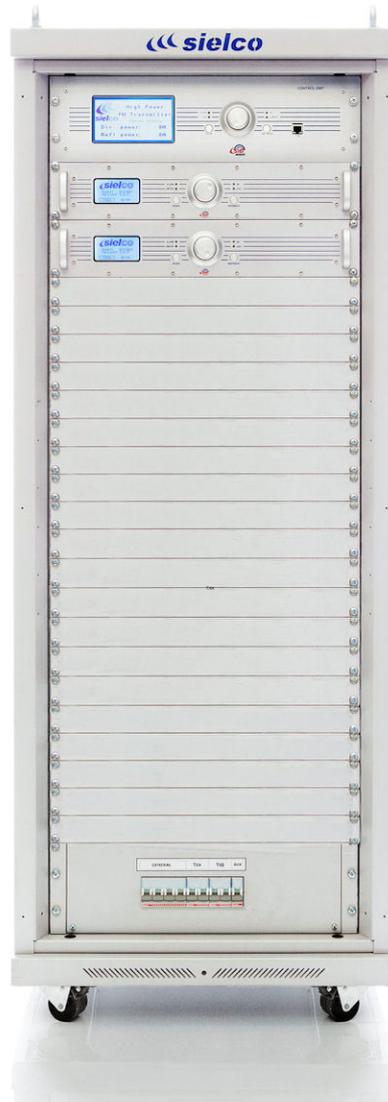


1+1 System



Switching system for 88÷108 MHz FM transmitters
User and maintenance manual

Revision 1.0



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 Srl, 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 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.

All rights reserved. No part of this document may be reproduced in any form or by any means, including recording or photocopy without prior written authorization of Sielco Srl.



Via Toscana 57/ 59 - 20090 Buccinasco (Milano) - Italy

Tel +39-02-45713300

Fax +39-02-45713351

E-mail: info@sielco.org

Web: www.sielco.org

This label indicates the express declaration by Sielco Srl that the product associated with this manual conforms to Directive 1999/05/EC

CE 0470 

 For further information about how Sielco ensures compliance with EC regulations, refer to Chapter 3.

Contents

1	INTRODUCTION	5
2	SAFETY FIRST!.....	6
2.1	Safety suggestions	6
2.1.a	General safety recommendations.....	6
2.1.b	Good practices	7
2.1.c	First aid in case of electrical shock.....	7
2.1.d	Emergency resuscitation technique.....	7
2.1.e	Treatment for burns.....	8
2.2	Warning instructions.....	8
2.2.a	Introduction.....	8
2.2.b	Checking safety conditions.....	8
2.2.c	AC/DC Line warning.....	9
2.2.d	Service and operational warning	9
2.2.e	Warning symbols.....	10
2.3	Symbols used in this manual.....	10
3	THE ADDED VALUE OF SIELCO PRODUCTS	11
3.1	Full conformity to EC regulations	11
3.2	Reliable quality	11
3.3	Savings on all fronts	11
4	1+1 SWITCHING SYSTEMS.....	12
4.1	General description	12
4.2	Architecture	12
4.3	Front view and typical component layout of an 1+1 Switching System	13
4.4	Modules of the system	14
4.4.a	Coaxial relay.....	14
4.4.b	TXA and TXB Transmitters.....	15
4.4.c	System power panel	15
4.4.d	Dummy load (optional)	15
4.4.e	Connections with the outside.....	16
4.5	Block diagram of a typical 1+1 Switching System.....	17
4.6	Connection diagram for the coaxial relay.....	18
4.7	Switching sequence	19
4.8	Switching mode	19
4.8.a	“No return” Mode– putting the main transmitter back on the air.....	19
5	COV23 CONTROL UNIT	20
5.1	General description	20
5.1.a	Connections with the system modules	20
5.1.b	Activation of the switching procedure	20
5.1.c	Resumption of operation after a mains power failure	20
5.1.d	Main components	21
5.1.e	Front panel	22
5.1.f	Rear panel.....	23
5.1.g	Wiring diagram for the boards composing the COV23 Control Unit	25
5.2	Menu and navigation commands	26
5.2.a	Multifunction knob	26
5.2.b	ESCAPE button.....	26
5.2.c	Examples of how to access and set the menu entries.....	26
5.3	Description of the menus.....	31
5.3.a	Turning on the system.....	31
5.3.b	Features common to all menus	32
5.3.c	Default screen	32
5.3.d	System Status menu	33
5.3.e	Switch Setup menu	33
5.3.f	TxA Status menu.....	34
5.3.g	TxB Status menu.....	34
5.3.h	System Alarms menu	35
5.3.i	GSM Status menu.....	37
5.3.j	Sms settings menu.....	38

5.3.k	SMS numbers menu.....	38
5.3.l	Password menu.....	40
5.4	Menu diagram	42
5.5	Remote control – Summary of the commands sent via SMS	43
5.6	System alarms.....	44
6	INSTALLATION	45
6.1	Checking the supplied parts.....	45
6.2	General safety rules	45
6.3	Choosing the proper room and placement.....	45
6.3.a	Electrical conditions.....	45
6.4	Wiring the 1+1 Switching System.....	46
6.4.a	Wiring into the antenna.....	46
6.4.b	Connection to modulation signals.....	46
6.4.c	Wiring into the mains.....	46
7	BASIC OPERATIONS	47
7.1	Initial start-up.....	47
8	MAINTENANCE AND WARRANTY	48
8.1	Maintenance.....	48
8.1.a	Clogging caused by dust	48
8.1.b	Ventilation fans.....	48
8.1.c	Periodic overhaul.....	48
8.1.d	Periodic overhaul of the COV23 control unit batteries.....	48
8.1.e	Maintenance.....	48
8.2	Warranty	48
9	INDEX	49
10	CE CONFORMITY DECLARATION	50
11	1+1 SWITCHING SYSTEM GENERAL ELECTRICAL DIAGRAM	51

1 INTRODUCTION

1+1 Switching Systems are the perfect choice to guarantee uninterrupted broadcasting service. The construction of the system is such as to allow either manual or automatic switching between the two transmitters, named “Main” and “Reserve” (the reserve transmitter), as a response to an alarm notification from the currently on-air transmitting unit. For each transmitter, the user can set the types of alarm which, when activated, trigger the switchover procedure.

1+1 systems use EXC-GT series transmitters, designed according to the most advanced solutions aimed at providing the best performance at the minimum operating cost, while fully complying with technical regulations.

Ease of use, reliability, quality and low electrical consumption make the 1+1 Switching Systems the best solution you can hope for.

- **Intuitive use.** The systems use a COV23 control unit equipped with a large **5” LCD display**, a handy multifunction knob and only a few buttons. This allows the user to easily set the functions of the system and inspect its operating parameters at a glance.
- **Straightforward diagnostics and easy-to-read parameters.** The values of power and frequency for the currently on-air transmitting unit can be displayed on the large screen of the COV23 control unit. All parameters and alarms are easily accessed from remote sites via the telemetry option, which allows the user to switch from stand-by to “on air” mode in a moment. In addition, commands sent via SMS can be used to check the system status and perform a reset. Upon request, an external controller can be provided which enables remote control of the apparatus.
- **Flexibility in the choice of the switchover criteria.** For each transmitter the user can select the types of alarm which, when activated, trigger the switchover procedure.
- **Reliable operation.** The alarm notification sent from the currently on-air transmitter to the control unit uses an RS485 bus. A proprietary serial bus ensures that the switchover between the transmitters can occur even in case of failure of the RS485 bus.
- **Reliability of the switching mechanism.** A special safety function enables the switching of the transmitter connected to the antenna only after confirmation is received of the correct positioning of the contacts of the output relay.
- **Flexibility in the choice of the system components.** Based on the installation requirements, the system can be equipped with transmitters of different power rating, the only restriction being the use of the same RF operating frequency.
- **Maximum flexibility in the choice of the transmitter models.** The system firmware is unrelated to the transmitters’ power rating, which allows replacing the transmitters with models of different power at a later time.
- **Low operating costs.** The unique design reduces internal loss and allows the device to achieve an extremely high yield – typically greater than 61 % – minimizing electrical consumption and thus decreasing operating costs.
- **Easy replacement of the transmitters for maintenance purposes.** It is very easy for the user to carry out the replacement of the transmitters.
- **Sturdy modular construction.** Reliable modular construction allows easier and faster maintenance operations. Depending on the power and size of the transmitters used, the system is housed in one or two 19” racks.
- **EXC-GT – Entirely modular and highly reliable transmitter units.** The EXC-GT transmitters are composed of ultra-compact modules designed according to the latest advances in technology and working in perfect synergy. Thanks to the internal balancing circuitry, when a failure occurs in one of the modules the other modules are automatically rebalanced, allowing the transmission to continue at reduced power. Thanks to the reduced number of interconnections achieved using multi-polar connectors, each module is easily identifiable, inspectable, and removable without the need of a welder.
- **Stable, reliable power supply to the transmitters.** As required by the latest regulations, the TX-GT transmitting modules integrate power sources with active power factor correction (PFC). As a result, the impact on the power source is minimal, providing greater reliability to the entire system.
- **Compliance with the strictest regulations.** This system was designed in full compliance with the current international regulations and the strict EC anti-magnetic noise reduction requirements.

And that’s not all: Sielco Srl products provide the greatest added value and unmatched quality. For further details, please refer to Chapter 3.

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

 **Warning!** Before performing any operations it is essential to read this entire manual in order to avoid damage to objects or people.

2 SAFETY FIRST!

2.1 Safety suggestions

Regardless of how well electrical equipment is designed, personnel can be exposed to dangerous electrical shock when protective covers are removed for maintenance or other activities. Therefore, it is of the utmost importance that all safety regulations be consistently observed and that every individual working on the equipment have a clear understanding of the first aid procedures to use in case of electrical shocks.

IN ADDITION THESE SAFETY PRACTICES MUST BE FOLLOWED:

- Do not attempt to adjust unprotected circuit or to dress leads with the power on.
- Always avoid placing any part of your the body in series between the ground and any point of the circuits.
- To avoid burns, do not touch heavily loaded or overheated components without precautions.
- Remember that some semiconductor cases and solid-state circuits carry high voltages.
- Do not assume that all dangers of electrical shock are removed when the power is off. Charged capacitors can retain dangerous voltages for a long time after the power has been turned off. These capacitors should be discharged through a suitable resistor before touching any circuit point.
- Don't take any chances. Be fully trained. Sielco equipment should be operated and maintained only by fully qualified personnel.
- Do not service alone and do not perform internal adjustments unless another person capable of providing first aid and resuscitation is present.
- Some components used in the construction contain Beryllium Oxide (BeO). This substance is harmless as it is, but becomes highly dangerous if it is ground to powder. Special disposal procedures must be observed in case of failure of these devices.

NOTE: This section is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this electronic equipment or others.

Sielco Srl shall NOT be responsible for injury or damage resulted from improper procedures or from the use of the equipment by improperly trained or inexperienced personnel.

2.1.a General safety recommendations

When connecting the equipment (or the system) to the power, 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.
- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired socket before connecting to the product input or output terminals.
- Upon loss of the protective-ground connection, all accessible conductive parts (including parts that may appear to be insulating) can render an electric shock.
- To avoid fire hazard, use only fuses of the correct type, voltage rating, and current rating. Refer to qualified service personnel for fuse replacement.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- To avoid personal injury, do not remove covers or panels. Do not operate the system without the covers and panels properly installed.

2.1.b Good practices

In maintaining the equipment/system 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 the power in 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.

2.1.c First aid in case of electrical shock

If someone seems unable to free himself/herself 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** loop a length of dry non-conducting material (such as a rope, insulating material, or clothing) around the victim and pull him free of the power. Carefully avoid touching him/her or the clothing until free of power.

**DO NOT TOUCH THE VICTIM OR HIS/HER CLOTHING BEFORE
POWER IS DISCONNECTED OR YOU CAN BECOME A SHOCK
VICTIM YOURSELF**

2.1.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. Push on chest 15 times.

CONTINUE WITH TWO BREATHS AND 15 PUMPS UNTIL HELP ARRIVES

2.1.e Treatment for burns

- Continue treat 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..

2.2 Warning instructions**2.2.a Introduction**

The equipment or the system described in this manual is developed, produced and tested in accordance with the relevant safety standard EN 60215. The following safety instructions inform the operator about the dangerous operation concerning the equipment. The user must read the safety instructions contained in the manual and follow them accurately. As mentioned in the safety rules section, qualified technical staff only can operate this equipment. Sielco srl declines any responsibility for damages caused by improper use or improper system settings performed by inexperienced, not qualified staff or personnel operating with instruments or tools not in compliance with the safety rules.

