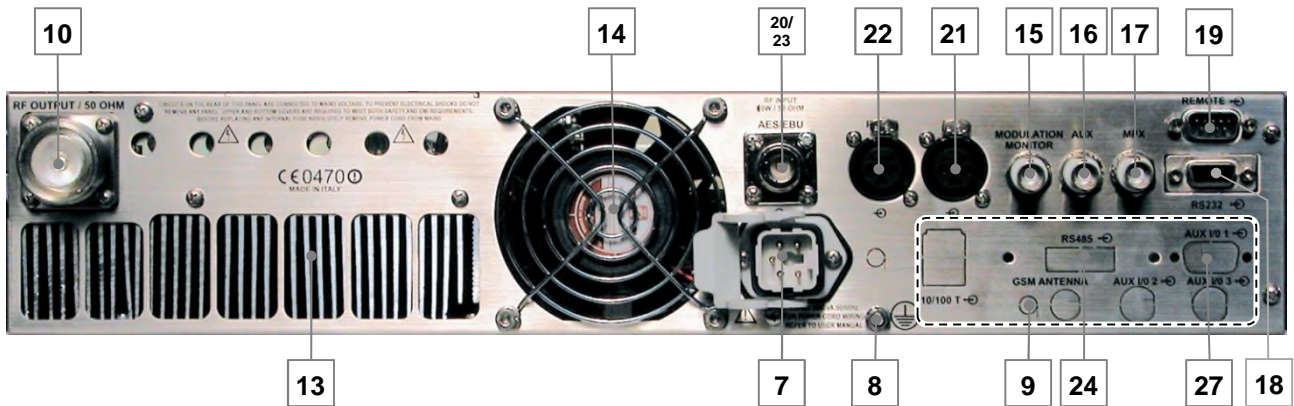
6.1.c EXC(RFB)500÷1600GX Transmitters and Amplifiers

Front



- Dimensions (LxHxD): 483 x 88 x 585 mm
- Weight: 12 kg
- Output connector: 7/16"
- Notes: these models internally differ for the type and/or number of output transistors/ RF power modules and/or the power supply

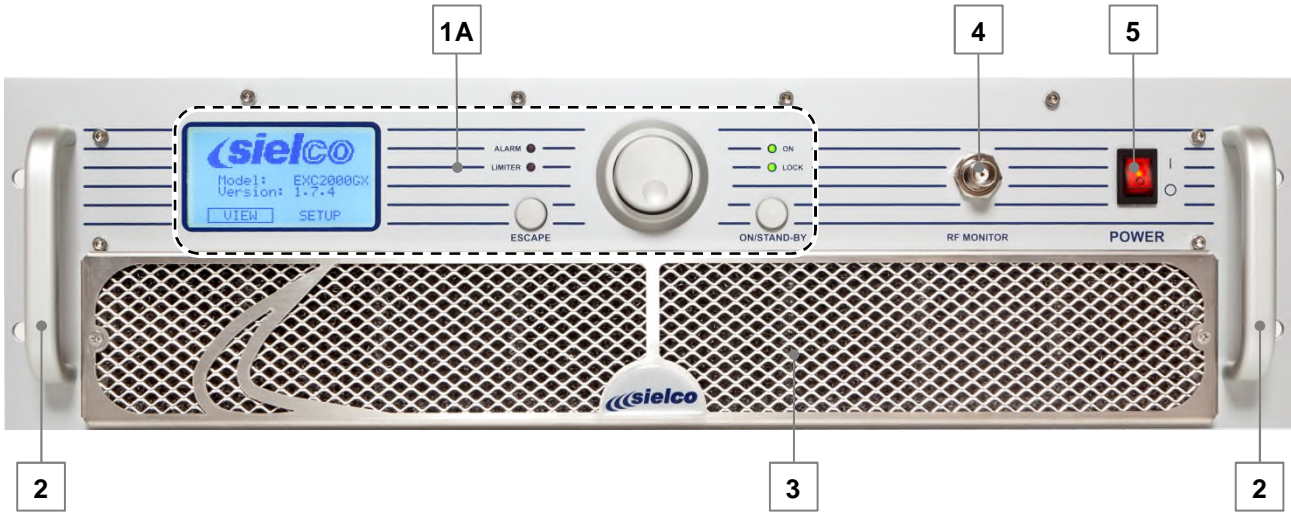
Rear





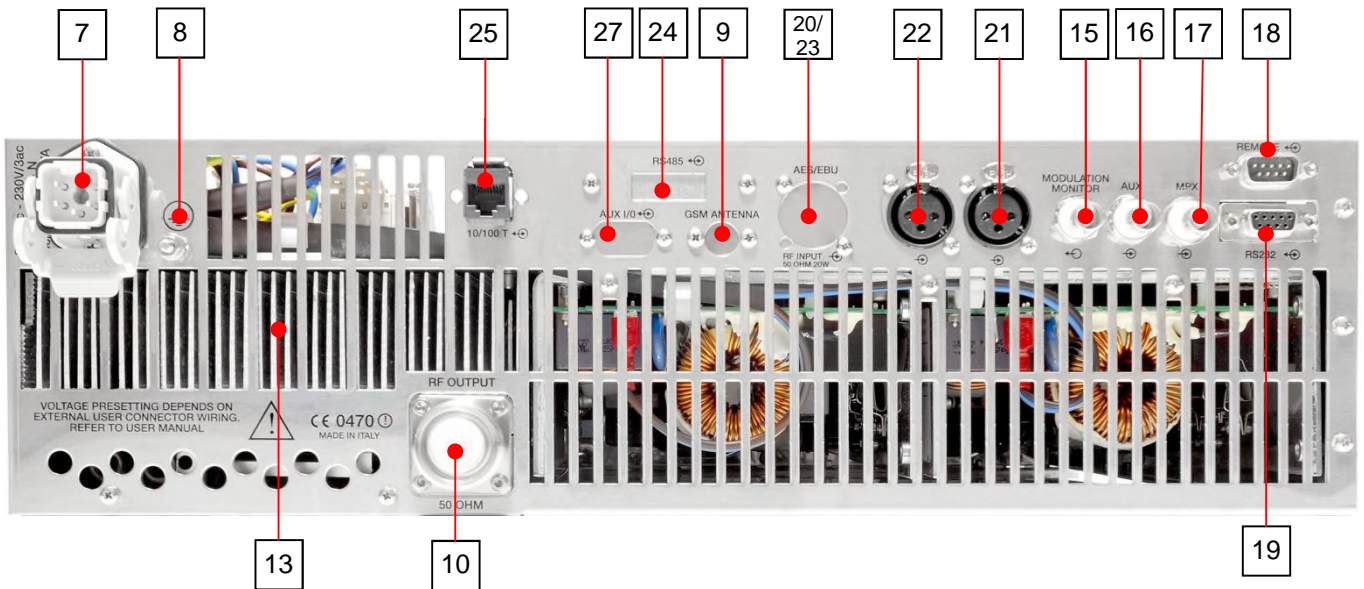
6.1.d EXC(RFB)2000GX Transmitter and Amplifier

Front



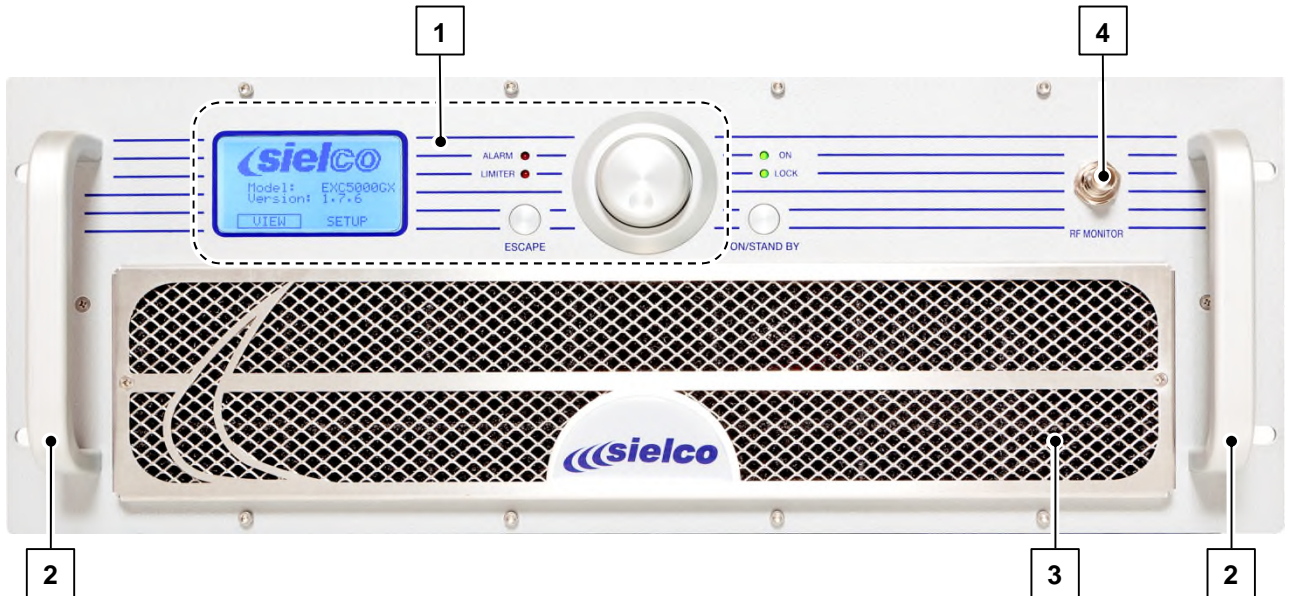
- Dimensions (LxHxD): 483 x 133 x 585 mm
- Weight: 21 kg
- Output connector: 7/16"

Rear



6.1.e EXC(RFB)3000-5000GX Transmitters and Amplifiers

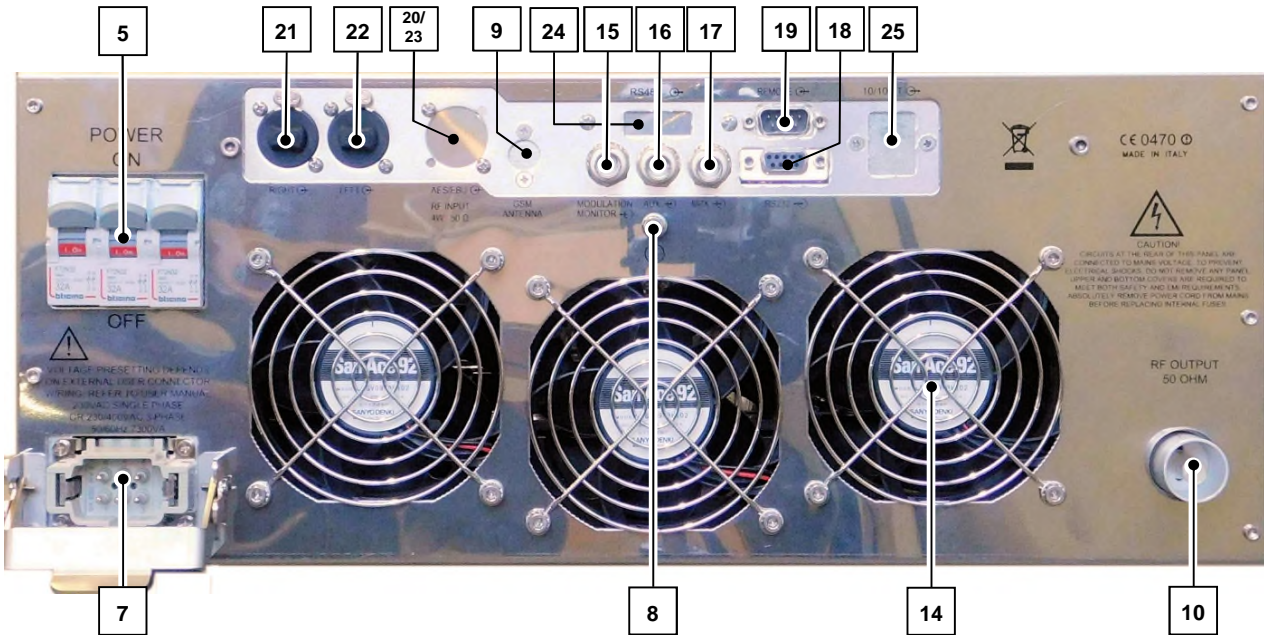
Front



6.1.f

- Dimensions (LxHxD): 483 x 177 x 650 mm
- Weight: 30-33 kg
- Output connector: 7/8"
- Notes: these models internally differ for the type and/or number of the RF pallets / power supply modules. E.g.: EXC3000GX (4/2), EXC3500GX (4/3), EXC5000GX (6/3). They all may be connected to single-phase or 3-phase mains network

Rear



## 6.2 List of commands and inputs

The commands and inputs that, according to your model, may be available on the device are listed below:

- [1] **Control panel 1 and 1A** – allows the user to set device functions, and to view and set operating parameters. It is composed of the following:




1




1A

- **Liquid crystal display (LCD)** – a graphics display that shows the operating parameters and functions selected via the multi-function knob.
- **ALARM indicator light** (red) – this LED lights up in red if an alarm event occurs (e.g., output power or modulation too low).
- **LIMITER indicator light** (red) – this LED lights up in red to indicate that the maximum deviation limiter has activated due to an audio signal that is too high.
- **ON indicator light** (yellow/green) – this LED lights up two ways:
  - It lights up in yellow when the device is on stand-by
  - It lights up in green when the device is in operation (powered up).
- **LOCK indicator light** (green) – this LED lights up in green to indicate that the internal frequency synthesizer is locked on the set operating frequency.
- **Multifunction knob (encoder)** – allows the user to navigate the command menu in various ways:
  - If turned – selects the various functions/operations for the device, or the parameter values to be set.
  - If briefly pressed (like a button) when inside a menu – activates the option currently selected.
  - When pressed longer (> 1 sec.) it act as **ESCAPE** button (see below)
- **ESCAPE button** – while navigating through a menu, pressing this button will return the user to the previous level. It may be simulated by a long pressure on the multifunction knob. (see above)
- **ON/STAND-BY button** – starts the device or puts it on stand-by.

 For further information regarding the use of navigation commands in the menu, see [Fig 8.1](#).

- [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 grill** (only on some models) – allows the device to draw in cool air.
- [4] **Anterior RF MONITOR output** (only on some models) – BNC-type connector for sourcing the low level RF signal; this function is useful for connecting to external measurement units. The output level, depending on your model, ranges from 0 dBm to +15 dBm.

 *RF MONITOR output does not guarantee an output level that is perfectly constant as the frequency varies; as such, it cannot be used for precision spectrum measurements.*

- [5] **General power switch (POWER ON)** – allows the user to turn the general system power on and off.
- [6] **Fuse holder** (only on some models) – protective fuse holder for the power supply socket.

- [7] **Power socket or cable** – used to connect to a mains supply.
- [8] **Ground** – used to ground the device, to ensure safe operation.
- [9] **Predisposition remote control antenna** – input for an external GSM antenna (to be connected if the device is equipped with a remote control option via the cellular phone network) (OPTIONAL).
- [10] **Antenna output socket/flange (RF OUTPUT)** – this socket/flange is connected to an FM broadcasting antenna that can tolerate the transmitter's nominal power.
- [11] **Posterior RF MONITOR input** (only on some models) – BNC-type connector for sourcing the low level RF signal. The signal attenuation is typically ≈57 dB but may vary depending on models
- [12] **Heatsink** (only on some models) – for dissipation of excess temperature during the transmitter power stages.
- [13] **Ventilation grill** (only on some models) – for heat dissipation or, for models with forced air circulation, for expelling air brought in through the front ventilation grill to cool the device.
- [14] **Cooling fan** (only on some models) – expels air sucked in through the front ventilation grill used to cool the device.
- [15] **MODULATION MONITOR socket** – BF modulation output socket to be used as a monitor, for synchronization of the RDS encoder, or broadcast retransmission (BNC-type connector).
- [16] **AUX** – auxiliary modulating channel input (RDS/SCA) at low frequency on a 20-100 KHz band (BNC-type unbalanced connector with grounding shield) for connection to an RDS encoder. For details, see ¶ 0.
- [17] **MPX** – externally created broadband stereo composite modulating signal input (BNC-type unbalanced connector with grounding shield). For details, see ¶ 8.5.
- [18] **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, see ¶ □.
- [19] **REMOTE parallel control port** – this 9-pin SUBD connector allows the user to remotely control the device or to perform other functions via a suitable interface. For connections to this input, see chapter. For details, see ¶ 7.4.e.
- 📄 *On some models this general control port may be replaced by the dedicated RS232 control port of the RDS internal Generator board if installed*
- [20] **AES/EBU** (female, optional) – input for AES/EBU digital LF modulation signal.
- [21] **LEFT** – balanced input (female XLR) for modulation of the left audio channel. For details, see ¶ 8.5.
- [22] **RIGHT** – balanced input (female XLR) for modulation of the right audio channel. This input can also accept a mono signal for monophonic transmissions, as explained in Chap. 8.
- [23] **RF IN** - female **N** connector, driver input from a low power exciter, provided only on RFBxxGX amplifiers
- [24] **RS485 serial port** (only on some models or on request) – RS 485 serial port which allows the user to connect multiple transmitters in series to an external controller, each of which is identified via a previously assigned logical address.
- [25] **Predisposition 10/100 T** (only on some models) – input for LAN connection using 10/100 Base-TX standard Ethernet (OPTIONAL).
- [26] **N+1 CONTROL** (only on some models, on request) – 9 pins socket SUBD for remote control.
- [27] **RDS** – (on request) 9 pole SUBD female connector for controlling an optional RDS internal Generator board. Whenever a dedicated slot on the rear panel is absent, it may be placed instead of [19].
- 📄 *The central BNC pin of the **MPX** input [17] is physically in parallel to the + signal (pin 3) on the **RIGHT** XLR input for the right channel [22]. As such, the connectors cannot both be used at the same time.*

## 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
- The user manual
- A power cable supplied with a suitable connector

If any parts are 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 apparatus 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 5°C and +25°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 cannot 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 present the most advantageous solution.
- For equipment with power output between 2000 and 5000W, were designed the air conveyors (OPTIONAL) that can be fixed to the rear of equipment and permit to channel warm air from air fans, inside pipes connected to the system through collars or metal clamps and in turn and connected with the external environment. In this way the hot air can be dissipated in the environment and not in the room where the equipment is installed.
- 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).
- The power supply nominal range comes from 185 to 265 V<sub>AC</sub> (nominal voltage single-phase 230 V<sub>AC</sub>). All higher power models may also be wired to 400 V<sub>AC</sub> three-phase + neutral network or 230 V<sub>AC</sub> 3-phase, no neutral.
- 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 Wiring into the antenna

Connect the **RF OUT** connector (Ⓜ par. 0 ref. [10]) 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 from the smallest 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 lightning or static electricity from reaching the amplifier through the antenna cable.**

### 7.4.b Connection to modulation signals

Connect the **LEFT** [21] and **RIGHT** [22] modulation inputs, or the **MPX** input [17] alternatively, based on your desired operating mode (monophonic or stereophonic) and the type of source being used (mono, stereo, or multiplex signal); refer to the information provided in Chap. 8.

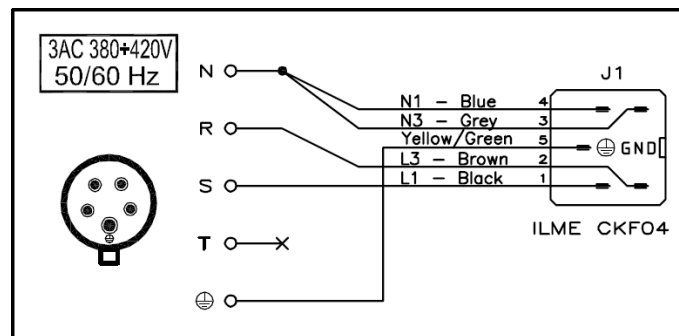
The MPX connector is internally connected in parallel to the RIGHT connector. As such, if the MPX connector is in use, the simultaneous connection of signals to the LEFT and RIGHT connectors is not possible. Again in this case, the highest impedance position is 5 kOhm.

Connection to the auxiliary RDS/SCA modulation signal is described further ahead, in section 7.4.d.

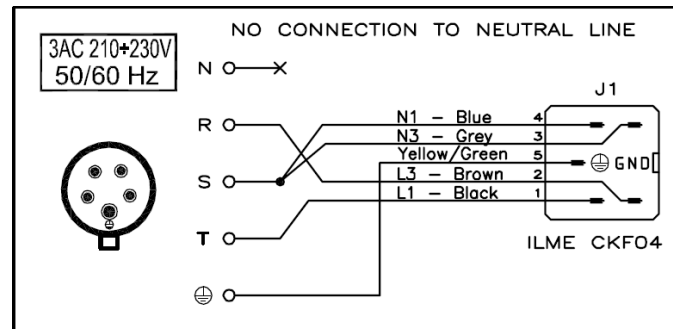
### 7.4.c Wiring into the mains

- 1) Verify that the rear power switch is turned off; if it is not off, do so now.
- 2) Ground the system.
- 3) Depending on the model, connect the power connector or the appliance cable to a suitable mains outlet as shown on the following labels:

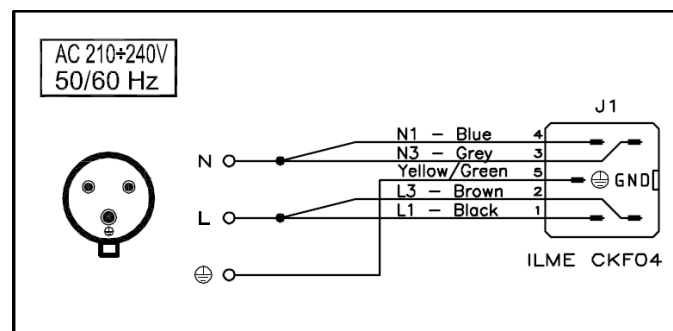
## EXC(RFB)2000GX



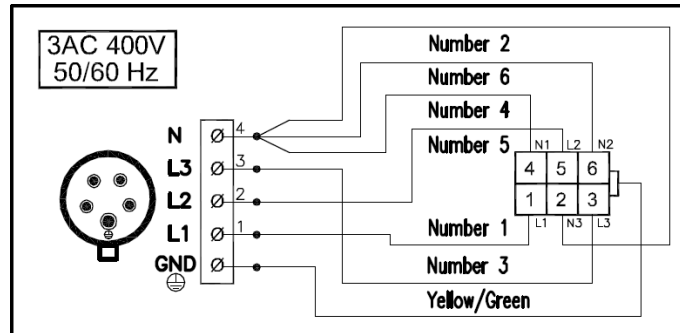
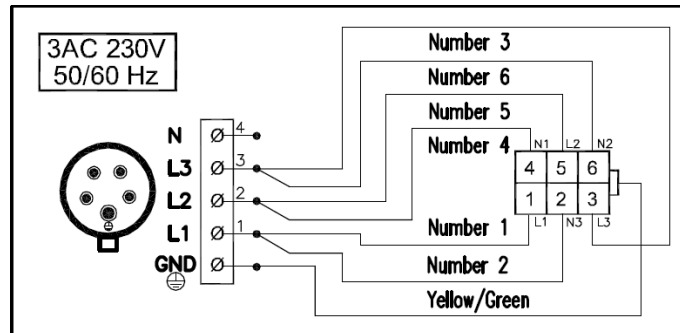
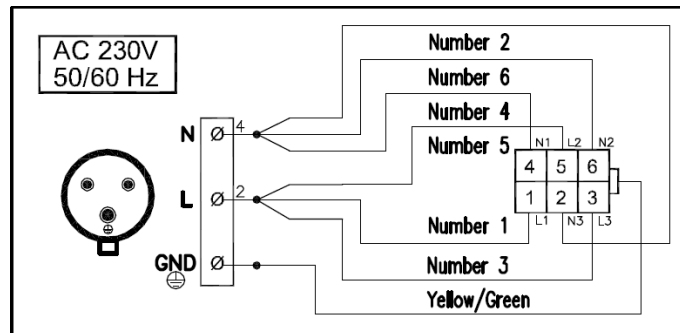
**3-phase 400Vac with neutral**



**3-phase 230Vac without neutral**



**Single phase 230Vac**

**EXC(RFB)3000GX-3500GX-5000GX**

**3-phase 400Vac with neutral**

**3-phase 230Vac without neutral**

**Single phase 230Vac**

- 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 section 7.3.c.
- Your transmitter should not be used when near the lower voltage limit with high-impedance lines: if the line voltage falls below a certain limit at full load, the low voltage sensor circuit could trigger a continuous, extremely dangerous on/off cycle. In such case, install an external voltage stabilizer.
- 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. Never connect the earth to the mains neutral lead.
- 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.

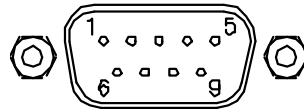
**7.4.d Connection to the auxiliary modulation (optional)**

Where necessary, an auxiliary RDS or SCA modulation source can be connected to the **AUX** input [16]; refer to the instructions outlined in Chap. 8.



#### 7.4.e Parallel port for remote control (optional)

Where necessary, connections can be made to the **REMOTE** parallel port [19]. Various lines are located in this port for simple, direct control of the transmitter via a male DB9 connector.



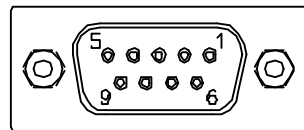
Connection of the pins is outlined in the following table:

N.	Connection	Notes
1, 5, and 8	ground	
2	"on the air" signal	+ 12V 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 0-5Vdc with an impedance of 1 KOhm. On the 1 KW 5V model, this equals 1500W
6	disable RF	This line's grounding deactivates the RF output. The maximum signal level is approximately + 10V/1mA
7	alarm	A low logic signal indicates an alarm. Normal function is indicated by the presence of + 12V on 10kohm. The maximum absorption capacity for the external current is limited to 10mA

#### 7.4.f Connection to the RS232 port (optional)

Where necessary, connections can be made to the **RS232** port [18]. 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.**

#### 7.4.g Connection of the external exciter to an amplifier



**Warning: the required power from of the exciter to correctly drive the subsequent amplifier is different for each model and usually comprised between 4 and 30W. Refer to Cap.11 for more information.**

Proceed as follows:

- 1) Connect the RF output of the exciter to a suitable dummy load, turn it on and set its output power to the required drive level
- 2) Verify the correct frequency on it and turn it off
- 3) Connect the **RF OUTPUT** of the exciter to the **RF INPUT** of the amplifier with a shielded RF cable with N-type connectors at both ends.

## 8 AUDIO OPERATING MODES AND ASSOCIATED LF 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.

### 8.1 Mono transmission from a mono signal

- 4) Connect the **RIGHT** connector [22] to the monophonic audio signal. Connection to the **LEFT** input is not necessary.
- 5) Using the **SETUP** menu, set the modulation mode to **Mono** (☞ section 11.3.f).
- 6) Confirm or change pre-emphasis according to the local standard.

### 8.2 Mono transmission from a stereo signal

- 7) Connect the **RIGHT** connector [22] to the right audio channel.
- 8) Connect the **LEFT** connector [21] to the left audio channel.
- 9) Using the **SETUP** menu, set the modulation mode to **Mono L+R** (☞ section 11.3.f).
- 10) 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 in section 6.5.b, ensuring that **stereo** is selected at step 3.

### 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 [17]. 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 **SETUP** menu, set the modulation mode to **Mpx** (☞ section 11.3.f).

 *Selecting the pre-emphasis according to the local standard (50 microseconds in Italy) is not required, as it is irrelevant in this mode. However, it is recommended that this be done anyway.*


 *If the length of 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 EXC(RFB)XXGT Series supports both balanced and unbalanced audio signals according to the connection that is made in the three **LEFT** and **RIGHT** XLR 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.

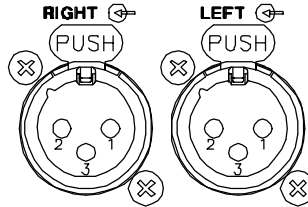
Normally, an XLR audio input with balanced connection is used for connection to the balanced output of a professional mixer. Alternatively, an unbalanced connection can be used, and is useful for output connections on inexpensive devices, without a perceptible degradation in the audio signal.


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

 The MPX connector is internally connected in parallel to the RIGHT connector. As such, if the MPX connector is in use, the simultaneous connection of signals to the LEFT and RIGHT connectors is not possible. In such case, the highest impedance position is 5 kOhm.

### 8.5.a Balanced connection to the LEFT and RIGHT 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 digital audio input (OPTIONAL)

3 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 75ohm unbalanced shielded cable and the interface connector is an RCA plug.
- EIAJ CP-1201: a similar Japanese standard.