The staff in charge, besides being technically qualified, must be trained in first aid procedure to use in case of emergency or accident (resuscitation, 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 extinguishers, which have to be used very quickly if necessary.

2.2.b Checking safety conditions

The following connections and verifications must be observed to guarantee the safety for the personnel:

- Proper connection to the antenna cable
- Proper connection to a mains line cable
- Proper connection to 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.

2.2.c AC/DC Line warning

This equipment/system uses dangerous high voltages and currents. Any voltage present inside this equipment can be potentially dangerous for personnel. The technical staff assigned to the service and repair operations must be qualified and they must follow the procedures described in the safety rules section.

2.2.d Service and operational warning

Technical personnel in charge of servicing the internal components of the equipment/system 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 is restored. High voltage is present on the mains stage of the equipments also when the mains switch is on OFF position and the mains line cable is connected.

If really necessary, and after authorization of Sielco srl, very qualified technical staff only can work with on live parts. In this particular 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, using a fuse with identical characteristics and only as specified by the manufacturer.



Care must be taken when the equipment is switched on, as dangerous R.F. high voltages are present both at the R.F. 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 (⚡ 6).

The switches installed in the unit do not guarantee complete separation from the mains as some circuits remain live.

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

2.2.e Warning symbols

The following symbols are used on this equipment to advise the user about the most important dangerous parts.

Symbol	Colour	Explanation
	Black/yellow	Live parts: risk of electric shock.
	Black/yellow	To preserve the instrument from damage the operator must refer to an explanation in the instruction manual.
	White/black	Protective earth (grounding) terminal.

2.3 Symbols used in this manual

For quick reference, we will use symbols that attract immediate attention, and 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 utmost importance. When such warning symbols are ignored, serious problems/consequences may arise.



The memo symbol 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 paragraph 3.1”.

3 THE ADDED VALUE OF SIELCO PRODUCTS

3.1 Full conformity to EC regulations

As is well known, broadcast equipments must conform to strict regulations in terms of quality, safety, and electromagnetic compatibility. This last aspect is of particular importance, as it ensures that the transmitter doesn't interfere with other devices and that it is not interfered with. In order to ensure electromagnetic compatibility, a number of extremely accurate measurements are required 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 Srl is particularly careful about guaranteeing its clients conformity to regulations. To this end, after having taken measurements during the research phase, Sielco Srl uses a certified laboratory and an international certification body to certify the full conformity of its products based on measurements taken according to regulations.

3.2 Reliable quality

A popular ad campaign from 80's claimed to provide "constant quality over time". In order to ensure that every mass-produced device conforms to testing and validation regulations, Sielco Srl takes special care in preparing the documentation related to the design and performing the testing and verifications procedures.

3.3 Savings on all fronts

Choosing a product merely because it costs less than another doesn't make sense if its operating costs are high. For this reason, Sielco srl has made a major commitment of ensuring that its products provide maximum return on the investment made. In particular, the 1+1 switching systems are distinguished by the following features:

- **Savings in electrical consumption** – The use of high-yield components allows significant savings in terms of electrical consumption. For a given RF power output, a smaller electrical bill "reimburses" the user a portion of the purchase cost – month after month.
- **Lower transportation costs** – the modular structure of our systems makes separating the modules from the racks fairly easy and facilitates their transport, which is particularly useful for installations in tight places.
- **Use more versatile** – The use of combined "standard" equipment allows quicker and simpler maintenance, performed by replacing the faulty component with a spare unit.
- **Less maintenance** – high energy efficiency also means less heat dissipation and less wear on components, which minimizes service calls and associated costs.

4 1+1 SWITCHING SYSTEMS

4.1 General description

The 1+1 Switching Systems are constituted by three main elements: a COV23 control unit, common to all systems irrespective of their nominal RF power rating, and two EXC-GT series transmitters. Depending on the characteristics of the broadcasting system, the transmitters can have different nominal power values (the only restriction is that both transmitters must operate at the same frequency). The systems are housed in 19" rack cabinets, whose height will vary according to both the client's specifications and the model of the transmitters used. In some cases, for example in systems comprising high power equipment, two cabinets in a side-by-side arrangement are used.

In addition to the EXC-GT series transmitters, the high level of operating reliability is also due to the adoption of solutions aimed at ensuring that the switchover takes place even in case of malfunction of the RS485 system bus. The transmitter to be activated is switched on only after confirmation of the correct positioning of the contacts of the coaxial output relay, with the connection to the antenna really in place.

The transmitters are used for the direct transmission from the antenna, and meet the latest national and international standards. Since the systems are designed for use in a highly electromagnetically polluted environment, they are well shielded from electrical noise radiated or coming from power lines.

4.2 Architecture

All 1+1 Switching Systems are based on the same electro/mechanical project. They share common mechanicals, with 19" units installed in cabinet racks of suitable height depending on the transmitters used. The basic design comprises a COV23 control unit and two transmitters ("Main" and "Reserve"). The system is completed by a power panel and a switching mechanism based on a coaxial relay, used to connect the currently on-air transmitter to the antenna.

Though not crucial to the correct operation of the system, it is advisable to fit the rack with an optional dummy load, which is useful to correctly terminate the output of the transmitter in the standby state (which is usually kept turned off) as well as perform periodical operation tests.



The system can be equipped with transmitters of different nominal power. The dummy load must be suitably dimensioned for the use with the most powerful transmitter.

The use of modules of the same family, individually tested for EC, EMC and electrical safety (at the end of 2007) compliances, ensures that all 1+1 Switching Systems in turn conform to the same rules for the transmission part.

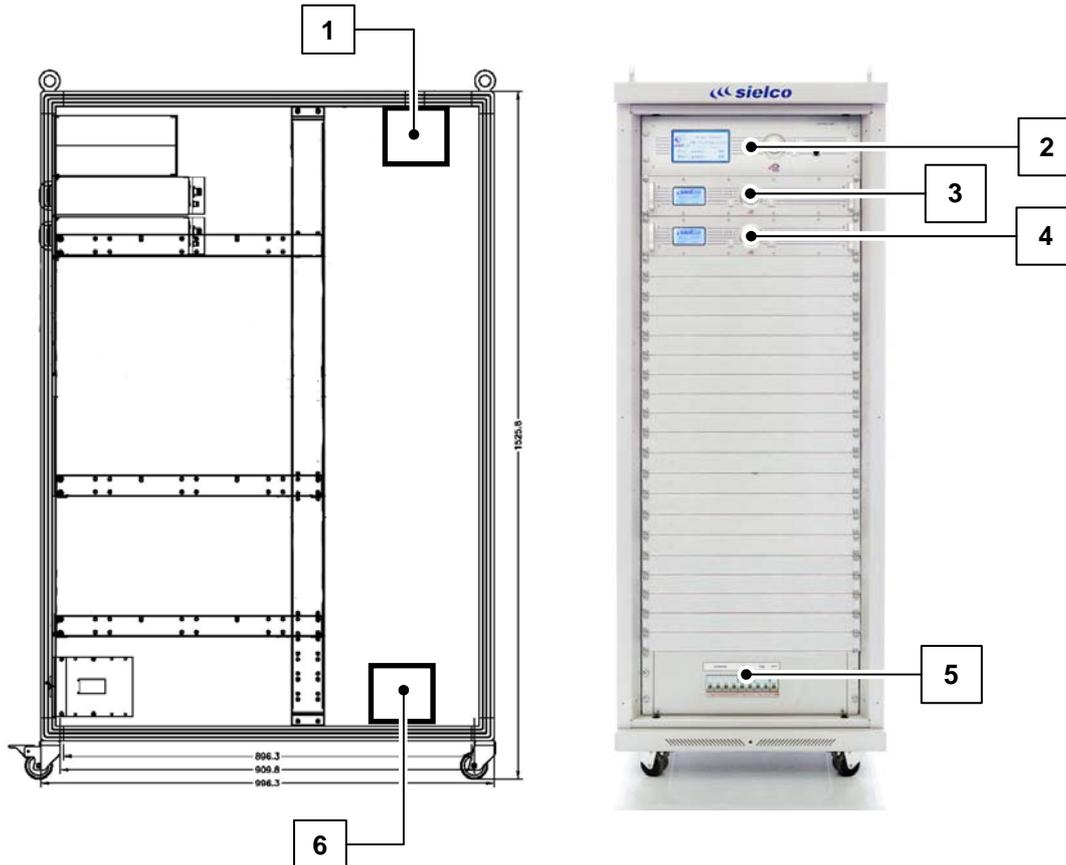
The COV23 control unit, hosted in a subrack individually shielded, adopts low power and low emissions components. It is also equipped with a power supply of reduced power, EC certified. Thanks to these characteristics, this unit doesn't significantly affect the overall EMC performance if compared with the amplifier units and their power supplies. The metal structure containing the entire switching system contributes to further shield the pre-certified individual components.

Depending on the components installed, the rack has room left for installing optional equipment, which can be mounted in place of the front blank panels. For example, additional equipment like radio links can be installed.

4.3 Front view and typical component layout of an 1+1 Switching System

The following image shows the positioning of the modules composing a typical 1+1 Switching System. At the end of the paragraph a numbered key list is given for easy identification of each module.

- ☰ The picture shows a one-rack system (depending of the RF power, one of the transmitter could be installed in a second rack).
- ☰ The picture is shown as an example of how modules are mounted in a typical 1+1 switching system.
- ☰ The free locations in the rack, protected by blank covers, can be used to install additional equipment, for example radio links.



- [1] **Coaxial relay** – managed by the **COV23 control unit**, selects the transmitter to be connected to the antenna.
- [2] **COV23 control unit** – provides full management of the entire system, setting the **transmitters** in active mode or standby mode and selecting which transmitter must be connected to the antenna. It also controls the communication with external systems and notifies active alarms. For further details please refer to Chapter 5.
- [3] **TXA transmitter** (usually the main transmitter) – modulates its RF signal with the Low Frequency signal coming from the **COV23 control unit**. The RF output is connected to the **coaxial relay** [1].
- [4] **TXB transmitter** (usually the reserve transmitter) – modulates its RF signal with the Low Frequency signal coming from the **COV23 control unit**. The RF output is connected to the **coaxial relay** [1].
- [5] **System power panel** – it includes various breakers: the main breaker, the breakers for each transmitter and a breaker for services.
- [6] **Dummy load (optional)** – though not indispensable to the correct operation of the 1+1 Switching System, the dummy load is useful to terminate the output of the transmitter currently not connected to the antenna (and therefore usually in the standby state), as well as to check its operation status. it is a good rule indeed to periodically verify that the reserve unit is in working order, ready for a possible switchover.

☞ **1 + 1 Switching Systems can be equipped with transmitters of different nominal power. The dummy load must then be suitably dimensioned for the use with the most powerful transmitter.**

4.4 Modules of the system

The main modules composing the system are:

- COV23 control unit
- Coaxial relay
- RF transmitters (TXA and TXB)
- System power panel
- Dummy load (optional)
- Connections with the outside

 For a description of the **COV23 control unit** please refer to Chapter 4.7.

4.4.a Coaxial relay

This module, mounted on the inner side of the cabinet top, routes the signal from the unit set by the system as the currently ‘on-air’ transmitter to the antenna. The COV23 control unit triggers the coaxial relay via a proprietary serial bus, checking the correct positioning of relay contacts before turning on the transmitter to be put into operation.

 *The transmitter connected to the antenna can be turned on only after the correct positioning of the contacts of the coaxial relay has been checked.*

The exact model of the coaxial relay used depends on the most powerful transmitter installed in the 1+1 Switching System:



Coaxial relay for 1+1 Switching Systems with power between 30 and 300 W
(the device is equipped with N-type connectors)



Coaxial relay for 1+1 Switching Systems with power between 500 and 2000 W
(the device is equipped with 7/16" flanges)



Coaxial relay for 1+1 Switching Systems with power between 2000 and 5000 W
(the device is equipped with 7/8" flanges)

 *1+1 Switching Systems with power exceeding 5 kW, for instance equipped with 10 or 15 kW transmitters, will be supplied with suitably sized coaxial relays.*

 *Special features (like, for instance, the type of the output connector to the antenna) will be agreed upon during the ordering process.*

4.4.b TXA and TXB Transmitters

The EXC-GT transmitters have been chosen to equip the 1+1 Switching Systems. Such choice is due to their characteristics of efficiency, reliability and low power consumption, as well as to their reduced size and weight. Fast and easy to install, the units will be operative in no time. Configuration is easy and intuitive thanks to the control interface, the LCD graphic and good resolution display, the practical multifunction knob and the reduced number of keys used to operate the transmitter. Their modern, attractive design reflects the philosophy of a reliable project aimed at reducing the frequency and cost of maintenance tasks.