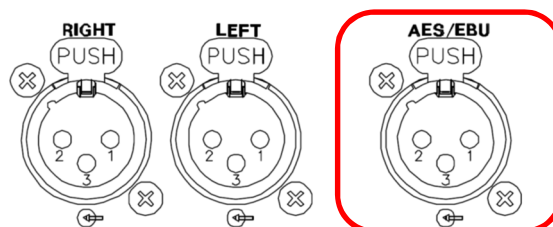
 *Adapters exist which permit to transform the RCA jack of S/PDIF to the balanced XLR connector of AES/EBU specifications.*

 *For more information, the latest AES3 standard is available from the Audio Engineering Society or ANSI at <http://www.aes.org> or at [www.ansi.org](http://www.ansi.org).*

 *EIAJ CP-1201 standard is available from the Japanese Electronics Bureau.*

 *A good Digital Audio Overview may be found on "AN22 - Digital Audio interface overview" from Cirrus Logic on their site at [www.cirrus.com](http://www.cirrus.com).*

 *The digital audio interface is based on a specific optional board which is internally mounted instead of the standard LF input interface and shall be factory mounted. In addition, AES/EBU stereo LF input necessarily requires the optional stereo-encoder board is also installed.*



### 8.6.a Advantage to use the digital audio input

The main advantage of digital process and transmission is its virtual insensitivity to external noise when properly managed. Being the audio signal essentially analogue at least one Analog to Digital conversion must be performed as one Digital to Analog conversion. These conversions will introduce small delays and subtle artifacts, so it is good practice to avoid multiple conversions between the initial A/D and final D/A ones. In the case of broadcast analogue 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.

### 8.6.b SEXC25DAC Digital Audio interface board characteristic

The SEXC25DAC board is a simple yet very high-quality Digital Audio Input Interface board which decodes the serially encoded digital audio stream into a balanced stereo signal which is sent to the balanced input of the transmitters.

It simply replaces the original passive input board (SEXC25IN) at the inner side of the rear panel and is able to manage the standard analogue audio signal or the digital audio.

Two relays switch the audio sources depending on a jumper internal preset. An "automatic" switch facility is also provided on board to switch from Analog to Digital in the presence of a suitable digital audio stream.

The board accepts all commonly available sample rates from 32k to 192kS/s and 16 to 24 bit sample length. The output voltage is fairly insensitive to the bit length and the sample rate and is nearly +9dBm for a full-scale digital input signal.

Any AES/EBU, S/PDIF or EIAJ CP-1201 compliant digital stream may be automatically managed. The recovered analogue signal is very flat over the audio band and a linear phase response is designed in the Digital to Analog Converter to have a minimal impact over the sound quality.

A 32kHz sample rate would produce a nominal 15kHz recovered audio band, while 44.1k, 48k, 96k and 192kHz will increase this range respectively to 20k, 22k, 40kHz and higher. LF frequencies will nevertheless anyway be cut to 15kHz by the internal audio channel low-pass filters inside on the transmitter. A slightly better band flatness is achieved with the higher sample rate which must be added to the basic audio response of the analogical low pass filter. It is possible to achieve 0.25dB flatness from 30 to 15kHz with 44.1 or 48kHz sample rate and typically < 0.15dB in the same band to 96kHz sample rate. The increased distortion over the analogical performance is always <0.01% at levels lower than the digital full scale, so 0.02-0.03% is typical for the full transmitter's response.

### 8.6.c How to use the SEXC25DAC

Use of the digital audio input feature is straightforward.

First of all you must preset the BD1 jumper on the board to the "digital" position: the upper one, as marked on the board silkscreen. Then you must properly adjust the modulation sensitivity of the transmitter to provide some headroom to the audio dynamical range, bearing in mind that the full-scale output is nearly +9dBm.

A good compromise is choosing +6dBm input sensitivity as the nominal sensitivity: this means that you have at least 3 dB (i.e. 106 kHz deviation) before having any detectable distortion component on the modulation. The right sensitivity must anyway be determined by the Sound Engineer basing on the digitally encoded signal and the possible over-modulation of the transmitter.

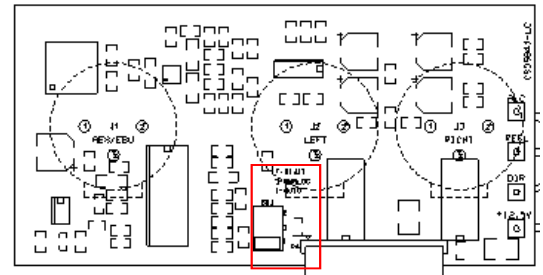
The transmitter must be preset only in "MONO R" or "MONO L+R" or "STEREO" with the internal stereo encoder with the correct pre-emphasis time constant (50us in Europe). No allowance is to use it in "MPX" mode because the digital signal cannot carry it and the digital audio interface would produce an unacceptable unfiltered high frequency noise on the supersonic band of the modulation.

Take also care that a missing digital stream could produce an audible raise in the noise floor of the transmitter, so avoid breaking the digital audio signal path in case of transmission with no modulation.

It is not possible to detect externally from the transmitter which of the digital audio input and the analogue one is engaged at any moment, without knowing the internal preset. To inspect or change the setting to the digital audio interface board BD1 the upper cover of the transmitter must be removed.

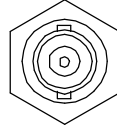
The balanced digital signal INPUT lines must be wired to pin 2 and 3 of the XLR connector while the screening braid must be connected to pin 1 just like a standard balanced audio signal.


It is possible to contemporary wire the analogue Left and Right channels with the digital AES signal, because they may be internally switched either manually or automatically. This is not allowed for the Mpx and the digital signal, that must be singly wired as needed.



## 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 or a Radio Link.



 If the length of 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.

### 8.7.a Checking the pilot tone in stereophonic transmission

Where the internal stereo encoder is used, the level of the stereo pilot tone, which is usually set internally at 9-10% of the modulation (from -21 to -20dB), corresponding to the standard established deviation of 7 / 7.5 kHz, cannot be changed externally.

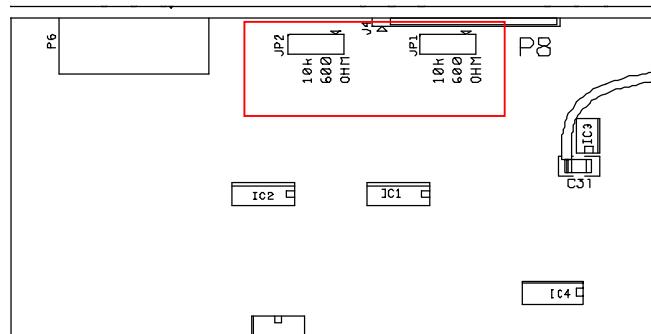
Where the stereo modulation signal is externally generated by a separate stereo encoder, the pilot tone must be measured in the absence of audio modulation and all other auxiliary signals, as described below:

- 11) Disconnect all signals from the external stereo encoder input, and any RDS or SCA signals.
- 4) Select the **VIEW - AUX** menu (section 11.2.c) and confirm that the driver tone is now the only available signal. The standard level is as indicated above, 9-10% (-21 to -20dB), and can be consequently adjusted on the external stereo encoder as required.
- 5) Reconnect the previously disconnected signals.

## 8.8 Changing the input impedance

As previously explained, the input impedance on the modulation inputs can be changed. Selection of the input impedance is one of the very few settings that can only be changed internally, as follows:

- 12) Disconnect the mains.
- 13) Unscrew the screws that hold the top cover in place (16 or more cross-head screws will require removal, depending on the model).
- 14) Remove the top cover and store it in a safe place.
- 15) Identify the input card.



- 16) The input impedance is internally set using the JP1 e JP2 jumpers found on the input card, immediately after the input connectors as illustrated in the design. The selectable impedance values are silkscreened on the printed circuit board.
- 17) Place the top cover back on the transmitter, ensuring that all the screws are correctly screwed into place.



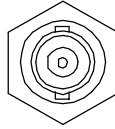
**Do not forget to properly secure all the screws on the top cover into place; this is required to guarantee conformity to EMI/EMC regulations.**

To make changes to the pre-emphasis, use the **SETUP** menu as indicated in section 11.3.f.


## 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 **AUX** terminal as follows:


- 18) Connect the **AUX** terminal [16] to the RDS or SCA encoder output.



- 19) If the internal stereo encoder is used, connect the **MODULATION MONITOR** output [15] to the “driver tone” synchronization input on the RDS encoder (where available).
- 20) Using the **SETUP - AUX SENS** menu (see section 11.3.d), 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 2kHz is the standard modulation value.
- 21) Modulation and deviation can be viewed on the **STATUS** screen, 11.2.a, in addition to any other multiplex signals available at that time.

 *If the length of the cable delivering the signal to the AUX 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.*

## 8.10 Operating with internal RDS Generator board (optional)

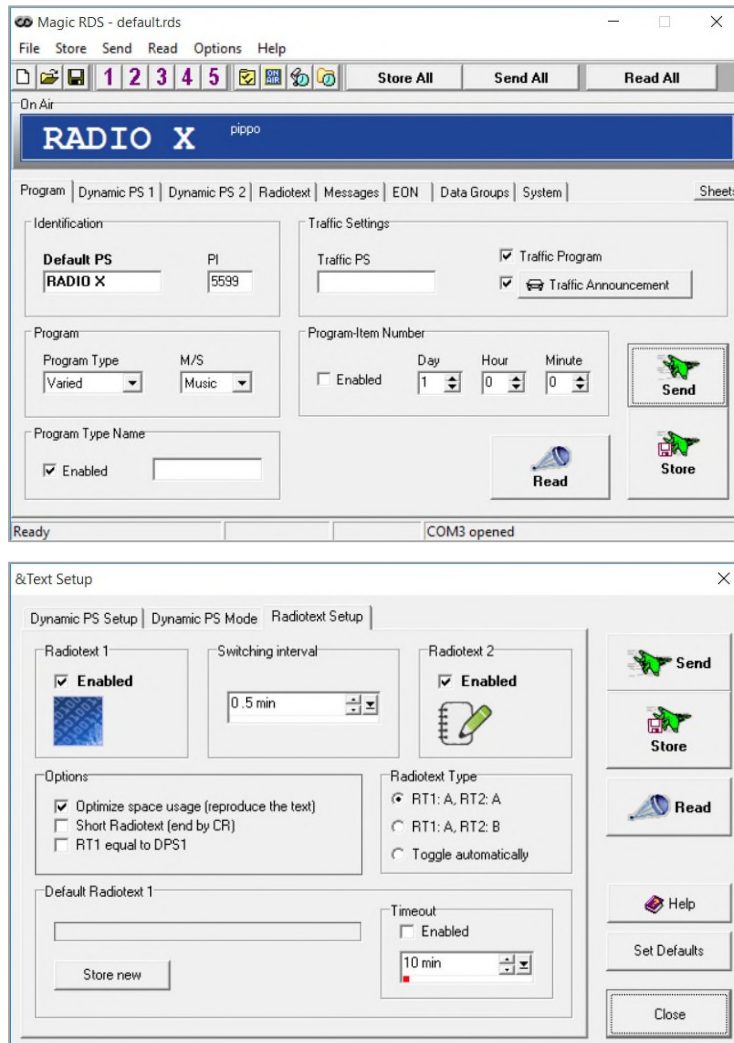
 **RDS Generator board requires good knowledge of each transmitter model and some technical skill. For this reason, it shall be installed on factory only.**

The optional SEXC30RDS RDS board can be installed on all models described in this manual as long as the optional internal stereo encoder is also present. The correct operation of the RDS board therefore requires that the stereo signal is internally encoded via the internal encoder.

Also, if an externally encoded stereo signal is used, the RDS of the internal card will not work. If switching from the internal stereo-encoder to an externally processed Mpx stereo signal, internal RDS will be also switched off.



The RDS Generator board is programmed with a normal PC or laptop operating with Windows OS (XP to 10) on which the dedicated software "Magic RDS" is installed and connected via an RS232 interface port. This may also be simulated through usual USB adapters. Some transmitter models are equipped with a predisposition hole on the rear panel that allows you to install an external socket for the RDS RS232 control port for subsequent reprogramming (see 6.2 [27]). Alternatively, this added port may be installed instead of another connector that is not used (e.g. remote parallel control socket). If both possibilities are not available, programming can be done during installation without creating external connections although, of course, this loses the advantage of a subsequent easy and fast reprogramming.



For further details please consult the proper User Manual of this board which is actually the same provided with the externally mounted RDS19 RDS Generator.

### 8.11 Operating with remote control with Ethernet/GSM adapter board (optional)

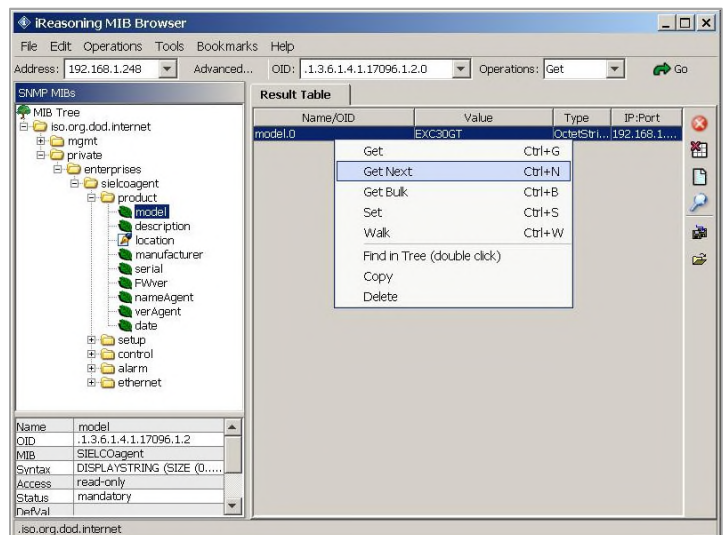
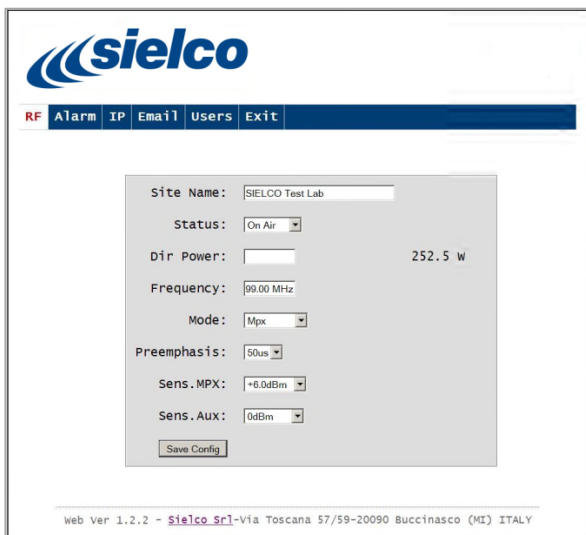
The optional SEXC30REM Ethernet adapter board or the SEXC30REM+, the same with GSM wireless control added, permit advanced remote control over LAN or Internet of any transmitter of the EXCxxGX series.