Use of the EXC-GT transmitters in 1+1 Switching Systems

These systems can be equipped with transmitters with different power specification. A typical example is the choice, for some installations, of a lower power unit as the reserve transmitter.

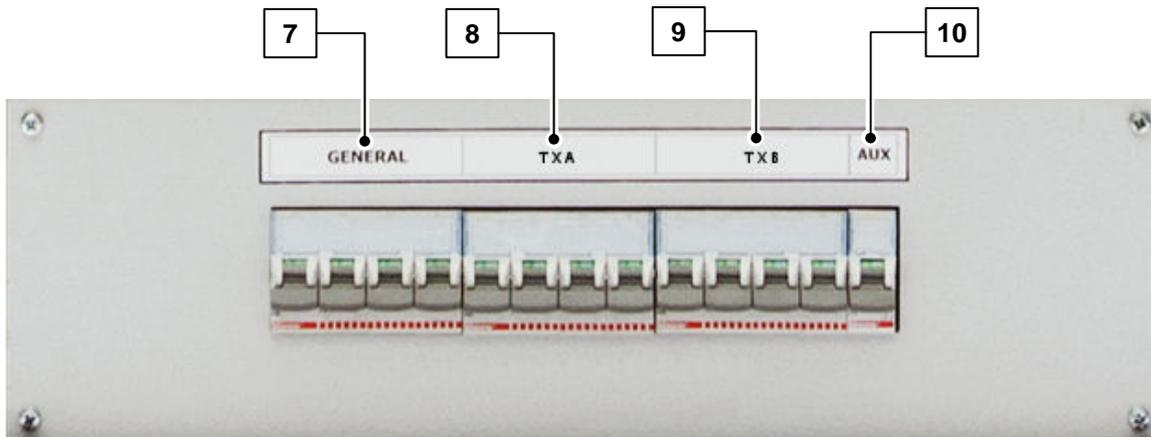
During the installation process, the output power and the operating frequency (the same for both units) has to be set for each transmitter. In addition, the user must select the alarms which, if active, will trigger the switchover to the other unit. These settings must be entered through the control panel of each transmitter (➤ 7.1).

For a detailed description of the EXC-GT transmitters and their configuration please refer to the relevant user and maintenance manuals.

📄 *During normal operation, the reserve unit is set to the standby state. However, to make sure the correct outcome of a switchover, it is a good rule to periodically check its operating condition by connecting it to the dummy load and turning it on by entering the proper commands (➤ 5.3.e on the **COV23 [2] control panel**. If a dummy load is present, its value must be suitably chosen for the use with the transmitter of highest power installed.*

4.4.c System power panel

This panel acts as a switch and distributor of the mains voltage to the various modules of the 1+1 Switching System. The panel consists of the following switches:



- [7] **GENERAL** – Main general breaker.
- [8] **TXA** – TXA Transmitter power switch.
- [9] **TXB** – TXB Transmitter power switch.
- [10] **AUX** – Services (for example the COV23 control unit) power switch.

4.4.d Dummy load (optional)

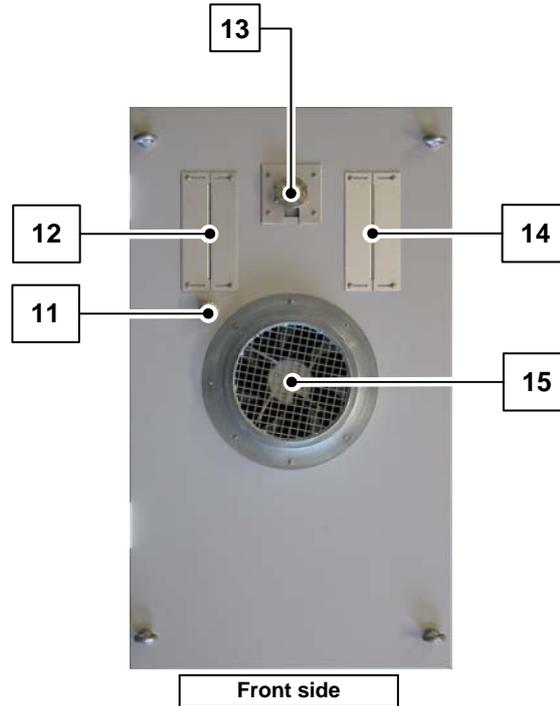
The dummy load, installed on the bottom of the cabinet, serves the purpose of correctly terminating the RF output of the reserve transmitter in case it is turned on in order to check its operating condition.

📄 *The unit currently not connected to the antenna is usually kept in standby state; however it is a good rule to periodically check its operating condition to ensure the continuity of the broadcasting service in case of a switchover.*

👉 **The value of the dummy load must be suitably chosen for the use with the transmitter of the highest power rating.**

4.4.e Connections with the outside

All the external connections pass through openings available in the top of the rack:



[11] Cable pass-through for the passage of the power cord.

[12] Opening for the passage of LF and data cables.

[13] RF connection to the antenna.

In the example picture a coaxial relay with 7/8" flange is shown. This type of relay is used in 1+1 Switching Systems with power between 2000 and 5000 W (see 4.4.a).

[14] Opening for the passage of LF and data cables.

[15] Hot air exhaust opening.

It is to be observed that:

- **Output connector to the antenna** – The type of connector used depends on the transmitters power rating:

Power of the most powerful transmitter	Type of connector
Less than 500 W	N
From 500 to 2000 W	7/16"
From 2 to 5 kW	7/8"
More than 5 kW	According to the transmitter power

Special features (like, for instance, the type of the output connector to the antenna) will be agreed upon during the ordering process.

1+1 Switching Systems with power exceeding 5 kW, for instance equipped with 10 or 15 kW transmitters, will be supplied with suitably sized coaxial relays.

- **Positioning of the antenna output connector** – on request, during the ordering process, the RF signal output can also be located at the rear of the cabinet.
- **Connection to the mains power supply** – in case the pass-through for the power cord must be placed in the floor of the cabinet, an additional cable gland is provided.

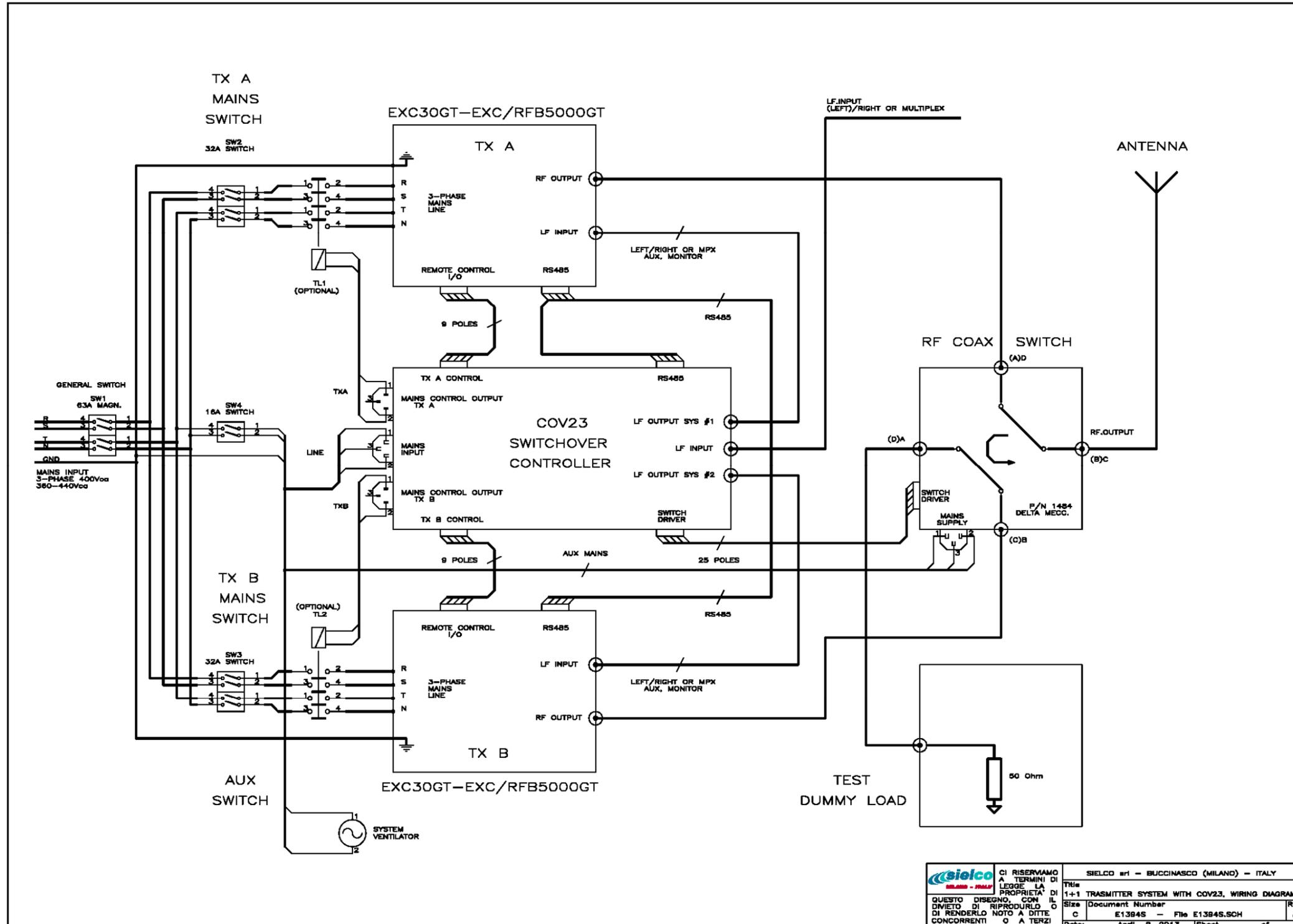
4.5 Block diagram of a typical 1+1 Switching System

Based on the same mechanical rack and on the same layout, 1+1 Switching Systems mainly differ because of the power rating of the transmitter modules.

The components of the system are usually housed in a 19" rack cabinet. In the case of high power equipment, one of the transmitters is installed in a second rack.

The following image shows the block diagram of the "standard" 1+1 Switching System, complete with coaxial relay (RF COAX SWITCH) and optional dummy load (TEST DUMMY LOAD).

For information about the wiring between the modules, please refer to paragraph 11.



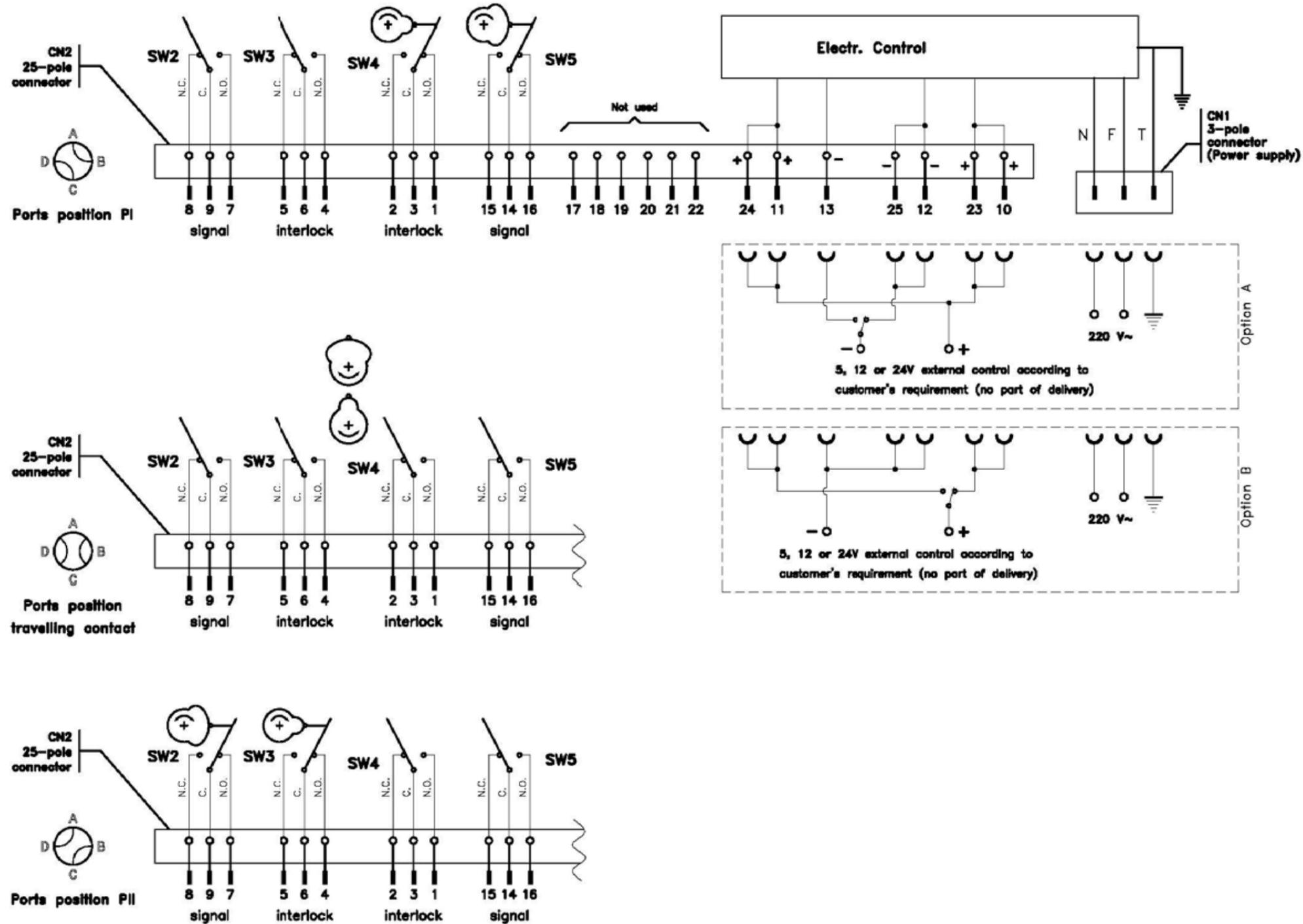
	CI RISERVIAMO A TERMINI DI LEGGE LA PROPRIETA' DI QUESTO DISEGNO, CON IL DIVIETO DI RIPRODURLO O DI RENDERSLO NOTO A DITTE CONCORRENTI O A TERZI	SIELCO srl - BUCCINASCO (MILANO) - ITALY
	TRUe	1+1 TRASMITTER SYSTEM WITH COV23. WIRING DIAGRAM
	Size	Document Number
	C	E1394S - File E1394S.SCH
Date:	April 8, 2013	Sheet of 1

4.6 Connection diagram for the coaxial relay

Connected by RF wiring to the power outputs of each transmitter (TXA and TXB), the **Coaxial Relay** [1] selects the RF output of the transmitter to be connected to the antenna.

The coaxial relay is operated by the **COV23** control unit through a bus consisting of a 25-pin flat cable connected to the **RF SWITCH** connector (see 5.1.f, [37]). The bus carries both the selector rotation commands and the information about the actual positioning of the relay contacts.

The selected transmitter is switched on only if the actual positioning of the contacts (this information is transmitted by the coaxial relay) is as expected by the control logic.



4.7 Switching sequence

The sequence consists of the following steps:

- 1) The COV23 control unit receives via the RS485 bus the notification that an alarm concerning the on-air transmitter is active.
- ☞ *The control unit does not start any switching procedure; the switching sequence is triggered by the on-air transmitter by notifying that an alarm condition is active.*
- 2) The ALARM LED indicator located on the unit's front panel [25] lights up.
- 3) The LF input signal is switched to the reserve transmitter (currently in standby).
- 4) The on-air transmitter (the one that triggered the alarm) is set in standby mode.
- 5) The control unit sends to the coaxial relay the command for switching to the reserve transmitter.
- 6) The correct positioning of the contacts on the coaxial relay is checked (the reserve unit is now connected to the antenna).
- 7) If the detected positioning of the relay contacts matches the expected one (☞ step 6) the reserve transmitter is turned on.

4.8 Switching mode

The user can select between two options (☞ **switch setup** menu, par.5.3.e):

☞ *In the following description, **TXA** is set as the main transmitter, **TXB** as the reserve transmitter.*

- **“Return” Mode** – following an alarm notification, **TXA** is replaced by **TXB**. Only in case of a subsequent alarm notification from **TXB** the system will connect **TXA** back to the antenna. The maximum number of switching between the two transmitters (**“Retry”**) can be set via menu.
- **“No return” Mode** - following an alarm notification, **TXA** is replaced by **TXB**. In case of an alarm notification from **TXB**, the system keeps **TXB** connected to the antenna. The **TXA** transmitter is put back in operation only through manual intervention by the user.

4.8.a “No return” Mode– putting the main transmitter back on the air

To bring the main transmitter (in this example: **TXA**) back on the air, the user has to:

- 1) Access the **switch setup** menu (☞ 5.3.e):



- 2) Select the **“Reset”** entry:



- 3) Press **ENTER**: this command reset the switch counter (**“Retry”**) and put the main transmitter back on air.

For detailed information about the use of the menus, please refer to paragraph 5.2.c.

5 COV23 CONTROL UNIT

5.1 General description

The control unit COV23 performs the following tasks:

- Switches the low frequency signals (coming from external sources) to the “on-air” transmitter
- Switches on/sets in standby the transmitters
- Controls the coaxial relay that selects the transmitter to be connected to the antenna
- Manages the data connections to external devices/control systems
- Manages the telemetry function

 The output power and frequency values for each transmitter are set directly through the control panel of the relevant unit.

5.1.a Connections with the system modules

- **Proprietary serial bus connected to each transmitter (ENABLE TXA [28] and ENABLE TXB [39] connectors).** Via this bus, the control unit can switch on/set in standby each transmitter.
- **RS485 bus connected to the transmitters (RS-485 INT [32] connector).** Via this bus the on-air transmitter notifies the control unit of possible alarm conditions and communicates the output power and frequency values.
- **Parallel bus (25-pin flat cable) connected to the coaxial relay (RF SWITCH [37] connector).** Via this bus the control unit controls the rotation of the coaxial commutator and checks, before turning on the transmitter, that the positioning of the contacts is as expected (on-air transmitter connected to the antenna).

 The on-air transmitter is turned on only if the contacts of the coaxial relay are actually positioned as expected.

5.1.b Activation of the switching procedure

Each transmitter is programmed with a list of alarms that, when activated, force the switching process to start. If the control unit receives notification from the currently on-air unit that one such alarm is active, COV23 starts the process that leads to the switching to the reserve transmitter.

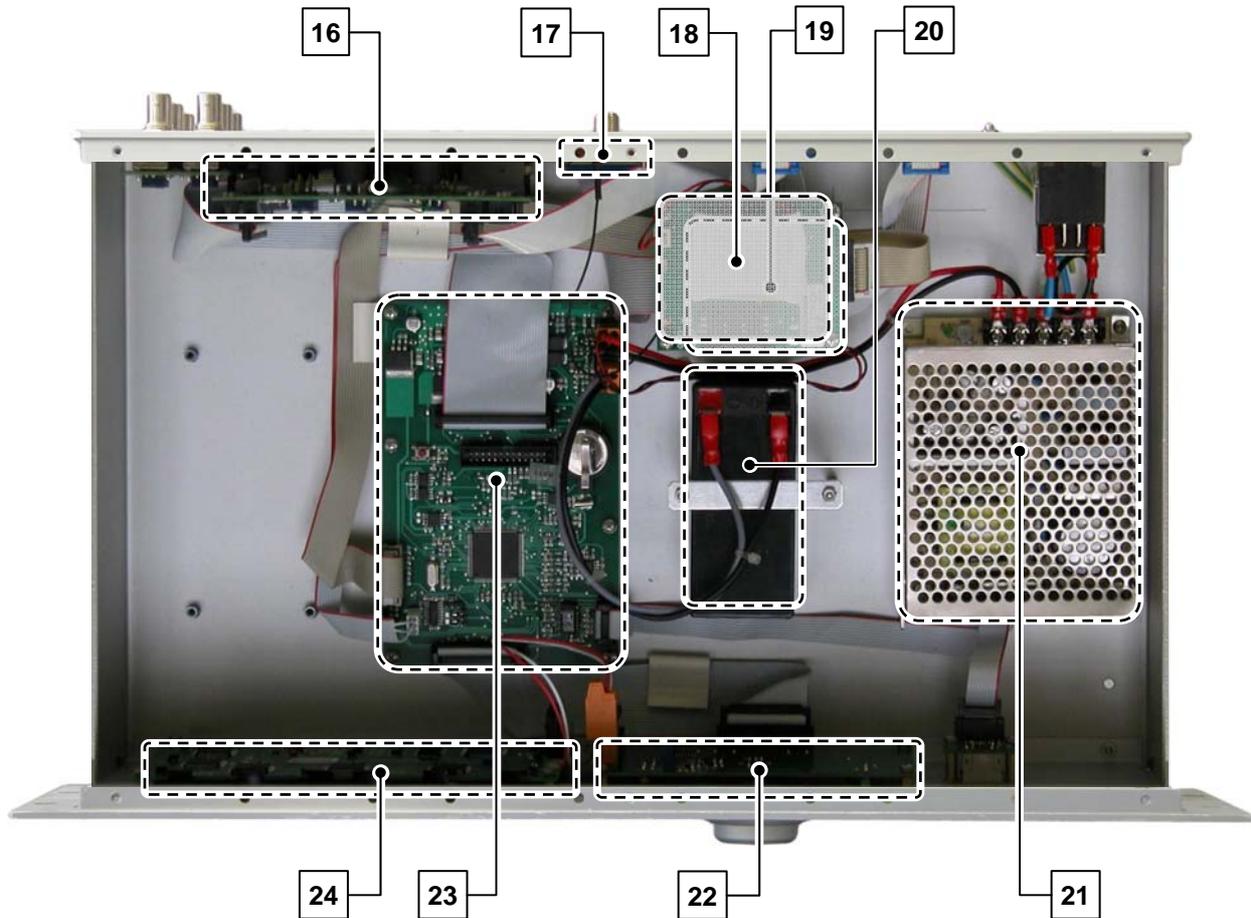
 The activation of the switching procedure is the direct consequence of the control unit receiving notification of an active alarm condition from the on-air transmitter.

5.1.c Resumption of operation after a mains power failure

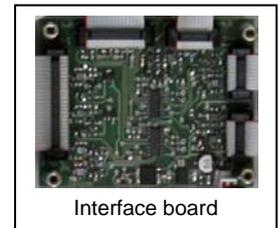
Thanks to the **12V lead buffer battery** [19], in case of a power failure the control logic is able to save the current system status in a EPROM memory before turning off the apparatus. When the mains power supply is restored, the control unit uses these data to restart the system, activating the transmitter that was on the air when the power shortage occurred.

5.1.d Main components

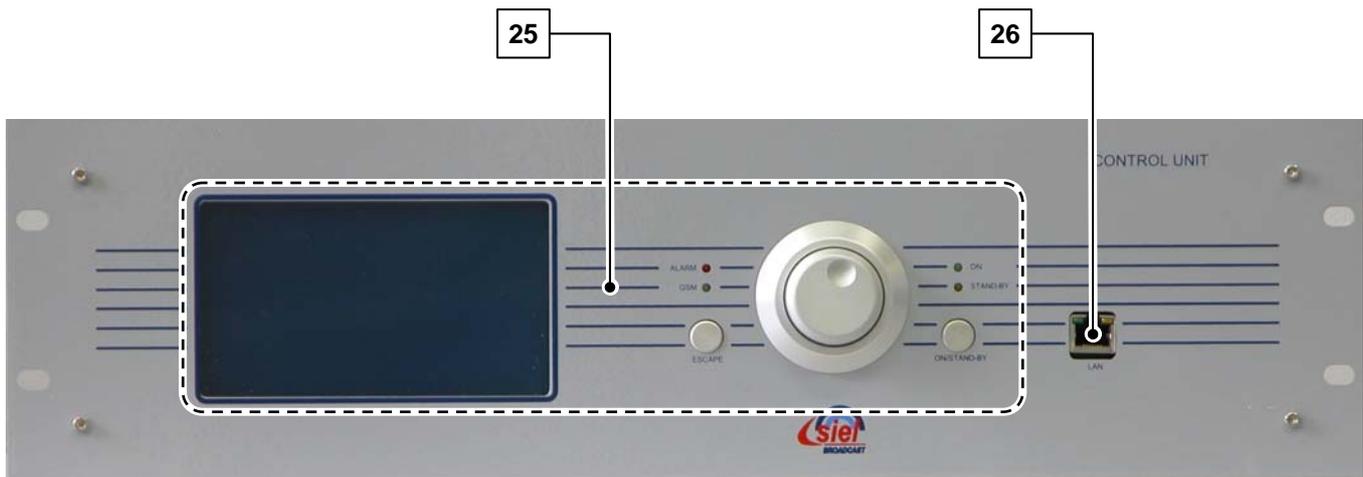
The following image shows the main components composing the COV23 control unit:



- [16] **Audio signals switching board** – under the control of the CPU, the board switches the LF input signals over to the currently on-air transmitter.
- [17] **RS485 interface board** – controls the communication via RS485 protocol between the CPU and the transmitters, and between the CPU and external management systems.
- [18] **Telemetry via GSM network board (optional)** – enables the telemetry service via the GSM network. This board is connected (through an FME male connector located on the rear panel of the control unit) to a magnetic antenna usually mounted on top of the rack.
- ☰ *LAN telemetry is not currently implemented.*
- [19] **SCOV23INSW interface board** – installed underneath the **telemetry via GSM network board** [18], allows turning on/putting in standby mode the transmitters via the proprietary serial bus, and manages the coaxial relay via a 25-pin flat cable.
- [20] **12 V lead-buffer battery** – in case of lack of power supply, the battery feeds the CPU board for the time necessary to send an alarm via a SMS message and to complete the latest processing activity.
- ☰ *When the mains power supply is restored, the system uses the information stored in the CPU Eprom to reconnect to the antenna the transmitter that was on the air when the power shortage occurred.*
- ☰ *The lead buffer battery is only mounted when the optional telemetry board [18] is also mounted.*
- [21] **Control Unit power supply.**
- [22] **Encoder, buttons and LEDs mounted on the front panel control board.**
- [23] **CPU board.**
- [24] **Display.**



5.1.e Front panel



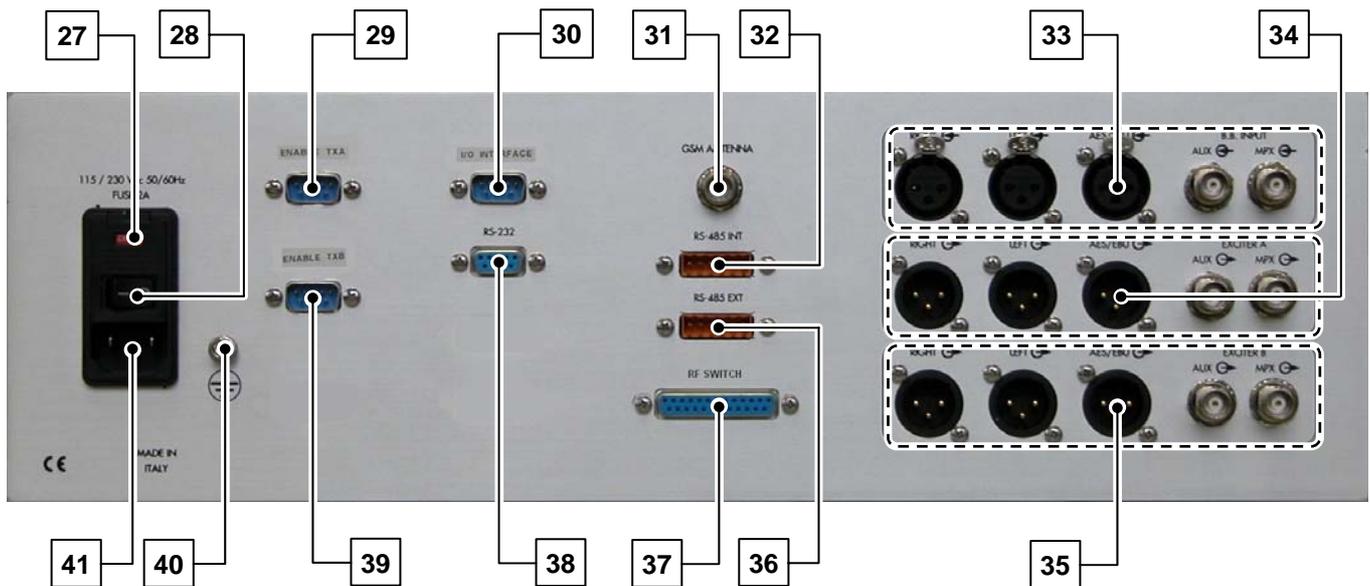
[25] **Control panel** – allows the user to control the functions and set the operating parameters of the system. Its main parts are:

- **LCD (Liquid Crystal Display)** – shows the operating parameters and the functions selected via the multifunction knob.
- **ALARM indicator light (red)** – this LED glows when a system alarm or an alarm related to the on-air transmitter is raised.
- **GSM indicator light (yellow)** – indication relative to the GSM module. LED off = the GSM module is switched off or disabled; LED glowing = GSM module malfunction (e.g.: SIM card missing); LED flashing = proper functioning (module mounted, telemetry function enabled, GSM cell connected).
- **ON indicator light (green)** – this LED glows when the transmitter is properly working.
- **STAND-BY indicator light (yellow)** – this LED glows when the on-air transmitter is in standby mode.
- **Multifunction knob (encoder)** – allows the user to navigate the command menu in various ways:
 - If turned – selects the various functions/options available in the menu.
 - If briefly pressed (like a button) when inside a menu – activates the currently selected option.
- **ESCAPE button** – while navigating through a menu, pressing this button will return the user to the previous menu level.
- **ON/STAND-BY button** – allow the user to switch on the transmitter (put it into operation) or to put it into standby mode.

For further information regarding the use of the commands in the navigation menus, please refer to Paragraph 5.2.

[26] **LAN** – connection to the Local Area Network. At the moment this function is not available.

5.1.f Rear panel

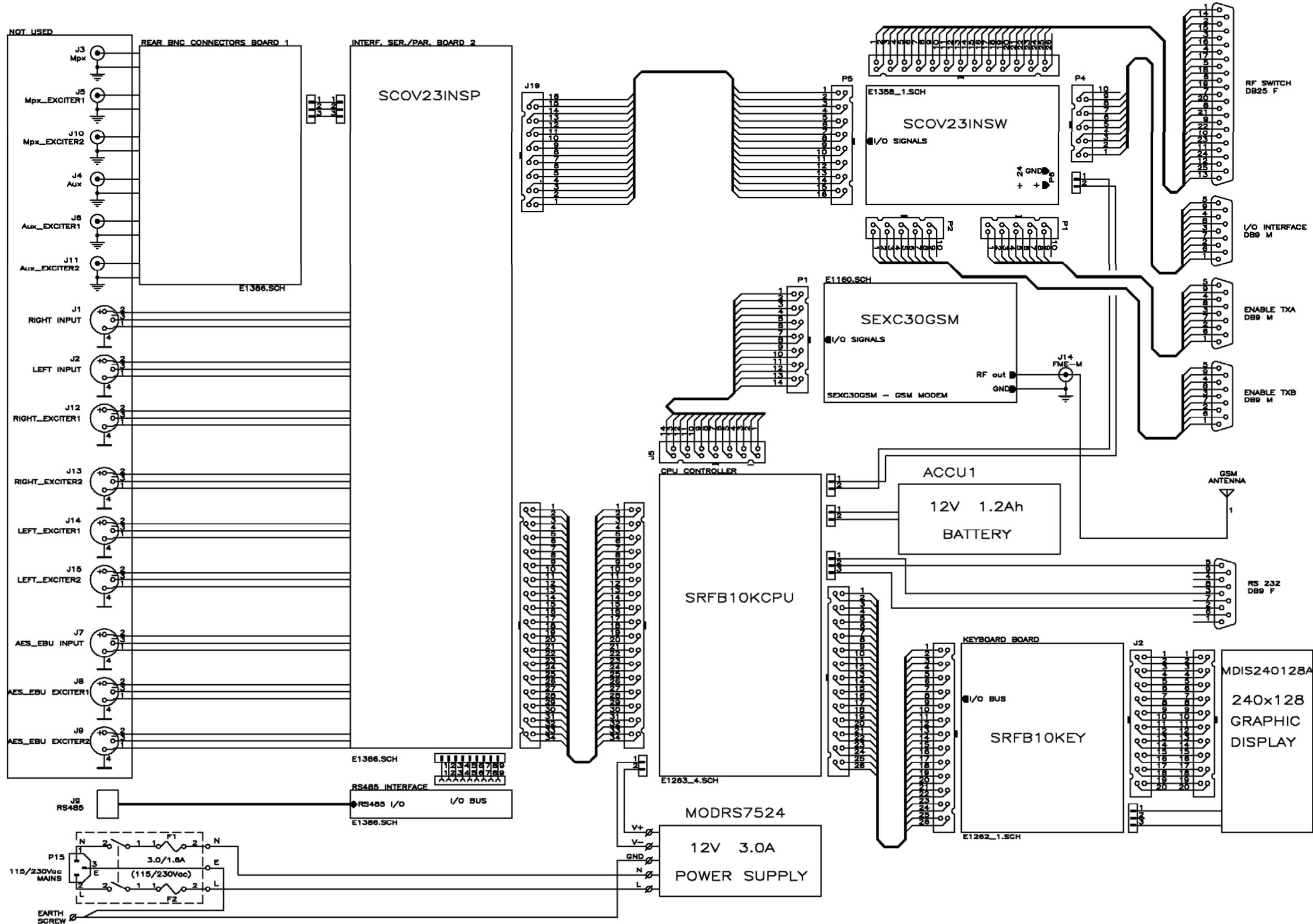


- [27] **Fuse holder** – fuse holder for the power supply socket (2 A fuse).
- [28] **Power switch** – allows to turn on/off the control unit.
- [29] **ENABLE TXA** – command to turn on/set in standby mode the TXA transmitter.
- [30] **I/O INTERFACE** – emergency command for enabling/disabling the transmitter modules (hardware Interlock command).
- [31] **GSM ANTENNA** – male FME connector (present only with the telemetry option installed) used to connect the control unit to the external GSM magnetic antenna (either the supplied one or another prepared by the user).
-  *If the optional telemetry is not installed, this connector is not present and is replaced by a black plastic plug.*
- [32] **RS-485 INT** – connector for the RS485 control bus connecting the COV23 with the TXA and TXB transmitters. Via this bus the on-air transmitter communicates to the control unit the alarm notifications and the output power/frequency values.
- [33] **B.B. INPUT** inputs for the LF signals coming from external sources. From left to right, the following inputs are available:
- **RIGHT** – Cannon connector, right channel input
 - **LEFT** – Cannon connector, left channel input
 - **AES/EBU** – Cannon connector, AES/EBU digital standard input
 - **AUX** – female BNC connector, auxiliary modulating channel (RDS/SCA) input
 - **MPX** – female BNC connector, broadband stereo composite modulating signal input
- [34] **EXCITER A** – LF signal output (from the commutation matrix) to be connected to the TXA transmitter (usually the main transmitter, located underneath the COV23). From left to right, the following outputs are available:
- **RIGHT** – Cannon connector, right channel output
 - **LEFT** – Cannon connector, left channel output
 - **AES/EBU** – Cannon connector, AES/EBU digital standard output
 - **AUX** – female BNC connector, auxiliary modulating channel (RDS/SCA) output
 - **MPX** – female BNC connector, broadband stereo composite modulating signal output
- [35] **EXCITER B** – LF signal output (from the commutation matrix) to be connected to the TXB transmitter (usually the reserve transmitter, located underneath the TXA unit). From left to right, the following outputs are available:
- **RIGHT** – Cannon connector, right channel output
 - **LEFT** – Cannon connector, left channel output
 - **AES/EBU** – Cannon connector, AES/EBU digital standard output
 - **AUX** – female BNC connector, auxiliary modulating channel (RDS/SCA) output
 - **MPX** – female BNC connector, broadband stereo composite modulating signal output
- [36] **RS-485 EXT** – connection via RS485 protocol of the COV23 control unit with external equipment. At the moment, this port cannot be used for controlling the system from outside.
-  **Pay great attention in making the LF connections with the connectors described at the points [33], [34], [35]: a reversal connection would result in the absence of LF signal at the transmitters LF signal inputs.**
- [37] **RF SWITCH** – connector for the communication bus between COV23 and the coaxial relay.
- [38] **RS-232** – connect this port to a PC for activities like software updates and pre-configuration of the system using the TXPCSAT software (used to manage the telemetry functions via PC).
- [39] **ENABLE TXB** – command to turn on/set in standby mode the TXB transmitter.

[40] **Earth connection** – it allows the connection of the unit to the ground for safe operation.

[41] **Power line plug** – IEC-type AC power input plug. Single phase, 195 to 264 V_{AC} – 50/60Hz.

5.1.g Wiring diagram for the boards composing the COV23 Control Unit



5.2 Menu and navigation commands

To inspect and set the system's operating parameters, you will need to navigate the commands menu shown on the LCD display of the control panel [25] of the **COV23** unit. You can navigate the menu by using:

- The **multifunction knob**.
- The **ESCAPE** button.