Remote control may be provided in several ways:

- Through a simple, standard web browser on a web page. Many control devices may be used: standard PC or laptop, tablets or smartphones equipped with any Operative System (Windows any version, Android, iOS etc.)
- Through an SNMP interface remote controller with a proper SNMP software. Software is not supplied by SIELCO
- Through a GSM device, either PC + modem or cellular. Control may be extensively done through a client software running on PC/laptops or by SMS in a simplified way. SIELCO provides this client software running on Windows OS.

The Ethernet/GSM adapter board provides an internal link with the transmitter CPU in order to continuously update data to and from remote controllers on nearly all functioning, preset or status parameters.



For additional information see the proper User Manual for remote control with this board.



## 9 MENU AND NAVIGATION COMMANDS

To view the device's operating parameters, and to set parameters according to your requirements, you will need to navigate the commands menu shown on the LCD display. You can navigate the menu using:

- The multi-function knob.
- The **ESCAPE** button.

### 9.1 Multifunction knob

The multifunction knob is used to select the various menus that allow you to view or set the device's parameters and functions. It can be used in a variety of ways:

- **When turned clockwise** (Figure 1), it shows the next menu (or next option).



Figura 1



Figura 2


- **When turned anti-clockwise** (Figure 2), it shows the previous menu (or previous option).
- **When pressed briefly like a button** (Figure 3), it allows the user to access the menu currently highlighted (or option currently highlighted).
- **When pressed longer (> 1 sec.)** it act as **ESCAPE** button (↗ 8.2)



Figura 3



Figura 4

 You can also turn the knob clockwise and anti-clockwise to select the various screens showing data that can be viewed within a menu. For example, alarm events in the view alarms menu (↗ 0).

### 9.2 ESCAPE button

The **ESCAPE** button allows you to return to the previous menu level. As such, repeatedly pressing this button returns you to the main screen (you usually only need to press it twice), which appears when you turn the device on (see section 11.1).

It may be simulated by a long pressure on the multifunction knob. (↗ 11.1)

### 9.3 Navigating the commands menu

Generally, you can navigate the commands menu as follows:

- 1) From the main screen (which appears when you turn the device on), turn the knob until one of the two main menus, **VIEW** or **SETUP**, are highlighted. In the example that follows, **SETUP** is highlighted.



- 2) Briefly press the knob to access the highlighted menu. The first page of the selected menu will appear (in the example below, the first page of the **SETUP** menu).



Transmitter display




Amplifier display

- 3) Turn the knob to select the desired sub-menu, then confirm by briefly pressing the knob. In the example below, the screen for the **FREQUENCY** sub-menu is shown. This screen is not available on an amplifier but anyone else may be tried.



- 4) At this point, depending on the main menu that you have accessed, various options may be available. Each option is explained in detail in the following chapter, and a brief overview is provided below:
  - o **VIEW menu** – used to check the device's operating parameters and alarms/events; as such, options are not usually available in its sub-menus. Once you have accessed a sub-menu, turning the knob has no effect, with the exception of the **MPX GRAPH** and **VIEW LOG** sub-menus. For further details regarding the use of these sub-menus, refer to sections 11.2.d and 0.
  - o **SETUP menu** – this was expressly designed to set the transmitter's parameters; as such, the options **EDIT**, **ABORT**, and **OK** are available in all the sub-menus. Refer to sections 11.2.d regarding the use of these options.
- 5) Where required, use the knob according to the instructions provided in each of the following descriptions of the individual sub-menus.
- 6) To go back to the previous level (and exit the current menu/sub-menu), press the **ESCAPE** button.
- 7) Where necessary, repeat the previous step multiple times until you return to the main screen, indicated in step 1.

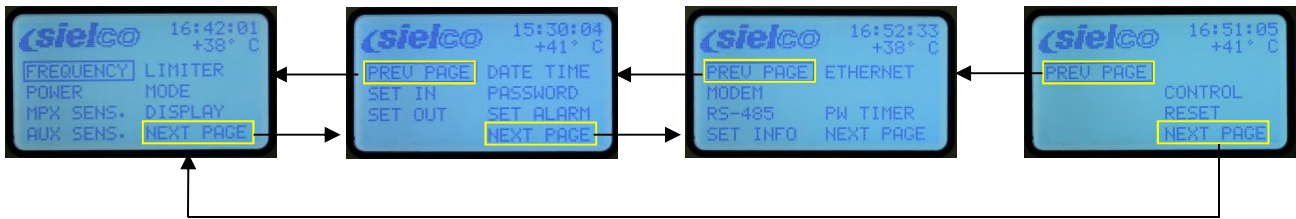
 Access to the **VIEW** and/or **SETUP** menus may be password protected. If so, you may need to enter a previously assigned password at step 2. For further details regarding passwords, refer to section 11.3.h.

### 9.4 Additional commands in the SETUP menu

#### 9.4.a NEXT PAGE and PREV PAGE

The **SETUP** menu is composed of multiple pages; as such, you can access the next page by selecting the **NEXT PAGE** sub-menu,

and the previous page by selecting **PREV. PAGE**.




#### 9.4.b EDIT, ABORT, and ESCAPE

Once you've entered one of the sub-menus in the **SETUP** menu, turning the knob allows you to select three commands that appear at the bottom of the screen:


- **EDIT** - used to access a setting and modify parameters.
- **ABORT** – used in the same manner as pressing the **ESCAPE** button, and thus to exit the screen and return to the previous navigation level without saving any settings made in that sub-menu.
- **OK** – confirms settings made in a sub-menu.


## 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 questions regarding navigation of the command menu, refer to section 0.

 If the device is left on the **SETUP** menu without receiving a command, the display will automatically return to the **STATUS** screen under the **VIEW** menu (➔ section 11.2.a).

- 1) Ensure that all installation conditions are met, as described in Chap. 7, and that all the connections described in sections 7, 7.4.b, and e 7.4.c 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 (➔ section 0 ref. □). For a few seconds, the Siel logo will appear on the full screen; after this, the default screen will be displayed (➔ section 11.1); the bottom of the default screen will show the two main menus, **VIEW** and **SETUP**:



Transmitter display



Amplifier display

- 3) At this point, two conditions are possible:
  - **The transmitter begins to operate** (including possible powering up) – the display turns on, and the **ON** LED lights up in green. In such case, it is recommended that the basic settings be made, turning the transmitter on stand-by. To do so, press the ON/STAND-BY button. Ensure the **ON** LED lights up in yellow and skip directly to step 4).
  - **The transmitter goes to stand-by** – the display turns on, and the **ON** LED lights up in yellow. At this point, proceed to the next step.
- 4) Turn the knob to select the main **SETUP** menu and press briefly to confirm. The first of the three pages comprising the **SETUP** menu (➔ section 11.3) will appear:



Transmitter display



Amplifier display

### 10.1.a Operating frequency (not available on amplifiers)

- 5) Ensure that the **FREQUENCY** sub-menu is selected; otherwise, turn the knob to select it.
- 6) Press the knob to access the sub-menu. The following screen will appear (☞ section 11.3.a):



- 7) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm.
- 8) A value will be indicated after **step** (frequency steps).
- 9) Turn the knob until you select the frequency step required to exactly set the required operating frequency, then press the knob to confirm.

☞ Normally, it is sufficient to leave it at **100KHz** (e.g., operating frequency of 99.300 MHz). Otherwise, if the operating frequency is defined at a step lower than 100 KHz (e.g., operating frequency of 97.850 MHz), you will need to select the 10 KHz step.

- 10) A value will be indicated after **Frequency**. Turn the knob until you reach the exact operating frequency desired, then press the knob to confirm.
- 11) **OK** will be highlighted. Three choices are now available:
  - If the parameters set are correct – skip directly to step 12) to confirm the settings.
  - If the parameters set are all incorrect – cancel all settings by turning the knob until **ABORT** is highlighted, then skip to step 12).
  - If a slight adjustment to the parameters is required – turn the knob until **EDIT** is highlighted, then return to step 8.
- 12) Press the knob to confirm. You will return to the page indicated in step 0.

### 10.1.b RF output power

- 13) Turn the knob until the **POWER** sub-menu is selected, then press to confirm. The power adjustment screen will appear (☞ section 11.3.b):



- 14) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm.
- 15) A value will be indicated after **Pow. set**.
- 16) Turn the knob until the desired power is set, then press the knob to confirm.
- 17) Okay will be highlighted **OK**. Three choices are now available:
  - If the parameters set are correct – skip directly to step 18) to confirm the settings.
  - If the parameters set are all incorrect – cancel all settings by turning the knob until **ABORT** is highlighted, then skip to step 18).
  - If a slight adjustment to the parameters is required – turn the knob until **EDIT** is highlighted, then return to step 15.
- 18) Press the knob to confirm. You will return to the page indicated in step 0.

☞ If the device is currently in operation (**green ON LED lit up**), the **pow. out:** indicator will show the power currently supplied. Otherwise, with the device on stand-by (**yellow ON LED lit up**), the indicator will remain at **0.0W**.

### 10.1.c Modulation sensitivity (not available on amplifiers)

- 19) Turn the knob until the **MPX SENS.** sub-menu is selected, then press the knob to confirm.
- 20) The modulation sensitivity adjustment screen will appear (☞ section 11.3.e):



- 21) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm.
- 22) A value will be indicated after **Nom. Input**, normally pre-defined at **+6.0 dBm**.
- 23) Turn the knob to adjust the value based on the modulation level used. The peak deviation indicated by **Mpx**, expressed in kHz, will consequently be changed. Note that, to the right of the deviation, the value of the modulating signal will be indicated, as compared to the nominal value set.
- 24) Ensure that the measured peak deviation does not exceed local regulations, then press the knob to confirm the setting.
- 25) **OK** will be highlighted. Three choices are now available:
  - If the parameters set are correct – skip directly to step 26) to confirm the settings.
  - If the parameters set are all incorrect – cancel all settings by turning the knob until **ABORT** is highlighted, then skip to step 26).
  - If a slight adjustment to the parameters is required – turn the knob until **EDIT** is highlighted, then return to step 22).
- 26) Press the knob to confirm. You will return to the page indicated in step 0.

☞ For audio modulation, we recommend that users adopt a nominal peak level ranging between +6 and + 11.5 dBm.

### 10.1.d Modulation limiter (not available on amplifiers)

- 27) Turn the knob until the **LIMITER** sub-menu is selected, then press the knob to confirm.
- 28) The modulation limiter adjustment screen will appear (☞ section 11.3.e):



- 29) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm.
- 30) A value will be indicated after **Limiter**. This indicator is normally followed by **OFF** or by the limiter intervention value, expressed in dB, in reference to a deviation of 75 kHz.
- 31) Turn the knob to set the desired value (0 dB = limiter intervention of 75 kHz), then press the knob to confirm.
- 32) **OK** will be highlighted. Three choices are now available:
  - If the parameters set are correct – skip directly to step 33) to confirm the settings.
  - If the parameters set are all incorrect – cancel all settings by turning the knob until **ABORT** is highlighted, then skip to step 33).
  - If a slight adjustment to the parameters is required – turn the knob until **EDIT** is highlighted, then return to step 30.
- 33) Press the knob to confirm. You will return to the page indicated in step 0.

☞ **According to Italian law as to most other countries, the limiter must intervene above 75kHz. This transmitter fully complies with Italian and international regulations when the limiter is set at +0.5dB, equal to 80 kHz.**

☞ When the limiter begins to intervene, the modulation distortion increases. As such, the modulation sensitivity should be adjusted (☞ section 11.3.c) so the limiter intervenes sporadically. Using this approach, its operation is generally imperceptible.

☞ When the limiter activates, the **LIMITER LED** lights up in red.

**10.1.e Transmission modes (mono/stereo) and pre-emphasis (not available on amplifiers)**

- 34) Turn the knob until the **MODE** sub-menu is selected, then press the knob to confirm.
- 35) The transmission mode settings screen will appear (☞ section 11.3.f):



- 36) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm.
- 37) A value will be indicated after **mode**. This indicator is normally followed by the operating mode (mono, stereo, mono L+R, or Mpx).
- 38) Turn the knob until the desired setting is selected, based on your needs, then press the knob to confirm.
- 39) A value will be indicated after **Preemphasis**. Turn the knob until the pre-emphasis value for your geographical region is selected (50 microseconds in Italy, 75us in the USA), then press the knob to confirm the value.
- 40) **OK** will be highlighted. Three choices are now available:
  - If the parameters set are correct – skip directly to step 41) to confirm the settings.
  - If the parameters set are all incorrect – cancel all settings by turning the knob until **ABORT** is highlighted, then skip to step 41).
  - If a slight adjustment to the parameters is required – turn the knob until **EDIT** is highlighted, then return to step 37).
- 41) Press the knob to confirm. You will return to the page indicated in step 0.

**10.1.f 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:

- 42) Turn the knob until the **NEXT PAGE** sub-menu is selected, then press the knob to confirm. The display will indicate the second page of the **SETUP** menu (☞ section 11.3):



**Transmitter display**



**Amplifier display**

- 43) Turn the knob until the **DATE TIME** sub-menu is selected, then press the knob to confirm.
- 44) The date and time settings screen will appear:




- 45) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm.
- 46) The **hour** will be indicated after **Time**. Turn the knob and adjust the current hour, then press the knob to confirm.
- 47) The **minute** will be indicated. Turn the knob to adjust the current minute, then press to confirm.
- 48) The **second** will be indicated. Turn the knob to adjust the current second, then press to confirm.
- 49) The day of the month will be indicated after **Date**. Turn the knob to set the current day, then press to confirm.
- 50) The **month** will be indicated. Turn the knob to set the current month, then press to confirm.

- 51) The **year** will be indicated. Turn the knob to set the current year, then press to confirm.
- 52) **OK** will be highlighted. Three choices are now available:
  - If the parameters set are correct – skip directly to step 53) to confirm the settings.
  - If the parameters set are all incorrect – cancel all settings by turning the knob until **ABORT** is highlighted, then skip to step 53).
  - If a slight adjustment to the parameters is required – turn the knob until **EDIT** is highlighted, then return to step 46).
- 53) Press the knob to confirm. You will return to the **SETUP** menu screen indicated in step 42).