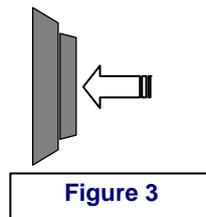
5.2.a Multifunction knob

The multifunction knob is used to select the various menus that allow you to view or set the system parameters and functions. It can be used in many ways:

- **When turned clockwise** (Figure 1), it shows the next menu (or the next option).
- **When turned anti-clockwise** (Figure 2), it shows the previous menu (or the previous option).



- **When pressed briefly like a button** (Figure 3), it allows to access the currently highlighted menu (or the currently highlighted option).



In this manual, particularly in chapter 5.3 (Description of the menus) the sentence “press ENTER...” means “press the knob”.

*You can also turn the knob clockwise and anti-clockwise to select the various data screens within a menu (for example to display in sequence the pages related to alarms within the *System Alarms* menu, [↗ 5.3.h](#)).*

5.2.b ESCAPE button

Wherever in the menu you are, pressing the **ESCAPE** button once allows you to return to the first menu (**System Status**, [↗ 5.3.d](#)). A second pressure of the **ESCAPE** button allows you to return to the **Default** screen ([↗ Errore. L'origine riferimento non è stata trovata.](#)).

5.2.c Examples of how to access and set the menu entries

This paragraph provides a few examples of how to access the menu entries and set their values. You will see how to:

- Access the menu fields.
- Set a field to a default value.
- Set a field to an alphanumeric value.

Accessing a menu field

- 1) The selection of the menu is made by rotating the knob. In the example below the **switch setup** menu is shown:



- To access/edit the menu fields, press **ENTER**: the cursor (a rectangle) will appear in the first field (the **mode** field in the example), on the left of the colon sign:



- To select the desired field, (for example the **Type** field) rotate the knob:



- To edit the selected field press **ENTER**: the cursor will move to the right of the colon sign, indicating that the user can now modify the field value:



Setting a menu field to a default value

The example below shows how to modify the setting of the **Type** field of the **Switch Setup** menu (p. 5.3.e), replacing the **Return** mode with the **No return** mode.

- First of all, navigate to the **switch setup** menu:



- Press **ENTER** to access the menu: the cursor (a rectangle) will appear in the first field (the **mode** field in the example), on the left of the colon sign.



- Rotate the knob to move the cursor and select the field you want to edit (the field **Type** in the example): the cursor will be shown on the right of the field:



4) Press **ENTER** to access the 'edit' mode: the cursor will move to the right of the colon sign:



5) Rotate the knob to select the new setting (**No return** in the example):



6) Press **ENTER** to confirm the new setting. The modified value will be stored:



7) To modify another field, press **ENTER**: the cursor will be shown on the right of the next field:



8) Follow the procedure described in the previous steps to edit the other fields.

 To quit the settings procedure, press **ESCAPE**.

Setting a menu field to an alphanumeric value

The example below shows how to modify the current time setting for the system clock (Clock field in the Switch Setup menu, 5.3.e), by changing 12:07 to 14:13.



- 1) Press **ENTER** to access the menu: the cursor (a flashing rectangle) will appear in the first field (the **Mode** field in the example), on the left of the colon sign:



- 2) Rotate the knob to move the cursor to the left of the colon sign in the **CLock** field:



- 3) Press **ENTER** once to move the cursor to the "hours" field ("12" in the figure below):



- 4) Rotate the knob to set the "hours" value:



- 5) Press **ENTER** to move the cursor to the "minutes" field ("07" in the figure below):



- 6) Rotate the knob to set the “minutes” value.
- 7) Press **ENTER** to move the cursor to the next field (“day”)
- 8) Rotate the knob to store the new setting, then confirm by pressing **ENTER**.
- 9) Proceed as explained in step 8) to edit the “month” and “year” settings. After setting the year value, press **ENTER** to store the new system clock setting and return to the **Switch Setup** menu:



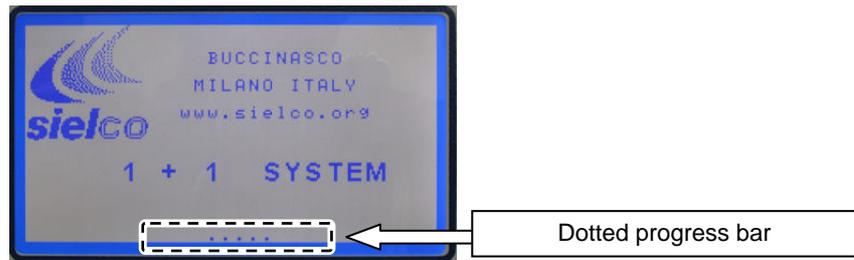
5.3 Description of the menus

The following menu descriptions refer to software version 1.0.2.

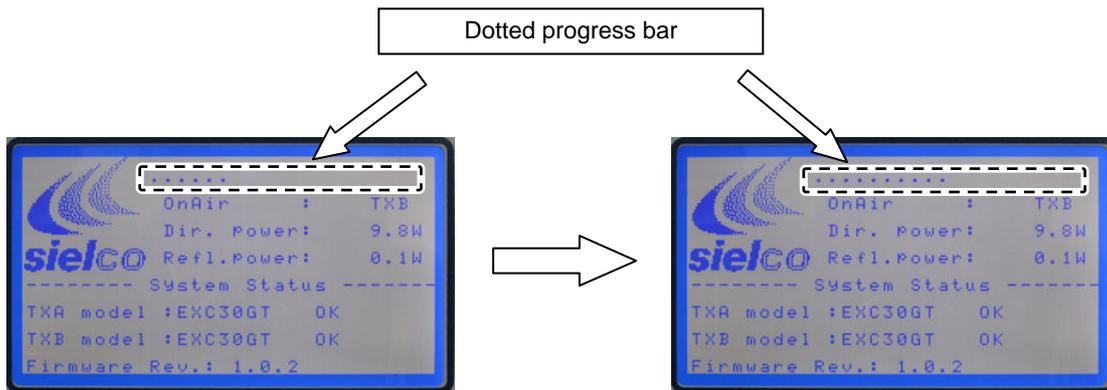
To reduce the power consumption of the system and the wear of the display, the brightness of the screen is reduced after a few minutes of inactivity (no command entered through the knob or the ESCAPE button).

5.3.a Turning on the system

- When the equipment is turned on, the control unit performs an initialization routine and some control activities on the entire 1+1 Switching System, such as checking the "ON" status of each transmitter and testing the proper operation of the RS485 system bus. During the first "start-up" phase, corresponding to the loading of the firmware, the display shows for a few seconds the following screen, which includes a dotted bar at the bottom indicating the progress of the process:



- When the loading of the firmware is completed, the system verifies the status of the transmitting modules. This phase corresponds to a new screen, shown here below, which shows in its upper part a bar indicating the progress of the verification process:



- Once the verifications are completed, the display will show the **system status** menu (see 5.3.d):



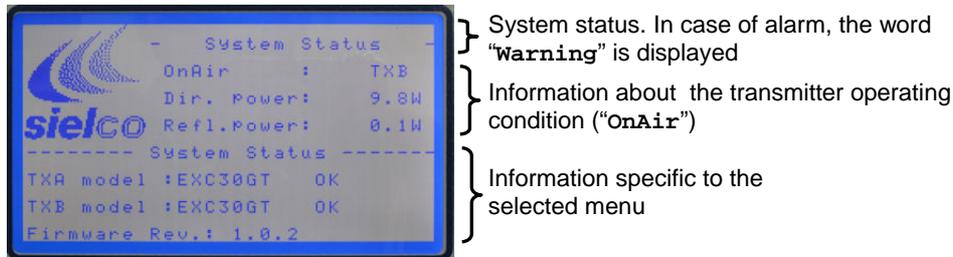
- After about a minute has expired without the knob or the **ESCAPE** button being used to enter any commands, the display will change to the **Default screen** (see **Errore. L'origine riferimento non è stata trovata.**):



5.3.b Features common to all menus

Conventionally, the transmitter mounted higher in the rack (usually just underneath the COV23 control unit) is referred to as “TXA” in the menus, “TXB” being the transmitter mounted underneath “TXA”.

Apart from the **Default screen** (☞ **Errore. L'origine riferimento non è stata trovata.**), most of the menu screens show in their upper half section the main information about the operation of the on-air transmitter, while in the bottom half section the information specific to the selected menu is listed (with the exception, for example, of the menus describing each stored alarm/event ☞ 5.3.h). Here below is an example of a menu page:



To select a menu when in the **Default screen**, press the knob. To move to the next menu turn clockwise the knob (two clicks).

The order in which the menus are described in the following paragraphs follows the sequence in which they can be selected rotating the knob.

☞ *The menus providing the ability to enter/edit settings show in the last row the text “Press ENTER to Setup”, prompting the user to press ENTER to enter a new setting:*



☞ **In some menus the cursor (a small gray rectangle) flashes to indicate that the system is waiting for data. In these cases, to quit the menu without entering data, press the ESCAPE key.**

ENTER command

To confirm the selection of an option or a setting, press the knob. Conventionally, in this manual this command is called “ENTER”. Therefore, when in the following descriptions you find the sentence “press ENTER” the intended meaning is “press the knob”.

5.3.c Default screen

After about three minute of inactivity of the navigation commands (**knob**, **ENTER** command or **ESCAPE** button), the display reverts to the Default screen:



Information shown on the screen:

- Sielco Logo
- Name of the system (1 + 1 SYSTEM in the example)
- “OnAir” (active) transmitter; the TXB transmitter in the example
- Information about active alarms (if any). (“System Status” row)

- Direct power level (“Dir power”) of the on-air transmitter, **9W** in the example
- Reflected power level (“Ref1. power”) of the on-air transmitter, **0W** in the example

☰ After a few minutes of inactivity, to reduce the power consumption of the system and the wear of the display, the background brightness of the display is reduced.

5.3.d System Status menu

By pressing **ENTER** in the **Default screen**, the **system status** menu is displayed, which shows the transmitter models used in the TXA and TXB positions, the status of the communication bus between the two units and the version of the firmware installed:



- **TXA model** : **EXC30GT** (transmitter’s model) **OK** (RS485 bus properly operating).
- **TXB model** : **EXC30GT** (transmitter’s model) **OK** (RS485 bus properly operating).
- **Firmware Rev.** : **1.0.2** (firmware version).

☰ The information provided by this menu are automatically updated.

☞ To avoid communication problems with the RS485 bus, pay attention to the configuration of the system, for example during the allocation of the ports and the relevant RS485 bus Baud rate (⌘ 7.1).

☞ An RS485 bus failure does not affect the normal operation of the apparatus. It must be remembered, however, that from that moment on any information related to possible alarm conditions raised by the on-air transmitter might not be received by the COV23 control unit. As a result, the switchover to the reserve transmitter would not be performed. **NOTE: If the control unit is equipped with the telemetry option, if a fault of the RS485 bus occurs, an alarm signal is sent via SMS.**

5.3.e Switch Setup menu

The **switch Setup** menu allows setting the switchover criteria. It can be displayed from the **system status** screen by rotating the knob clockwise (two clicks):



The information about the menu are listed in the lower half section of the screen.

- **Mode** : – sets the switching priority. Four options are available to the user, in this order:
 - **TxA -> TxB** – TXA as the main transmitter, TXB as the reserve unit.
 - **TxB -> TxA** – TXB as the main transmitter, TXA as the reserve unit.
 - **TxA** – regardless of the presence of any alarm conditions, the systems will keep the TXA transmitter constantly on-air.
 - **TxB** – regardless of the presence of any alarm conditions, the systems will keep the TXB transmitter constantly on-air.
- **Type** : – sets the mode for later switchover events:
 - **Return** – the notification of an alarm condition by the on-air transmitter triggers a switchover; therefore, more than one switching process can take place. When the maximum number of switching events is reached (this value can be entered at the **Retry** field) the system will keep the lastly selected unit as the on-air transmitter.
 - **No return** – after the first switchover (from the main transmitter to the reserve unit) no further switching procedure is allowed. The reserve transmitter will be kept in operation irrespective of any possible alarm condition).
- **Retry** : – besides displaying the total number of switching carried out since the last **Reset** command, this field allows setting the maximum number of switchovers that can be performed while in **Return** mode. The information is provided in the <n/m> format, where “n” = number of switchovers carried out, “m” = maximum number of switchovers that can be performed before the switching procedure is no longer

The information are displayed in the lower half section of the screen:

- **Output Power** :– output power level of the transmitter.
- **Vswr** :– reflected power level of the transmitter.
- **RF temp** :– temperature of the transmitter's power circuits.
- **Frequency** :– set value of the RF working frequency
- **Alarm** :– information about the currently active alarms (in the example shown: **none** – there are no active alarms).