## 10.2 Changing from stand-by to full operation

The transmitter is thus programmed with the basic parameters. You can now return to the default screen by pressing the **ESCAPE** button. Of course, you may now need to adjust other parameters, according to your requirements (e.g., modulation of the auxiliary RDS/SCA signal (▢ 11.2.c). For further information regarding the parameters that can be set, refer to Chap. 11.

Once you are sure that you've correctly programmed all the parameters, you can place the transceiver in full operation by pressing the **ON/STAND-BY** button. Ensure that the **ON** LED is lit up in green.

 **If the red ALARM indicator light appears, this 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 ▢, and solve the problem.**

### 10.2.a Checking parameters

We recommend that all the operating parameters be verified the first time that the transceiver is placed in full operation, via the **VIEW** menu. To access this menu from the default screen:



Transmitter display



Amplifier display

- 54) Turn the knob to select the main **VIEW** menu, then press to confirm.
- 55) The page composing the **VIEW** menu will appear:




Transmitter display




Amplifier display


- 56) Refer to section 11.2 and verify that all parameters are correct, in particular:
  - Direct and reflected power, via the **STATUS** sub-menu (▢ 11.2.a).
  - Modulation, via the **L/R** and **MPX GRAPH** sub-menus (▢ 11.2.b).
  - Operating frequency, mono/stereo mode, and pre-emphasis, via the **SYSTEM** sub-menu (▢ 11.2.e).
  - Internal temperatures, via the **TEMPERAT.** sub-menu (▢ ▢).


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 the red ALARM indicator light appears, this 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 [□](#), and resolve the problem.**

 *While in normal operation, we recommend that you leave your device on the **STATUS** sub-menu, found under the main **VIEW** menu ([F3](#) 11.2.e).*

 *If you leave the device in the main **SETUP** menu, after a period, the timer will automatically select the **STATUS** sub-menu under the main **VIEW** menu in order to avoid programming accidental settings.*

Siel 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. The device is on stand-by when the **ON** LED changes from green to yellow.

To perform the reverse operation, press the **ON/STAND-BY** button again. The **ON** LED will light up in green.

### 10.4 Turning off the transmitter

To completely deactivate the device (for maintenance, etc.), we recommend that you first put it on stand-by, as described above, and then completely turn off the device via the general power switch ([F3](#) section 0 ref. [□](#)).

## 11 MENUS DESCRIPTION

### 11.1 Default screen


As soon as the device is turned on, the default screen will appear on the display, indicating the following information:




- **Model:** indicates the transmitter model (in this example, EXC30GT).
- **Version:** indicates the software version installed (in this example, 1.2.3).

The following main menu can be selected from the bottom part of the screen:

- **VIEW:** used to view the transmitter's operating parameters (▫ 11.2).
- **SETUP:** used to set operating parameters and many of the device's functions/services (▫ 11.3).

 The main **VIEW** menu is normally the menu accessed; as such, pressing the knob will take you to that menu. For further details, refer to the next section.

 Access to the **VIEW** and **SETUP** menus may be password protected. If so, you will be asked for the previously assigned password. For details regarding passwords, see ▫ 11.3.h.

 The menu and sub-menu screens described below all indicate the current time and temperature in the top right corner.

 **In order to avoid misinterpreting the screens, it is important to verify the exact model number of your device on the main menu, and to safely store this model number (▫ Chap. 5).**

### 11.2 VIEW menu

This menu is used to view the transmitter's operating parameters; for example, direct power, reflected power, modulation, etc. It is in turn organized into eight sub-menus:



Transmitter display



Amplifier display

- **STATUS** (stato) – mostra le misure principali come la potenza diretta, riflessa, ecc. (▫ 11.2.a).
- **L/R** (canale sinistro /destro) – dedicato alle misure di modulazione (▫ 11.2.b) (non disponibile sugli amplificatori)
- **AUX** (ausiliario) – dedicato alla misura di modulazione del segnale ausiliario RDS/SCA (▫ 11.2.c) (non disponibile sugli amplificatori)
- **MPX GRAPH** (grafico MPX) – indica graficamente la modulazione in diverse modalità (▫ 11.2.d) (non disponibile sugli amplificatori)
- **SYSTEM** (sistema) – Mostra i parametri principali di sistema come la frequenza, modalità mono/stereo, preenfasi, ecc. (▫ 11.2.e).
- **VOLTAGE** (tensione) – Misura le tensioni interne di alimentazione (▫ 11.2.f).
- **TEMPERAT.** (temperatura) – Misura le temperature interne (▫ □).
- **VIEW LOG** (visualizzazione allarmi) – Mostra gli eventuali allarmi/eventi verificatisi durante il funzionamento (▫ 0).

During normal use of the device, we recommend that the **STATUS** menu be selected.

Each of the above sub-menus is used to view parameters; as such, options cannot be selected using the knob, with the exception of the **MPX GRAPH** and **VIEW LOG** sub-menus. Refer to 11.2.d and 0.

### 11.2.a STATUS sub-menu

The screen for this sub-menu contains the following items:



Transmitter display



Amplifier display

- **Dir. Power:** indicates the direct power currently delivered (in the example, 25.0 W).
- **Refl. Power:** indicates the reflected power currently measured (in the example, 0.0 W).
- **Mpx** (multiplex) (not available on amplifier) – indicates the peak deviation, expressed in KHz (in the example, 69.1 KHz) and dB, in reference to a deviation of 75 KHz (0dB = 75 KHz). To change the deviation in function of the modulating signal, the modulation sensitivity must be set via the **MPX SENS** sub-menu, from the main **SETUP** menu (11.3.c).

In addition, the bar indicator graphically shows the last parameter indicated.

This screen shows the most important parameters; as such, it is normally the one displayed during normal use of the transmitter.

In order to avoid saving accidental settings, when the **SETUP** has been accessed but no operation performed within a certain period of time, the device will automatically exit the **SETUP** menu and enter the **VIEW** menu, selecting the sub-menu **STATUS**.

To adjust the output power, go to the sub-menu **POWER** under the **SETUP** menu (11.3.b).

### 11.2.b L/R sub-menu (not available on amplifiers)

The screen for this sub-menu is used to monitor total peak modulation. It shows the following items:




- **Left** (left channel) – the current level of the left modulating signal, expressed in dB, against the nominal level (in the example, +0.85 dB).
- **Right** (right channel) – the current level of the right modulating signal, expressed in dB, against the nominal level (in the example, +0.77 dB).

In addition, the bar indicators graphically show the two parameters indicated above (peak value).

Depending on the setting made in the **SETUP** menu, the modulation level can also be viewed via the following screen, which indicates a solo or a multiplex channel (which shares the same channel).



In the example above, the **Right** channel is indicated.


 Adjustments can be made to the nominal modulation level via the **SETUP** menu (p 11.3).

**11.2.c AUX sub-menu (not available on amplifiers)**

The screen for this sub-menu shows the modulation level for the **Aux** RDS/SCA signal:



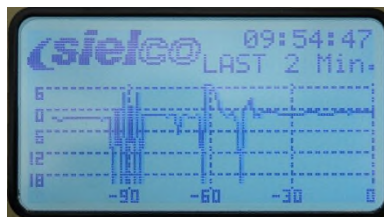
The above example shows the standard level of the RDS signal (2 KHz), as well as the bar indicator, which shows the level graphically.

 Adjustments can be made to modulation of the auxiliary signal via the **SETUP** menu (p 11.3).

**11.2.d MPX GRAPH sub-menu (not available on amplifiers)**

This sub-menu graphically shows the modulation trend over time in three different scales indicated on the right. The different scales can be selected by simply turning the knob.

The first (**LAST 2 Min.**) shows the modulation trend for the last two minutes:




The second (**LAST 2 Hr.**) shows the modulation trend for the last two hours:



The third (**LAST 24 Hr.**) shows the modulation trend for the last 24 hours:



Consequently, the graph shown on the third example screen approximately shows the modulation trend for the last two hours.


 The screens are shown cyclically. As such, at the third screen, turning the knob clockwise will take you back to the first screen. Similarly, if you are at the first screen and you turn the knob anti-clockwise, the last screen will be selected.

**11.2.e SYSTEM sub-menu**

The screen for this sub-menu shows the key parameters (set frequency, mono/stereo mode, etc.) as follows:

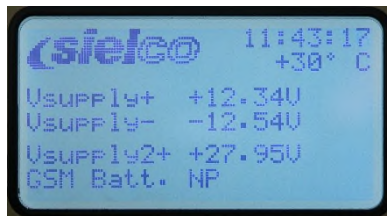


- **Frequency:** indicates the operating frequency (in the example, 98.00 MHz).
- **Mode:** indicates **Mono**, **Stereo**, **Mono L+R**, or **Mpx** mode (in the example, **Stereo**).
- **Preemphasis:** indicates the modulation preemphasis value (in the example, 50 microseconds).
- **Elapsed hours:** indicates the time elapsed since the device was first turned on in the factory (in the example, 1 hour).

 These adjustments are available via the **SETUP** menu (↗ 11.3.a and 11.3.f).

### 11.2.f VOLTAGE sub-menu

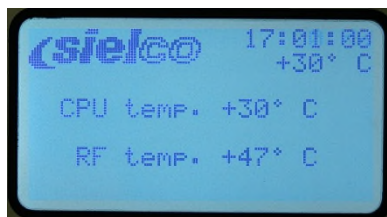
The screen for this sub-menu indicates the device's power voltages as follows:




- **Vsupply+** (positive voltage supply) – indicates the positive voltage supply for the low power section (in the example, +12.27V)
- **Vsupply-** (negative voltage supply) – indicates the negative voltage supply for the low power section (in the example, -13.23V)
- **Vsupply2+** (positive voltage 2) – indicates the voltage supply for the RF power section (in the example, +29.62V)
- **GSM Batt** (GSM battery voltage supply) – indicates the voltage for the battery that powers the optional remote-control unit via GSM cellular phone (in the example, **NP** indicates that the optional module is not present)

### 11.2.g TEMPERATURE sub-menu

The screen for this sub-menu indicates the current operating temperatures as follows:



- **CPU temp.** – indicates the current CPU temperature (in the example, +30 °C)
- **RF temp.** – indicates the RF temperature, if pertinent to the model in use (in the example +47 °C), other ways read "n.a." (not available)

 The line **RF temp.** is available only on the more powerful transmitters (EXC100GT and up), which are equipped with a heat probe on the RF power stage.

### 11.2.h VIEW LOG sub-menu

This sub-menu provides a historical record of events (transmitter turned on, turned off, on stand-by, etc.) and alarms (insufficient modulation, excessive reflected power, etc.) that took place during operation. The transmitter's memory (non-volatile) can record up to 100 alarms/events. As soon as you enter this menu, the transmitter takes a few seconds to update the data; during this time, the screen **waiting...** appears. Next, the following screen will appear:



- ☞ *If the device already has 100 events/alarms in its memory, a new event/alarm that occurs will cancel out the oldest recording so that the new event/alarm can be saved (FIFO).*
- ☞ *Via the **SETUP** menu, you can decide whether to activate/deactivate each alarm (e.g., low power, insufficient modulation, etc.), and set new detection thresholds (see section 11.3.m). Through this menu, you can also delete the alarm history.*
- ☞ *If an alarm event occurs when you are accessing the **VIEW LOG** menu, you must exit and re-enter the **VIEW LOG** menu in order to view the alarm on the event list.*

In the above example, an **Mpx Low** alarm is shown

- **Alarm 002 of 034**, meaning the second alarm of thirty-four recorded events
- **Mpx Low** indicates that the type of alarm refers to insufficient modulation
- **Start:** followed by the date and time, indicates when the alarm event started
- **End:** indicates the date and time at which the transmitter returned to normal operation.

As such, the duration of the alarm event can be calculated; in this example, 16 minutes. To select subsequent alarm events (less recent, with higher numbers), turn the knob anti-clockwise; turning the knob clockwise will take you to the most recent events.

### 11.3 SETUP menu

This menu allows you to program the device's operating parameters; for example, operating frequency, output power, modulation, passwords, etc. It is divided into the following three pages:

#### SETUP Page 1



Transmitter display



Amplifier display

#### SETUP Page 2



Transmitter display



Amplifier display

**SETUP Page 3**

**Transmitter display**

**Amplifier display**
**SETUP Page 4**

**Transmitter display**

To move from one page to another, select the commands **NEXT PAGE** or **PREV PAGE** using the knob, then press to confirm.

As you can see, the three pages allow you to access the following settings:

- **FREQUENCY** – frequency increment steps and operating frequency (⌘ 11.3.a)
- **POWER** – output power level (⌘ 11.3.b)
- **MPX SENS** – modulation sensitivity (⌘ 11.3.c)
- **AUX SENS** – auxiliary modulation sensitivity, e.g., RDS (⌘ 11.3.d)
- **LIMITER** – maximum deviation limiter (⌘ 11.3.e)
- **MODE** – transmission mode, e.g., stereo/mono and pre-emphasis (⌘ 11.3.f)
- **DISPLAY** – display backlighting and contrast (⌘ 0)
- **SET IN** – logic levels for the ENABLE line and related activation mode (⌘ 11.2.h)
- **SET OUT** – logic levels for remote control (⌘ 11.3.i)
- **DATE TIME** – system date and time (⌘ 11.3.j)
- **PASSWORD** – set passwords (⌘ 11.3.h)
- **SET ALARM** – alarm identification mode (⌘ 11.3.m)
- **ETHERNET** – Ethernet LAN interface settings (⌘ 0)
- **POW TIMER** – set automatic power reduction during specific time periods (⌘ 11.3.n)
- **MODEM** – modem modes (⌘ 11.3.p)

### 11.3.a FREQUENCY setting (not available on amplifiers)

Used to define the transmitter's operating frequency.



The following parameters can be set:

- **step** – frequency increments can be selected (in the example, 100 kHz)
- **Frequency** – operating frequency

Use of this menu is described in section 10.1.a.

### 11.3.b POWER setting

Used to adjust the transmitter's output power.



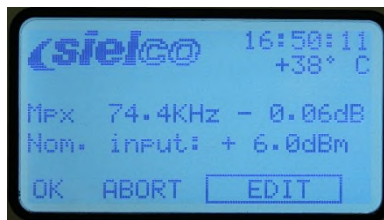
The display shows the following:

- **Pow. set** – set power
- **Pow. out** – measurement of the power supplied

Use of this menu is described in section 10.1.b.