 The information in this menu are sent by the transmitter via the RS485 bus (**RS-485 INT** connector [32] on the control unit).

5.3.h System Alarms menu

This menu lists up to 60 alarms or events related to the system. If the maximum number (60) is exceeded, the system removes the oldest alarm/event to make room for the new one.

To access this menu, rotate the knob clockwise (two clicks) when in the **TxB Status** screen:



- **11 Alarms** – number of stored alarms/events (in the example shown there are 11 alarms/events stored).

To access the information related to each specific event press **ENTER**. The menu displays the information, starting from the most recent event:

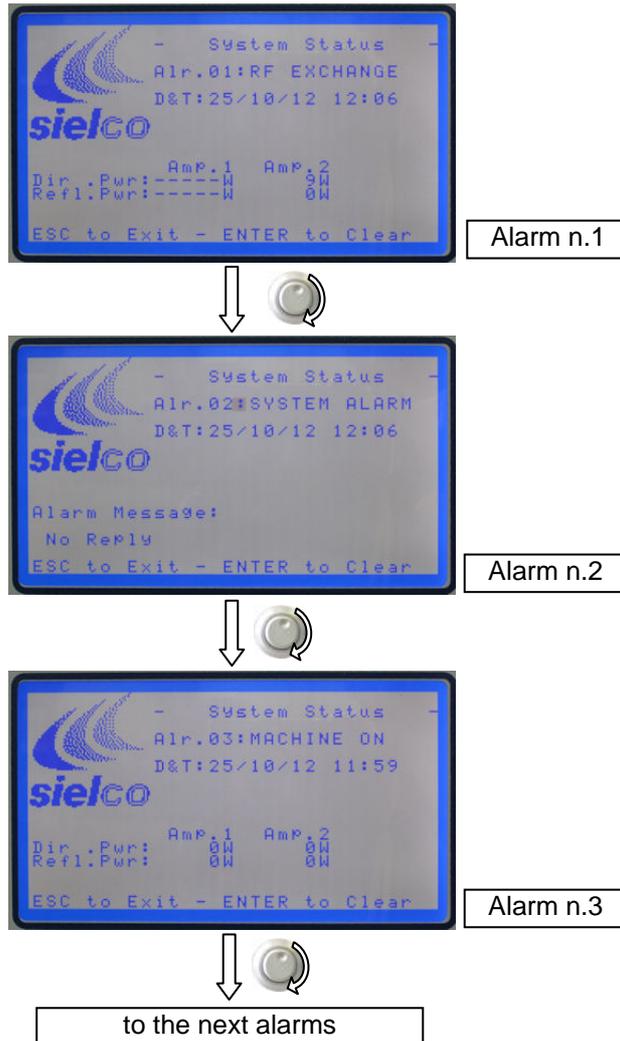


The following information are provided:

- **Alr. <alarm number>: <alarm type>** – in the example shown, alarm **01** is displayed, of the **RF EXCHANGE** type.
- **D&T** – date and time of the alarm. In the shown example the alarm condition started on **25/10/2012 at 12:06**.
- Values of direct power and reflected power of each transmitter at the time the alarm condition occurred:

	Amp. 1	Amp. 2
	(TXA transmitter)	(TXB transmitter)
Dir. Pwr :	-----W	9W
(Direct power)		
Refl. Pwr :	-----W	0W
(Reflected power)		

To view the pages related to each alarm, rotate the knob:



To clear the stored alarms/events list, press **ENTER** when in a page showing the details of an alarm/event. The following screen is displayed:



- To quit the menu leaving the data unchanged, press **ESCAPE**.
- To delete the list of stored data, press **ENTER**.

5.3.i GSM Status menu

This menu provides information about the status of the GSM connection. It also allows setting the GSM connection parameters.

To access this menu, rotate the knob clockwise (two clicks) when in the **System Alarms** screen:



The following information are provided:

- **Status** : – status of the connection via GSM (in the example shown: **Enabled - I TIM** – enabled, with TIM as service provider).
- **RX level** : – GSM received signal level (in the example shown **-59 dbm**).

 **It is recommended to disable the PIN of the SIM card before using the card with the system.**

To access the GSM connection settings, press **ENTER**. The display will show the following submenu:



The following fields are displayed:

- **Status** : – status of the GSM connection (in this example: **Enabled - I TIM** – enabled, with TIM as service provider).
- **Network** : – selection of the GSM network (in this example: **Auto** – automatic selection).
- **Name** : – name of the position. This data is added to the SMS text and provides the receiver with the reference of the 1+1 Switching System that has sent the message (in the example shown, the name of the position is “**Test - 1**”).
- **Code** : – identifier of a specific system, useful when in the same position there are more systems or equipments.
- **IMEI** : – identifier of the SIM card.

 *If the optional telemetry function is not installed, the **Status** field is automatically set to **Disabled**.*

If the system doesn't detect the presence of the telemetry function, the display shows the following screen to inform the user that the option is **Not Installed**:



It is however possible to search for the presence of the GSM module by pressing **ENTER**. During the searching process, the display shows the following screen:



When the search is completed, if no GSM module has been found the display reverts to the previous screen:



5.3.j Sms settings menu

This menu, available even if the optional telemetry service is not installed, enables the user to set the parameters for the SMS function.

To access this menu, rotate the knob clockwise (two clicks) when in the **GSM Status** screen:



The following information are provided:

- **SMS Status** : – status of the SMS function (in the example shown: **Enabled**).
- **SMS Delay** : – delay in sending SMS's.
- **Max SMS/Day** : – daily maximum number of allowed SMS's.
- **Max SMS/Hour** : – hourly maximum number of allowed SMS's.

5.3.k SMS numbers menu

This menu allows entering up to five telephone numbers to which the alarm/event notifications will be sent via SMS.

Each number is associated with specific events/alarms. Each time one of these events/alarm becomes active, the system sends to the telephone number an SMS reporting the identifier of the event/alarm.

 *If two telephone numbers are associated with the same alarm/event, the system sends a notification to both numbers if that alarm/event becomes active.*

 **A telephone number NOT associated with events/alarms, will NEVER be used by the system.**

 **Each phone number can be associated with up to 8 events/alarms.**

To access this menu, rotate the knob clockwise (two clicks) when in the **GSMS Numbers** screen:



The following information are provided:

- **SMS numbers** – name of the menu.
- **Num. 1** – first telephone number.
- **Num. 2** – second telephone number.
- **Num. 3** – third telephone number.
- **Num. 4** – fourth telephone number.
- **Num. 5** – fifth telephone number.

To view/edit a phone number and its associated alarms:

- 1) Press **ENTER**, then rotate the knob to move the cursor near the desired number (in the example the second number, **Num. 2**, was chosen):



- 2) Press **ENTER** to confirm the selection: the display shows the screen related to the selected phone number:



- 3) Enter the phone number: rotate the knob to set the first digit, then confirm by pressing **ENTER** (the cursor will move one digit to the right). Continue until the entire number is entered.
- 4) After setting the last digit of the telephone number, press **ENTER** twice to move the cursor to the second field ("**Alarm:**"), then turn the knob to select the alarms associated with the current telephone number. Confirm the selected event/alarm by pressing **ENTER**. A dash is added to the field. Rotate the knob again to select another event/alarm and press **ENTER** to confirm the new selection. Continue until you have entered all the events/alarms that you want to be associated with the currently selected phone number:



- 5) To confirm your settings and exit the phone number page, press **ESCAPE**.

 The sequence of alarms/events displayed in the **Alarm** field is fixed. The alarms/events not associated with the number are replaced by a series of four dots ("- . . . -"). In the example above, the third alarm ("**MPX**"), next to the alarm "**AC**", is not associated with the number, so it is replaced by "- . . . -".

Selectable alarms:

- **LPWR**: low RF output power level.
- **AC**: no mains power.
- **MPX**: no MPX input signal (PAY ATTENTION when selecting this alarm in case of use with radio links or communication satellites).
- **UNBL**: unbalanced power (of the system) alarm.
- **VSWR**: Voltage Standing Wave Ratio alarm.
- **T.SYS**: system temperature alarm. The value shown refers to the system component with the highest temperature (measured on the CPU board).
- **UNLOCK**: transmitter's PLL unlocked alarm.

5.3.1 Password menu

This menu allows enabling/disabling the access to certain functionalities of the system.

To access this menu, rotate the knob clockwise (two clicks) when in the **SMS numbers** screen:



The following information are provided:

- **Password** – name of the menu.
- **Level 1** : – Level 1 password: any access to the system menu is blocked, both in viewing and editing mode. The only screen displayed is the start-up screen, showing the system model. No other information, such as the level or frequency of the output signal, is given. Password access can be enabled or disabled (in this example the **Level 1** is "Off", meaning that there is no need to enter a password to access the system information).
- **Level 2** : – Level 2 password: no change to the system programmable parameters is allowed. Complete access to system parameters is allowed in view-only mode. Password access can be enabled or disabled (in this example **Level 2** is "Off", meaning that there is no need to enter a password to access and/or change the parameters of the system).

Though not shown, the level 3 password remains always active. This password will unlock, if entered, all types of access (for example, it allows the user to enter new level 1 and/or level 2 passwords in case they were forgotten).

Setting/enabling a password

- 1) Press **ENTER**: the cursor will be displayed next to **Level 1**:



- 2) To select the password to be set/changed turn the knob. Press **ENTER** to confirm:



- 3) To enable/disable the selected password, turn the knob (**On**: password enabled, **Off** password disabled). Confirm with **ENTER**.
- 4) If **On** has been selected, the display will show the menu for setting the password:



- 5) Now the cursor is highlighting the first character to be set. Turn the knob to enter the first character, then press **ENTER** to confirm the character just set and select the next one. Once the fifth character has been set, press **ENTER** to return to the **Default menu**:

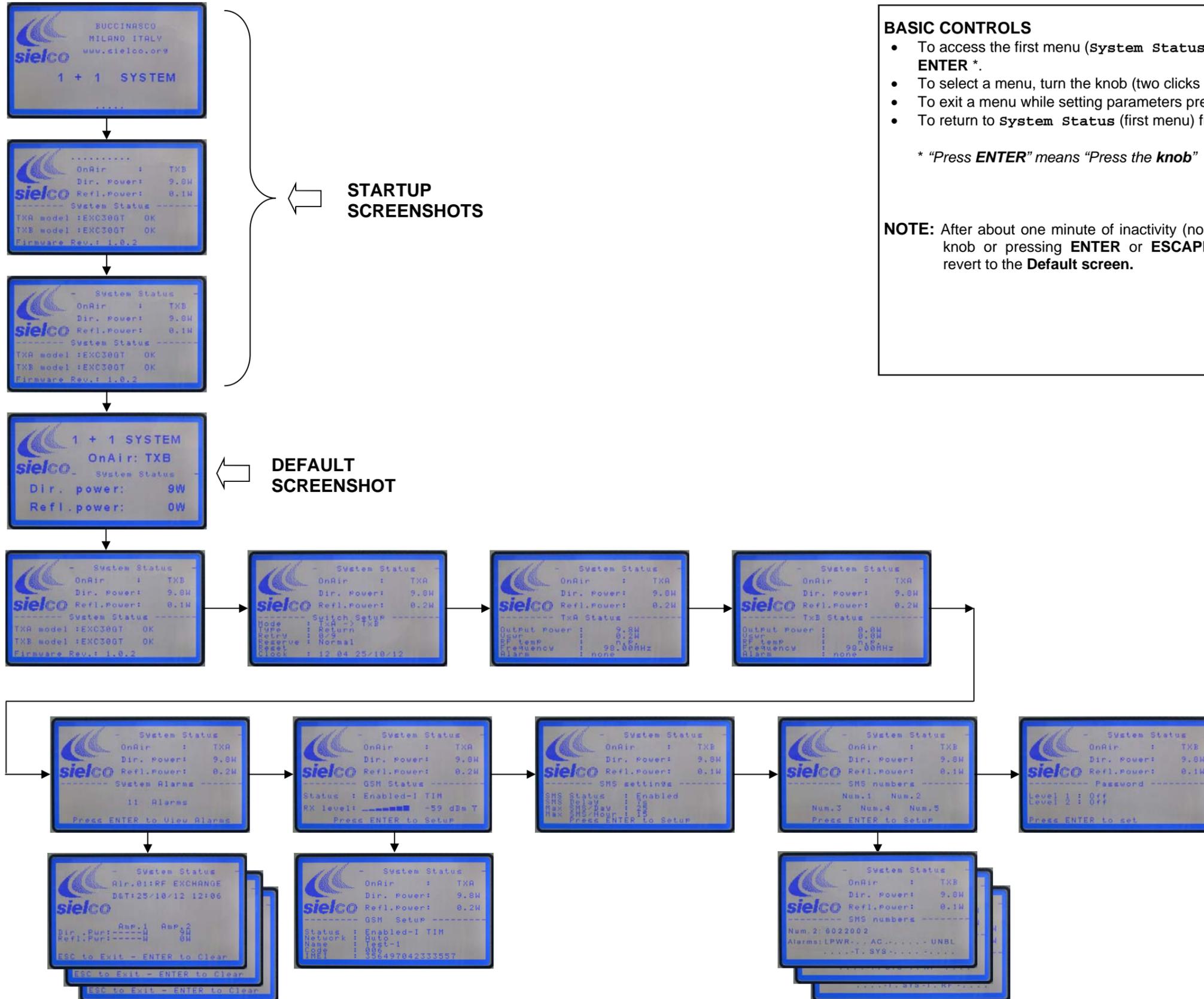


With the **Password** function enabled, the system requires the user to type the password in order to access the menus after pressing **ENTER**:



-  If enabled, the Level 2 password (accessing and editing the system parameters) will be required when trying to change a parameter.