### 11.3.c MPX SENS setting (not available on amplifiers)

Used to adjust modulation input sensitivity according to the low frequency level available.



The display shows the following:

- **Mpx** – followed by the deviation value, expressed in kHz (in the example, 80.2 kHz) and in dB, in reference to a deviation of 75 kHz (0dB = 75 kHz)
- **Nom. input** – nominal value of low frequency input level (in the example, + 6.0 dBm)

Use of this menu is described in section 10.1.a.

### 11.3.d AUX SENS (RDS/SCA sensitivity modulation) setting (not available on amplifiers)

Used to adjust the present modulation result of the single auxiliary signal (RDS/SCA).



The display shows the following:

- **Aux** – followed by a deviation value expressed in KHz (in the example, 1.9 KHz) and in dB, in reference to a deviation of 75 kHz (0dB = 75 kHz)
- **Nom. input** – nominal value of auxiliary signal input level

To change the auxiliary modulation:

- 8) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm.
- 9) A value will be indicated after **Nom. input**. This indicator is normally predefined at **+0.0 dBm**.
- 10) Turn the knob to change the value, based on the modulation level used. The peak deviation indicated by **Aux**, expressed in KHz, will consequently change. You will note that, to the right of the deviation, the value of the modulating signal will be indicated in dB, against the nominal value set.
- 11) Ensure that the deviation measured does not exceed local regulations, then press the knob to confirm the setting.



- 12) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶ 9.4a).

### 11.3.e LIMITER setting (not available on amplifier)

Used to limit the peak modulation at a maximum value.




The display shows the following:

- **Limiter** – followed by **OFF** if deactivated, or by a value expressed in dB, in reference to a deviation of 75 kHz (0dB = 75 kHz)
- **Mpx** – measurement of the current peak deviation value, expressed in KHz (in the example, 81.4 kHz) in dB, in reference to a deviation of 75 kHz (0dB = 75 kHz)

In addition, the bar indicator graphically shows the current peak deviation value.

By changing the **Limiter**, you can set a maximum modulation value beyond which the limiter will activate. Use of this menu is described in section 10.1.d.

 *When the limiter begins to intervene, the modulation distortion increases. As such, the modulation sensitivity should be adjusted (¶ section 11.3.c) so the limiter intervenes sporadically. Using this approach, its operation is generally imperceptible.*

### 11.3.f MODE setting (not available on amplifiers)

Used to define whether the transmitter operates in mono or stereo, and its pre-emphasis value.



The display shows the following:

- **Mode** – followed by **Mono** (from the **RIGHT** input (¶ ref. [22] section 0), **Stereo**, **Mono L+R** (monophony obtained through the sum of the stereo channels), or **Mpx** (external multiplex modulation signal originating from the **MPX** input (¶ section 0 ref. [17])).
- **Preemphasis** – followed by the current preemphasis value, expressed in microseconds.

To change the auxiliary modulation:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **Mode**.
- 2) Turn the knob to change the setting to **Mono**, **Stereo**, **Mono L+R**, or **Mpx** according to your requirements, then press the knob. A value will be indicated after **Preemphasis**.
- 3) Turn the knob to change the setting to 0, 25, 50, or 75 microseconds, according to your requirements (50 microseconds for Italy), then press the knob to set the value.
- 4) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶ 9.4a).

### 11.3.g DISPLAY setting

Used to optimize display legibility, based on ambient lighting conditions and the angle of the visual field.



This screen shows:

- **Backlight** – followed by the current backlighting value (in the example, 3)
- **Contrast** – followed by the current contrast value (in the example, 4)

To change these parameters:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **Backlight**.
- 2) Turn the knob to change the backlighting, which will immediately change based on the setting selected (three levels are available; 3 corresponds to maximum illumination), then press to confirm. A value will be indicated after **Contrast**.
- 3) Turn the knob to change the contrast, which will immediately change based on the setting selected (twenty levels are available; 1 corresponds to maximum contrast), then press the knob to set the value.
- 4) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶ 9.4a).

### 11.3.h SET IN (remote control input) setting

Used to set logic levels for the ENABLE line in the remote control input (¶ section 0 ref. [19]):





The following parameters can be adjusted:

- **Type** – transmitter's activation/deactivation mode. You can define whether this takes place via the front ON/STAND-BY button only (the ENABLE line is therefore deactivated), the rear line only (the front ON/STAND-BY button is deactivated), or using both commands (either the front button or the ENABLE line). To this end, the settings **BOTH**, **LOCAL**, and **REMOTE** (only via the ENABLE line) are available.
- **Disable logic:** - defines whether activation of the command takes place using a LOW or HIGH logic level. The device is normally deactivated with a low level, meaning when this line is grounded.

To set these parameters:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **Type**.
- 2) Turn the knob to change the setting to **BOTH**, **LOCAL**, or **REMOTE** according to your requirements, then press the knob to set the value. A value will be indicated after **Disable logic**.
- 3) Turn the knob to change the setting to **LOW** or **HIGH** according to your requirements, then press the knob to set the value.
- 4) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶9.4a).

 *The ENABLE line is equipped with an internal pull-up resistance that maintains the line on high status in the absence of a signal or connection.*

 *If **BOTH** is set under **Type** and the ENABLE line on the rear input is short-circuited, the ON/STAND-BY button won't work correct when this setting performs a logic function (OR) for the two commands.*

### 11.3.i SET OUT (remote control output) setting

This screen allows you to define the logic levels (high/low) used for remote control:




You can define whether the status of the following lines normally has a HIGH or LOW logic level:

- **OnAIR logic** – ON THE AIR line, which signals when the device is powered up
- **Alarm logic** – ALARM line, which signals the presence of an alarm

To set these parameters:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **OnAIR logic**.
- 2) Turn the knob to change the setting to **LOW** or **HIGH** according to your requirements, then press the knob to set the value. A value will be indicated after **Alarm logic**.
- 3) Turn the knob to change the setting to **LOW** or **HIGH** according to your requirements, then press the knob to set the value.
- 4) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶9.4a).

 *The alarm activation threshold levels can also be defined via the alarm menu (¶ par. 11.3.m).*

### 11.3.j DATE TIME setting


Used to set the date and time used by the system to generate an alarm history, and for other functions.



The display shows the following:

- **Time** – followed by the currently set time
- **Date** – followed by the currently set date

Use of this menu is described in section 10.1.f

 **It is important to correctly set the time and date; otherwise, the alarm history and various other functions will not operate correctly.**

### 11.3.k ETHERNET setting

To permit the Ethernet adapter to correctly dialog internally and externally its own LAN (Local Area Network) through its web-server or SNMP protocol, it is mandatory correct IP address, Gateway and other parameters are preset on the Transmitter and on the adapter board. IP address on the Transmitter shall be unique on the LAN not shared with other devices. Gateway, "Subnet Mask" and possible "DNS" can be preset only on the adapter board through the web-server or SNMP control (see SEXC30REMC Ethernet adapter board User Manual).



Ethernet setup menu

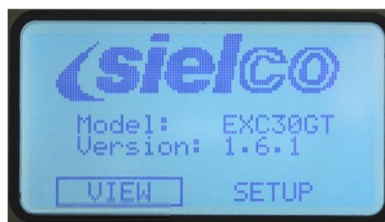


IP setup on Ethernet sub-menu

### 11.3.I PASSWORD (menu protection) setting

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

- **LEV 1** – this level is more restrictive and protects access to both the **VIEW** and the **SETUP** main menus. On the display of the equipment the following screen appears without any other information




Whenever **VIEW** or **SETUP** menu is selected, the equipment will ask for a suitable password



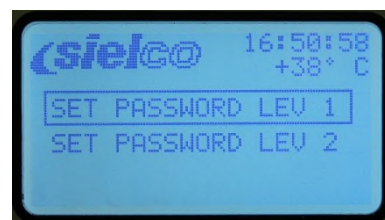
- **LEV 2** – protects access to the **SETUP** menu only. On the display of the equipment it appears only the last screen selected in the menu **VIEW**. When you select **SETUP**, the password is requested as per password of level 1.

Each password is composed of four alphanumeric characters (numbers **0-9** or letters **A-Z**).

 *Activate only one of the two passwords (**LEV 1** or **LEV 2**) according to your requirements. Activating both passwords may cause problems when using the transmitter.*

 **If one of the two passwords is activated, remember to store it in a safe location. Losing a password requires that the level 3 password be used; this password should never normally be used (see section 11.4).**

The display shows the following:



- **SET PASSWORD LEV 1**
- **SET PASSWORD LEV 2**
- 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.


## LEVEL 1 PASSWORD

To protect both main menus, activate/set the **LEV 1** password as follows:

- 1) Select **SET PASSWORD LEV 1** with the knob, then press to confirm. The following screen will appear:



- 2) Using the knob, select **EDIT** and press to confirm. **OFF** (password deactivated) will be selected. Turn the knob to select **ON**, then press to confirm. The first character in the password will be highlighted.
- 3) Turn the knob to select the **first character**, then press to confirm. The second character in the password will be highlighted.
- 4) Turn the knob to select the **second character**, then press to confirm. The third character in the password will be highlighted.
- 5) Turn the knob to select the **third character**, then press to confirm. The fourth character in the password will be highlighted.
- 6) Turn the knob to select the **fourth character**, then press to confirm. The first character in the **Confirm** line will be highlighted; repeat the same **password** on this line in order avoid errors in setting the password.
- 7) Set the four characters on the **Confirm** line as explained in steps 3) to 6).
- 8) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press the knob to confirm (for further details regarding these commands, see ¶10.3).
- 9) Store the **password** in a safe place.

 If the four characters in the **CONFIRM** line do not correspond to the ones entered in the first line, a **Wrong password** message will appear. Press the knob to delete the screen and return to step 2).

Once a level 1 password is activated, each time someone attempts to access the **SETUP** menu, they will receive an **Insert PASSWORD** message asking for the password to be entered. Access to the **VIEW** menu is timed, and the password will only be requested if the **VIEW** menu is not used for a given period of time.

## LEVEL 2 PASSWORD

If you wish to protect the **SETUP** menu only, activate/set the **LEV 2** password using the same procedure as outlined above, ensuring that **SET PASSWORD LEV 2** is selected at step 1).

Once a level 2 password is activated, each time someone attempts to access the **SETUP** menu, they will receive an **Insert PASSWORD** message asking for the level 2 password to be entered. The **VIEW** menu will remain accessible at all times.

### 11.3.m SET ALARM setting

As previously explained, if a parameter falls outside a given value for a specific period of time (for example: modulation 6 dB lower than the nominal value for more than 10 minutes), the **ON** LED will light up in red and the bottom part of the display will indicate the associated alarm (e.g., **MPX Low** = insufficient modulation). The last 100 alarm events can be accessed via the **VIEW LOG** alarm history menu, under the main **VIEW** menu, as explained in a.

This menu allows you to activate/deactivate each diagnostic alarm, and to set its sensitivity level and the time period beyond which the alarm is activated. In addition, the **RESET LOG** function is available, which allows you to delete the alarm history saved. For details , see ¶14.1).



The following alarms can be set:

- **LOW RF POW** – an alarm is issued when the RF power is detected at below a certain percentage value.
- **HIGH VSWR** – an alarm is issued when an excessive SWR (standing wave ratio) is detected.

- **UNLOCK** – an alarm is issued when the internal PLL frequency synthesizer is unlocked.
- **MPX** – an alarm is issued when low (or no) modulation is detected for a given period of time.

In general, to set alarms:

- 1) Turn the knob to select the alarm that you wish to activate/configure (e.g., **LOW RF POW**), then press to confirm.
- 2) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. The first value to be set will be highlighted.
- 3) Turn the knob to change the setting according to your requirements, then press to set.
- 4) If the setting includes this option, the second alarm setting will be highlighted. Turn the knob to change the setting according to your requirements, then press to set.
- 5) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press the knob to confirm (for further details regarding these commands, see ¶9.4 a).

### LOW RF POW(ER)

Two parameters can be set from this screen:



- **PreAl. Low Power** – if the output power falls below the percentage set here (in reference to the nominal value set using the command outlined in section 11.3.b), a warning pre-alarm is issued by flashing the **ALARM** LED. The pre-alarm is not saved in the event history.
- **Alarm Low Power** – if the output power falls below the percentage set here (in reference to the nominal value set using the command outlined in section 11.3.b), an alarm is issued via a steadily lit **ALARM** LED. Obviously, this alarm is saved in the event history.

To set the low power pre-alarm and alarm:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **PreAl. Low Power**.
- 2) Turn the knob to change the percentage to meet your requirements, then press to confirm. A value will be indicated after **Alarm Low Power**.
- 3) Turn the knob to change the percentage to meet your requirements, then press to confirm.
- 4) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶9.4 a).

### HIGH VSWR

From this screen, a value can be set for reflected power, beyond which a high SWR alarm will be issued.



In the above example, the **Refl. Power alarm** is issued when a reflected power of 2.8 W is exceeded.

To set the high reflected power alarm:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **Refl. Power alarm**.
- 2) Turn the knob to change the reflected power level according to your requirements, then press to confirm.
- 3) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶9.4 a).

**UNLOCK** (not available on amplifiers)

From this screen, a time can be set, beyond which an alarm will be issued if the transmitter's internal synthesizer continues to be unlocked.



In the above example, if the synthesizer is unlocked for a **Delay** of 31 seconds, an alarm will be issued.

To set the synthesizer unlock alarm:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **Delay**.
- 2) Turn the knob to change the time according to your requirements, then press to confirm.
- 3) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see 9.4 a).

**MPX** (not available on amplifier)

From this screen, you can personalize the insufficient modulation alarm. Two parameters can be set:



- **Mpx Alarm** – the threshold below which modulation, expressed in dB in reference to a deviation of 75 kHz (0dB = 75 kHz), is considered insufficient.
- **Delay** – the time in seconds after which, if modulation remains insufficient, an alarm is issued.

In the above example, the alarm is issued only when modulation constantly remains at least 17 dB below 75 kHz for 60 seconds.

To set the insufficient modulation pre-alarm and alarm:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be indicated after **Mpx Alarm**.
- 2) Turn the knob to change the modulation to a level that is considered insufficient for your requirements, then press to confirm. A value will be indicated after **Delay**.
- 3) Turn the knob to change the time interval according to your requirements, then press to confirm.
- 4) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see 9.4 a).

**RESET LOG**

As previously mentioned, this menu does not allow you to configure alarms, but rather to delete the alarm history.



When you access this menu, two simple commands are available by turning the knob:

- **YES** – the alarm history will be deleted. The message **waiting...** will appear while the history is being deleted.

- **NO** – the alarm history will not be deleted (in cases of accidental access to the sub-menu, where there is no actual need to delete the history).

After either command is selected, the display will return to the **SET ALARM** sub-menu.



**The alarm/event history delete function does not request confirmation; as such, be careful not to accidentally delete the history.**

### 11.3.n ETHERNET (LAN) setting

Used to set parameters related to the Ethernet LAN interface.



The display will show the following parameters:

- **MAC** – physical Media Access Control address for the internal network card.
- **IP** – static IP address for the internal network card.

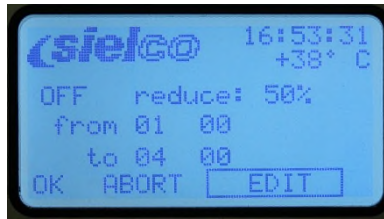
To set the IP address:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. The first number after **IP** will be highlighted.
- 2) Turn the knob to change the *first number* of the IP address, then press to confirm. The second number will be highlighted.
- 3) Turn the knob to change the *second number* of the IP address, then press to confirm. The third number will be highlighted.
- 4) Turn the knob to change the *third number* of the IP address, then press to confirm. The fourth number will be highlighted.
- 5) Turn the knob to change the *fourth number* of the IP address, then press to confirm.
- 6) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see 9.4 a).



### 11.3.o PW TIMER setting

Used to automatically decrease the transmitter's power by a given percentage during a specific time period (e.g., night time).



The display shows the following parameters:


- **OFF** or **ON** – power reduction deactivated (OFF) or activated (ON).
- **Reduce**: percentage of power reduction compared to the power set via the menu, as per section 11.3.b.
- **From** – followed by two sets of numbers (hour and minute). Indicates the time in which the transmitter will reduce power.
- **To** – followed by two sets of numbers (hour and minute). Indicates the time in which the transmitter will return to the normal power level set via the menu, as per section 11.3.b.

To set automatic power reduction:

- 1) Ensure that the **EDIT** option is selected; otherwise, turn the knob to select it, then press to confirm. A value will be displayed after **OFF** or **ON**.
- 2) Turn the knob to set **OFF** or **ON** according to your requirements, then press to confirm. A value will be indicated after **reduce**.
- 3) Turn the knob to change the power reduction percentage, then press to confirm. The first number (hour) will be highlighted after **from**.
- 4) Turn the knob to change the hour in which the power reduction will start (24-hour clock), then press to confirm. The second number (minutes) will be highlighted after **from**.
- 5) Turn the knob to change the minute in which the power reduction will start, then press to confirm. The first number (hour) will be indicated after **to**.
- 6) Repeat steps 4 and 5 to set the time in which the transmitter will return to *normal power*.
- 7) Using the knob, select **OK** to save the settings, **EDIT** to make further changes, or **ABORT** to exit without saving the new settings, then press to confirm (for further details regarding these commands, see ¶ 4)).

### 11.3.p MODEM setting

If the transmitter is equipped with an optional modem, its parameters can be defined via this screen. For further details, refer to the documentation provided with this option.

 *If a modem has not been installed, the screen will indicate **Modem not present**.*

## 11.4 Hidden or Factory menus (under level 3 password)

Beside the two level 1 and level 2 passwords described in the par. 11.3.h, a third password, called “level 3 password” is available. It's preset during the production, it's always active and allows to access the **SETUP** sub menu and the one which allows the activation/change of the level 1 and level 2 passwords even when the user has activated and forgotten them.

There are two hidden menus which can be accessed only by entering the level 3 password. Briefly, accessing the **SETUP** menu by means of the level 3 password allows to:

- Access the **SETUP** sub menu and the one which allows the activation/change of the level 1 and level 2 passwords even when the user has activated and forgotten them.
- Change the level 3 password in order to change the one preset during the production of the equipment.

### 11.4.a Accessing the level 3 password

To access the **SETUP** submenu when you have forgotten the level 1 or level 2 password currently active:

- 1) Use the knob to select the **SETUP** menu and press it to confirm.
- 2) When the password is prompted, enter the level 3 password which was set during the production to **A B C D**.



- 3) Select the `password change` menu and change the level 1 or level 2 password which is currently active (▢ par. 11.3.h.)
- 4) Note down the new level 1 or level 2 password currently active and backup this information in a safe place.

#### 11.4.b Changing the level 3 password

Some unauthorized people who know the level 3 password preset in the production could alter the setting of the transmitter even when it's protected with either one or both the level 1 or two passwords. For this reason, you can change the level 3 password preset in the production. This operation must be done only if you are absolutely sure to note down the new level 3 password and to store it in a safety place.



**IMPORTANT! Always note down the level 3 password and backup it in a safe place. Should you loose it, the total re-programming of the equipment or the CPU replacement at SIELCO will be mandatory, with the related costs which this operation involves. This kind of service is not included in the warranty.**

To change the level 3 password :


- 1) Use the knob to select the `SETUP` menu and press it to confirm.
- 2) When the `password` is prompted, enter the level 3 password which was set during the production to `A B C D`.



- 3) Select the `PASSWORD` submenu. As you can see, the command `SET PASSWORD LEV 3` (set level 3 password) also appears in it



- 4) Select `SET PASSWORD LEV 3` and change the password by following the procedure stated in par. 11.3.h.


 You can change the level 3 password, but not disable it, because its setting is always fixed to `ON`.

#### 11.5 Output power reduction by remote input parallel connector

An option on transmitter menu permits a reduction in RF power output driven by a control line of the remote control connector on the rear of the equipment.

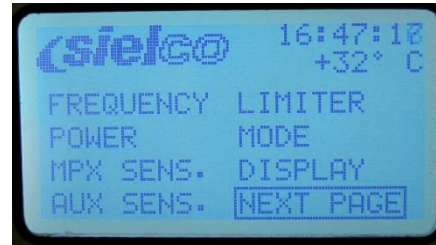
A parameter must be preset to this aim in the "SET IN" sub-menu: in the row "Type" it must be selected the option "PW SET". This selection modifies the action associated to pin 6 of the sub-D9 remote control connector which is usually associated to RF Enable. In this new case acting on this pin the output power will not be turned completely on (enabled) or off (disabled) but will vary between "completely on" and "reduced power". The reduced power level in percentage will be that one preset on "PW TIMER" menu (see ▢ 11.3.h).

This latter function, i.e. Power reduction controlled by timer, can be operative at the same time if preset and its action will be and-ed with the logic state of the remote control.

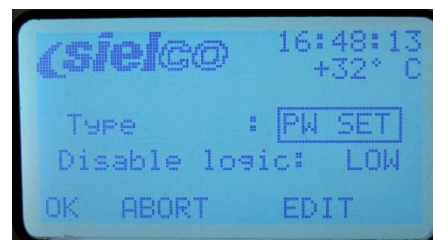
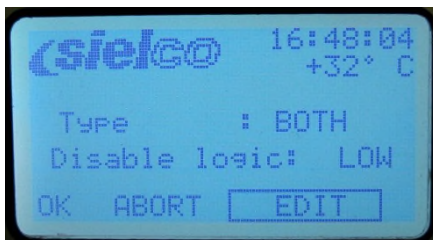
 **WARNING:** do not send power control SMS "PWxxx", "MEZZA" or "PWTIMER" when the pin "PW SET" is enabled because it may result in unpredictable output power. These anomalies are canceled again momentary disabling "PW SET" either by setup menu or acting on the remote-control line.

### 11.5.a How to enable Output power reduction by the remote-control line

1. Select the "SETUP" tree on the default page of the equipment menu,
2. Descend the submenu to "NEXT PAGE" and down to "SET IN" line on the new page
3. Press the knob to enter (↵ section 10.3 of user manual)



4. Press again the knob to confirm "EDIT", than change "Type" parameter to "PW SET". Confirm "OK".



This will assign pin 9 of the remote-control connector to the reduced power function.

You may either vary the control logic associated to this action from "LOW" to "HIGH" in the second row of this panel. Nevertheless logic "LOW" is the preferred preset: in this position you must short-circuit pin 6 to ground (pin 4) to reduce the output power..

### 11.5.b Setting of Power Level Reduction

1. To set the power level reduction you must descend the SETUP menu tree up to "PW TIMER" on the 3rd panel page.
2. This submenu is usually used to automatically decrease the transmitter's power by a given percentage during a specific time period (e.g., night time) or, in this case, from an external command.



3. The function of this submenu is not modified by the remotely controlled power reduction and for its function you may still refer to it proper section of the manual (↗ section 11.3 o of user manual):



Briefly you must preset:

- 1) "EDIT" to vary the setup options if required.
- 2) "ON" or "OFF" if you want the timer driven power control to be enabled. Default position is "OFF", this will not impair the power reduction by remote control function.
- 3) Reduction power level percentage ("reduce:"). Please note that this number indicates how deep is the reduction: 80% in the above picture indicates that the output power will be reduced to 20% of the regular level!
- 4) Vary if required the starting time of the timed power reduction ("from"), in hour and minutes and the ending time ("to").
- 5) Select "OK" to confirm the setup and exit the menu.

## 12 RFB-GX AMPLIFIER'S SERIES

RFBxxGX is a series of solid state MosFet based FM broadband amplifiers extremely compact and efficient which shares the same characteristics of the transmitters from which derives. In fact, they are essentially the same equipment from which the modulator, the input interface and the driver board were removed. This amplifier line was created for those clients who wish to separate the power equipment from the driver.

They are also a used as amplifier modules in the high-power transmitters of the TXxxKGX series.



The amplifier series is composed as following:

RFB500GX    RFB1000GX    RFB1600GX    RFB2000GX    RFB3000GX    RFB3500GX    RFB5000GX

To operate the amplifier needs to be driven by an external exciter preset to a power level peculiar to each model, usually between 4 to 30W. The following table illustrate the correct drive power for each amplifier:

Model	Output nominal power (W)	Required input driver power (W)
RFB500GX	500	8÷10
RFB1000GX	1.000	8÷10
RFB1600GX	1.600	18÷20
RFB2000GX	2.000	18÷20
RFB3000GX	3.000	4÷5
RFB3500GX	3.500	4÷5
RFB5000GX	5.000	4÷5



The power output of the amplifier **must be exclusively regulated through the amplifier menu**, not through the driving power which must be always preset as shown on the upper table. On the contrary, LF modulation parameters must be preset on the exciter.


### 12.1 Configuration of the equipment

#### 12.1.a Transmitter, Module Amplifier, Master Amplifier

The factory preset menu permits to tailor the equipment control firmware to 3 different configuration. They may be chosen by the "SET TYPE" menu, from which may be preset:

- Transmitter
- Module Amplifier
- Master Amplifier

The first two presets are the most used, making the equipment use essentially independent in their control but permitting the amplifiers to be driven by an external properly preset exciter through its RF input connector. In this case the parameters of each machine must be independently controlled by its menu

 In particular the "Module Amplifier" configuration is necessary when the amplifier is a module part of a bigger transmitter system (TX6KGX, TX8KGX, TX10KGX, etc.).

When the amplifier is driven by one exciter of the same -GX or -GT series and you want to manage both through the amplifier menu, then the control must be preset as "Master Amplifier".

To access to "SET TYPE" menu, 3<sup>d</sup> security level must be allowed. Therefore, it is necessary to input the corresponding password prior to enter the **SETUP MENU**.

To force the password request, you must temporarily activate the level 2 password (see paragraph 11.3.k) After inserting that one, switch off and on again the machine, than enter the **SETUP MENU** and insert the level 3 password when required. Go to "SET TYPE" menu, located on the fourth menu screen and finally press the knob to confirm.



To set the type of equipment:

- 1) Make sure to select the option EDIT (editing), otherwise turn the knob to select it and press it. 3 choices may be selected: **TRANSMITTER, MODULE AMPLIFIER, MASTER AMPLIFIER.**

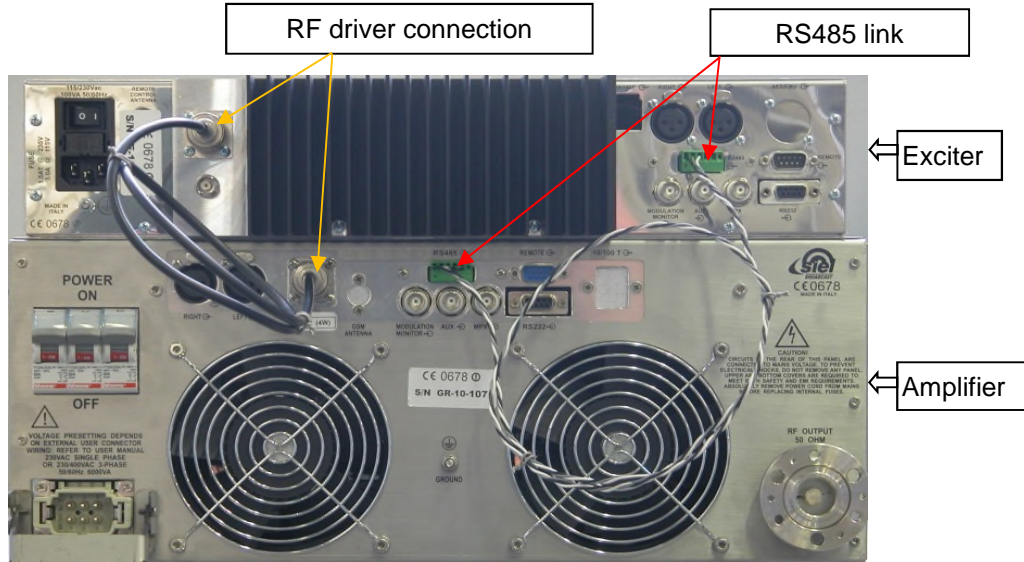


- 2) Choose either "Module Amplifier" or "Master Amplifier" to preset proper control for an amplifier as needed.

## 12.2 Connecting amplifier and transmitter through the RS485 port

As indicated in the previous section, remote-management of both the equipment can be performed through the **RS485** serial bus. The RS485 interface port is an optional board (**SEXC30RS485**) which must be factory mounted. This is also the primary way to control when used within a transmitter TXxxGX by the system controller.

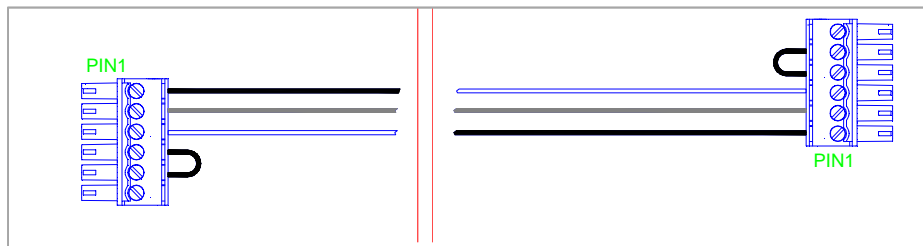
This also allows the optional telemetry control installed on the amplifier to access to the transmitter parameters. On the contrary, if the equipment is not wired on the serial port, only the amplifier parameters may be accessed.



Example of connection between the exciter and an amplifier

Pay attention, the RS485 port conflicts with the RS232 port when used simultaneously but is fully compatible with contemporary use of the optional ETHERNET and/or GSM remote control.

### 12.2.a Specifications for construction RS485 interface cable



The connectors on both ends of the cable are PHOENIX MC1,5/6-ST-6.5 or equivalent models. The cable length must be as short as possible while permitting some jocking on the single machine. A bifilar screened cable is usually required: in this case the screen is connected on pin 1 of both connectors.

### 12.3 Impostazioni indirizzi porta RS485

In order to allow communication between the "Exciter" and the "Master Amplifier" it is necessary to assign the correct addresses: the "Master Amplifier" needs to be assigned the address code 01 and the "Exciter" the code 02.

The addresses of the two machines must be independently set through their menu. To set it, enter the SETUP menu, display the page with the sub-menu "RS-485" than press the knob to confirm.



On the Amplifier, preset it as "Master Amplifier":

- 1) Select "EDIT" and turn the knob to preset address **01**. Press the knob to confirm. Leave speed at 9600 baud.



On the Exciter, preset it as "Transmitter":

- 2) As before preset address **02**. Press the knob to confirm and leave speed at 9600 baud.



**Warning, if you reverse or anyway vary the values of the addresses or differently preset the control mode, the mutual control will not occur.**



## 13 MAINTENANCE, SOFTWARE UPGRADE AND WARRANTY

### 13.1 Maintenance



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

#### 13.1.a Clogging caused by dust

Since the transmitter other than the 30W model 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 other than dust cleaning.

A regular routine service, mainly to clear from air filters, is recommended every 6 months or less depending on the environment. In high quality environments it may be relaxed up to one year. Keep in mind that 90% of the air circulation is restricted to the main internal ventilation channel and does not affect the components. Internal dust cleaning may be done though compressed air in an open environment.

The air filter may also be cleaned same way or washed with water and neutral soap after removing it from its framework. Let it full dry before reassembling on the equipment.



**In the case of sites with particularly dusty air, these interventions could be requested within lower intervals (e.g. every 3 months). In these cases, it may be advisable to set up a room air filtering system in order to expose the equipment to cleaner dusty air.**



**This is even more appropriate in case of salty or corrosive environments: possible damages in these situations are not covered by the warranty.**

#### 13.1.b Ventilation fan

All equipment provided with forced cooling shall be verified for the conditions of their ventilation fans, especially in case of dusty or hot environments. Fans must be controlled at least once in a year and usually replaced every 2 to 5 years depending on their conditions. Full fan kit is suggested to be replaced in this case.

Use only the same model or equivalent high-quality ball-bearing fans

#### 13.1.c Power supply modules

All this equipment is powered by switch power supply modules (SMPS). Usually they are high quality modules, some commercially available types other custom made.

In most case provisional life of these modules is the same of the whole equipment. Nevertheless, being them subjected to hot environments and electrical stress from mains they may fail and required to be replaced. In this case be sure to replace them with the same original model.

In case of 2 or more identical SMPS modules, if a single module fails it may be wise to replace the full set with identical new units if they are very old, even if actually functioning. A replaced but still functioning module may be used as an emergency spare for the same or a similar equipment.

#### 13.1.a Periodic overhaul

Regularly remove dust from air filter and internally: (see [Pb 11.3.h](#)).

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.

It is especially important that the power supply be overhauled if the transmitter has been working at high temperatures, over 30 - 35°C.

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 new features or fixing occasional bugs may require software upgrade of the equipment.



**Software upgrade may not improve performance of the equipment but may add some new functions or correct bugs. It is usually suggested only in case of clear malfunction. It shall be done by skilled technicians because it may be a risky operation. In case of failure due to the upgrade process or any consequent damage, the equipment is not covered by the warranty if the operation was not made in Sielco or by their appointed representatives.**

Control software is uploaded to the equipment CPU on the SEXC30CPU board. The equipment can be updated in two ways:

- through the RS232 port on the field
- directly on the CPU board (only in the factory)


For details please refer to the dedicated booklet.

### 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 connectors.

 **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

 **IMPORTANT!** *if you send the equipment for repair or call for assistance, in order to allow easy maintenance in the factory or know how to intervene, always specify its serial number, the installed software version, the voltages shown on the display or detected, the elapsed time, any warning or error message and the observed defect. Also specify in what conditions the latter occurs if not immediately visible (e.g. if it is occasional, cold, hot, etc.).*

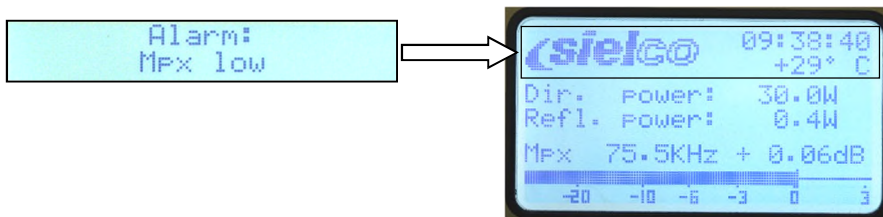
## 14 TROUBLESHOOTING

If all instructions set in this manual are followed, any equipment of the EXC(RFB)xxGX series will guarantee several years of continuous, perfect service. However, should problems arise, refer to this chapter before contacting the local authorized assistance point.

**IMPORTANT!** if you send the equipment for repair or call for assistance, in order to allow easy maintenance in the factory or know how to intervene, always specify its serial number, the installed software version, the voltages shown on the display or detected, the elapsed time, any warning or error message and the observed defect. Also specify in what conditions the latter occurs if not immediately visible (e.g. if it is occasional, cold, hot, etc.).

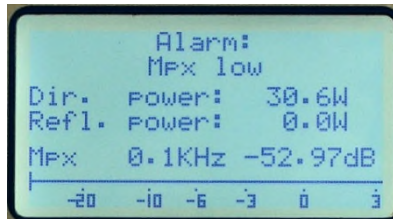
The following table explains the meaning of the main error messages and indicates the actions to be taken in order to solve the problem.

All alarms will be usually shown in any screen you are, and they will be overlapped on the upper screen section, where you normally see the company logo, system temperature and system time. In addition, the **ALARM** LED will light (☞ 11.3.h, point [1]).



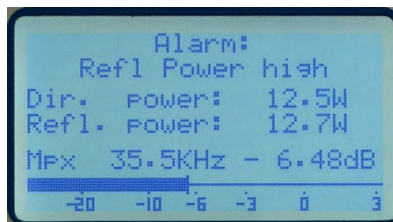
The messages below may appear during the amplifier normal operation as well as when the alarm data are displayed in the **VIEW LOG** sub-menu. For further details see the paragraph 0.

### 14.1.a Mpx low (insufficient modulation)



The **Mpx low** alarm message appears when an insufficient modulation lasts for more than a given time. Both alarm delay and alarm threshold can be set in the alarms menu (☞ 11.3.m - **MPX**), respectively up to 180 seconds and < -16dB (as to 75 kHz frequency deviation, that is 0dB = 75 kHz).

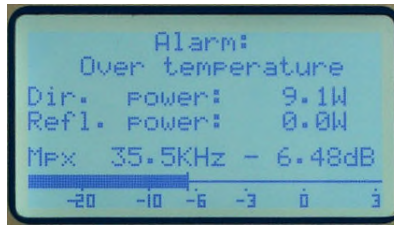
### 14.1.b Refl Power High (excessive reflected power)



The **Refl Power high** alarm message appears when the reflected power level exceeds a threshold, usually set in the range from 5% to 7% of the maximum nominal power level. The threshold level can be adjusted via the alarms menu (☞ 11.3.m - **HIGH VSWR**).

If necessary, the maximum reflected power level can be automatically limited to the ~ 10% of the maximum output power level reducing the direct output power.

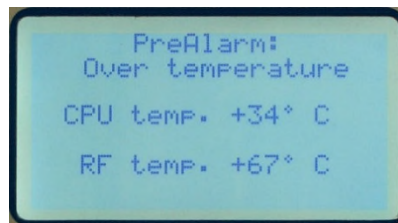
### 14.1.c Over temperature



The **Over temperature** alarm may be referred to a system over temperature (CPU Temp.) or only to a RF power stage over temperature (RF temp.); each of the said temperatures is taken via a specific heat probe.

Before reaching the max allowed temperature, the alarm LED starts flashing, to signalize the approach to the limit condition. If the threshold is exceeded, the alarm LED stops flashing and starts steadily lighting. In this condition the output power level will be progressively reduced, to limit dissipation without completely blocking the transmitter operation.

To check whether the over temperature is due to whole system or to the RF power stage only, select the **Temperat.** sub-menu (F2 □), in the **view** menu (F2 11.2), which displays both the temperatures:



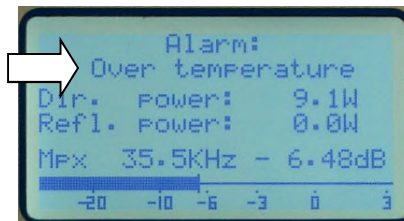
Where:

**CPU temp.** = system temperature

**RF temp.** = RF power stage temperature

### 14.1.d Unlock (unlocked PLL synthesizer)

Unlock  
Synthesizer unlock








**Unlock** shows an unlock status of the built-in synthesizer, generally meaning a real transmitter fault. When this failure happens it's quite important to contact the local authorized assistance point.

Depending on the software release of the control firmware, this alarm is often "masked" by the consequent low RF direct output power alarm, however the **LOCK** LED keeps off whereas the **ALARM** LED steadily lights.

With the most recent software releases the **Synthesizer unlock** priority alarm will be shown in the current screen, immediately signaling such condition.

## 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: 30W to 5KW FM super compact Transmitters -GX series. Electrical drawings and components**

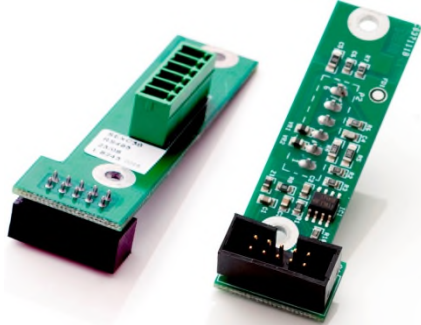
## 16 TECHNICAL FEATURES

Frequency range .....	87,5 ÷ 108 MHz
FM modulation .....	75 kHz (adjustable) peak deviation
Mono .....	180kF3E
Stereo .....	256kF3E
Audio/MPX input level .....	-3,5 ÷ +12,5 dBm @ 75 kHz deviation
Audio input connectors .....	XLR female
Aux channel input level (RDS/SCA)	
SCA .....	-12,5 to +3,5 dBm @ 7,5 kHz deviation
RDS .....	-24 to -8 dBm @ 2 kHz deviation
Aux channel input impedance .....	10 kOhm
Modulation distortion .....	<0,05 %, 0,02% typical @ 75 kHz deviation
Mono S/N ratio	
30 ÷ 20000 Hz .....	>76 dB, 83 dB typical
CCIR .....	>75 dB, 79 dB typical
Stereo S/N ratio	
30 ÷ 20000 Hz .....	>72 dB, 77 dB typical
CCIR .....	>68 dB, 72 dB typical
Stereo separation .....	>50dB (100 ÷ 10000Hz)
Audio channels band width .....	30 ÷ 15.000 Hz ±0,1 dB
Pre-emphasis time constant .....	.0/50/75 microseconds, selectable
Nominal RF output power .....	25 ÷ 5.000 W, depending on the model
Amplifiers driving power .....	4-30W, depending on model
Transmitter tuning steps .....	10/100 kHz
Frequency stability and error .....	± 250 Hz over temperature – 100 Hz/year
Output power ALC stability .....	± 3%
Harmonics and spurious emissions .....	<-75dBc (harmonics), < -80 dBc (spurious)
RF output impedance .....	50 Ohm
RF input connector .....	N type
RF antenna output connector .....	N, 7/16 or 7/8" depending on the model
RF sampler connector .....	BNC type
Power supply	
Single phase .....	230 V <sub>AC</sub> (190÷250 V <sub>AC</sub> )
Three phase (where possible) .....	400 V <sub>AC</sub> (350÷440 V <sub>AC</sub> ) with neutral line or 230 V <sub>AC</sub> (190÷250 V <sub>AC</sub> ), no neutral
Total consumption .....	depending on the model. See proper data sheet
Operating temperature range	
Recommended .....	0 ÷ 35 °C
Extreme: .....	- 10 ÷ + 45 °C (50°C max, with possible derating)
Relative umidity .....	up to 95% not condensing
Dimensions .....	19" standard, height and depth depending on the model (see proper section on Manual)
Weight .....	7 to 33 kg, depending on the model (see proper section on Manual)

 *The above details may undergo changes without prior notice*

## 17 OPTIONALS

Many different optional boards are available to increase versatility where needed, adding new features to basic transmitter. Here are the most common ones.



**SEXC30RS485** RS485 INTERFACE BOARD



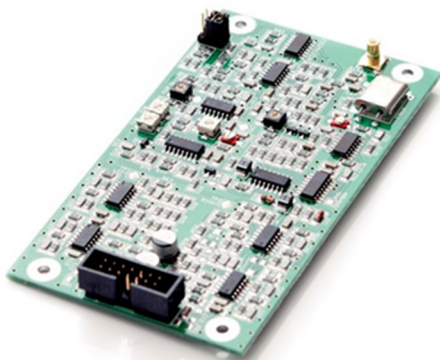
**SEXC19DAC** AES/EBU DIGITAL AUDIO INPUT BOARD  
**SEXC25DAC** AES/EBU DIGITAL AUDIO INPUT BOARD



**SEXC30REMC** ETHERNET WEB-SERVER / SNMP CONTROL ADAPTER BOARD



**SEXC30REMC+** ETHERNET WEB-SERVER / SNMP AND GSM CONTROL ADAPTER BOARD



**SEXC23COD2** STEREO-ENCODER BOARD



**SEXC30RDS** RDS GENERATOR BOARD