5.4 Menu diagram



BASIC CONTROLS

- To access the first menu (**system status**) from the **Default screen**, press **ENTER** *.
- To select a menu, turn the knob (two clicks to access the next menu)
- To exit a menu while setting parameters press (usually) **ESCAPE**
- To return to **system status** (first menu) from any menu, press **ESCAPE**

* "Press **ENTER**" means "Press the **knob**"

NOTE: After about one minute of inactivity (no command entered by turning the knob or pressing **ENTER** or **ESCAPE**), the display will automatically revert to the **Default screen**.

5.5 Remote control – Summary of the commands sent via SMS

By sending SMS commands the user can receive information about the status of the system, perform a reset, force the selection of the on-air transmitter and much more. The following table summarizes the SMS commands:

Command name	Returned information	Example
INFO1	<ul style="list-style-type: none"> ▪ Mains power status ▪ On-air transmitter ▪ RF frequency ▪ Direct power ▪ Reflected power ▪ TXA alarms ▪ TXB alarms 	INFO1 Test-1 1+1System Mains ok OnAir:TXA primary F:98.00MHz Pf: 9W Pr: 0W TXA alr:none TXB alr:none (1-006-00000)
INFO2	<ul style="list-style-type: none"> ▪ Direct power ▪ Reflected power 	INFO2 Test-1 1+1SYSTEM Rffwr 9W RFrefl. 0W (2-006-00009-0000-00000)
INFO6	<ul style="list-style-type: none"> ▪ Switchover priority (mode) ▪ Management of later switchings (Type) ▪ Value of the Retry field ▪ Setting of the Reserve field ▪ On-air transmitter ▪ RF frequency ▪ Direct power ▪ Reflected power 	INFO6 Test-1 1+1System Status: Mode:TxA->TxB Type:Return Retry: 0/7 Reserve:Normal OnAir:TXA primary F:98.00MHz Pf: 9W Pr: 0W (1-006-00000)
RESET	<ul style="list-style-type: none"> ▪ Result of the reset command ▪ Switching priority (mode) ▪ Management of later switchings (Type) ▪ Value of the Retry field ▪ Setting of the Reserve field ▪ Direct power ▪ Reflected power 	RESET Test-1 1+1SYSTEM Ok RESET Mode:TxB->TxA Type:Return Retry: 0/7 Reserve:Normal Pf: 9W Pr: 0W (2-006-00009-0000-00000)
EXCHANGE	<ul style="list-style-type: none"> ▪ Result of the EXCHANGE command ▪ Switching priority (mode) ▪ Management of later switchings (Type) ▪ Value of the Retry field ▪ Setting of the Reserve field ▪ Direct power ▪ Reflected power 	EXCHANGE Test-1 1+1SYSTEM Ok EXCHANGE Mode:TxB->TxA Type:Return Retry: 0/7 Reserve:Normal Pf: 9W Pr: 0W (2-006-00009-0000-00000)

5.6 System alarms

The following table summarizes the system alarms:

Alarm name	Active alarm:
AC MAINS ALARM	Problem with the system mains voltage
TRANSMITTER 1 ALARM	Alarm related to Transmitter 1
TRANSMITTER 2 ALARM	Alarm related to Transmitter 2
EXCHANGE ALARM	A switchover has been performed by the system
RF SWITCH FAIL	Switching problems with the coaxial relay
RESTART FAIL	The system did not restart following a restart command
INTERNAL RS-485	Communications problems on the RS485 system bus
WARNING RESERVE TEST	Warning: the reserve transmitter operational status is being verified, so no switchover can take place. For further information, please refer to the Reserve field of the switch setup menu (paragraph 5.3.e)

6 INSTALLATION



Warning! To ensure safe performance, it is absolutely essential to comply with all the instructions outlined in this chapter.

6.1 Checking the supplied parts

Make sure that the following parts are included in the package:

- 1+1 System complete with all modules installed and all internal wirings.
- This user manual.

In case of missing or damaged parts, immediately contact your dealer.

6.2 General safety rules



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

- Although in most cases no special instruments are required, the system should be installed only by skilled personnel. To make the best use of the system and prevent any damage to it, 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 Srl or a local agent/dealer.
- Sielco Srl will be happy to provide qualified technical assistance. Technical intervention by personnel not authorized by Sielco Srl should not be performed.
- The user should not access the inside of the modules. Tampering with the factory settings renders the warranty null and void, and may also affect the 1+1 System's performance, causing costly damage.
- The rack must be properly grounded and all modules must have all their 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 modules without first disconnecting the 1+1 System from the mains. Opening the rear panel of the rack exposes the user to dangerous AC, DC and radiofrequency voltages.
- Do not operate the system unless the covers of all modules are properly screwed into place: it may be dangerous to objects or people. Owing to the strong RF fields generated, you may also experience a malfunction of the system or electronic measurement instruments you are using.

6.3 Choosing the proper room and placement

For systems with high nominal power, the floor where the system rack (or possibly the racks) will be installed must be able to support a weight of at least **1000 kg/m²**.

The room must be clean and free from excessive dust.

Around the installation site there must be sufficient space to ensure the proper cooling of the system and facilitate the maintenance activities (minimum space required: 4 x 4 x 4 meters). The floor must be flat and regular, so as not to adversely affect the physical stability of the rack.

Suggested environmental operating temperature range: from 0 to 35 °C; maximum temperature range: from – 5 to + 45 °C. Relative humidity: up to 95%, not condensing.

6.3.a Electrical conditions

- The mains power supply has to meet the system's power consumption requirements (including a sufficient safety margin).
- The power supply nominal value must be 400 V_{AC} three-phase with 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 protecting device, an insulating transformer and, if possible, an electromechanical mains voltage regulator.

6.4 Wiring the 1+1 Switching System

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

-  In case the system is equipped with a dummy load, please make sure that its value suits the requirements of the transmitter with the highest nominal power.
-  In case the transmitter is replaced with equipment of different power, make sure that the wiring connections, the dummy load (if present) and the coaxial relay are suitably dimensioned.

6.4.a Wiring into the antenna

Connect the RF output flange (or the connector) to the antenna using a good quality cable of the proper type (for example a 50 ohm rigid cable), with low attenuation properties.

-  It is very important to ensure that the antenna, cables, and connectors have the correct impedance and are suitable for the use with the transmitter of highest nominal power installed in the 1+1 System.
-  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.

6.4.b Connection to modulation signals

Connect the modulation inputs according to the desired operating mode (monophonic or stereophonic) and the type of source being used (mono, stereo, or multiplex signal).

6.4.c Wiring into the mains

-  **WARNING:** for the wiring of the system into the mains contact qualified personnel and comply with installation regulations.
-  The equipment can be connected to the mains either permanently, by installing a suitable current breaker with thermal-magnetic overcurrent protection upstream of the electric system, or to an industrial three-phase electrical outlet (400 V_{AC}) connected to a power cable with conductors of at least 10 mm².
 - 1) In a permanent installation, a 4-poles current breaker, 400V_{AC}, with thermal-magnetic overcurrent protection, tripping curve C, and power threshold equivalent to 1.5 times the nominal current value must be installed upstream of the system power connection.
 - 2) Use an appropriate power cable with at least 10 mm² conductors. Connect it to the main terminal of the 1+1 System, respecting the phase sequence (L1, L2 and L3), the neutral (N) and the grounding connection.
 - 3) Pass the cable through one of the two holes, one on the top and the other in the bottom of the rack. These holes are provided with plastic gland that prevents the cable from disconnecting once fixed.
 - 4) Connect the power cable to a suitable three-phase outlet (400 V_{AC} nominal voltage).
 - 5) Make sure that the grounding system is fully functional.
 - 6) Ensure that the general power switch ( **Errore. L'origine riferimento non è stata trovata.**) is turned OFF; if it is not, move it to the OFF position.
 - 7) Connect the system to the mains and turn ON the general power switch.
-  The power provided by the electric system/outlet must meet the system supply requirements.
-  The system should not be used close to 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 a case, install an external voltage stabilizer.
-  In order to ensure proper operation and comply with safety regulations, proper grounding is required. To that end, use the yellow/green lead of the power cable. Never connect the earth to the mains neutral lead.
-  Never turn the system on without an antenna connection, not even in stand-by mode.

7 BASIC OPERATIONS

-  Following the installation, the first time the system is turned on it is absolutely fundamental to follow the instructions outlined in this chapter. Failure to carry out the adjustments and controls explained in this section could cause serious damage to the device or interfere with other broadcasters or services that operate via radio signal; any such damage will be the sole responsibility of the user.
-  The transmitter stores the operating mode it was in when the power supply was turned off (or a mains failure took place). Therefore, before proceeding, it is important to ensure that the system is connected to an RF load, able to support the maximum deliverable power.
-  Operating the transmitter without an antenna, or when the antenna is improperly connected, may cause damage, particularly to the final stages of the amplifiers, that are not covered by the warranty.
-  Proper adjustment of the parameters should be made to conform to local regulations; such conformity is the full responsibility of the user.

7.1 Initial start-up

- 1) Ensure that all the switches of the Main Power System Panel ( **Errore. L'origine riferimento non è stata trovata.**) are turned OFF".
 - 2) Ensure that all the power switches of the modules are switched "ON".
 - 3) Turn the switches **GENERAL [7] and AUX [10]** of the Main Power System Panel "ON".
 - 4) Then, turn the switches of each transmitter module "ON". They are named **TXA [8]** and **TXB [9]**.
 - 5) Directly from the control panel of each transmitter, set the value of the following:
 - **RF output power**
 - **RF output frequency** (use the same value for both units)
 - **RS485 bus rate: 38,400 Baud**
 - **RS485 bus addresses: TXA = 1; TXB = 2**
 - **SET IN and SET OUT parameters: REMOTE LOW**
 - **Types of alarm which trigger a switchover sequence**
 - 6) On the control panel display, check that the communication with the transmitters via the RS485 bus is properly established. If problems are encountered, check the relevant settings ( step 5) above).
-  *For information about the adjustments to be directly carried out on the transmitter units, please refer to the relevant user manuals.*
- 7) From the **COV23** control panel [25] adjust the settings related to the specific operational characteristics of the system (main transmitter, switchover with/without return to the main transmitter, maximum number of switchover allowed, etc) ( **switch setup menu**, 5.3.e).
 - 8) Appropriately adjust the audio input levels.

8 MAINTENANCE AND WARRANTY

8.1 Maintenance



Strictly follow the instructions outlined in this section

8.1.a Clogging caused by dust

Since the transmitters are air cooled, they are subject to clogging caused by dust. Because of the high-quality materials used in their manufacture, if the system is installed according to the procedures described in Chapter 6, it will not require special maintenance for quite some time.

A regular service routine, mainly to remove internal dust, is recommended every 6 months to one year at the most.

8.1.b Ventilation fans

It is advisable to check the proper functioning of all the fans of each transmitter and provide immediate replacement in case of a sudden increase in noise levels, malfunction or performance degradation.

A lack of maintenance could result in a shutdown of a module or compromise the entire system, making the switching procedure impossible.

It is advisable to order new impellers for the ventilation systems every 2 years, always choosing good quality components of the same model, mounted on ball bearings.

8.1.c Periodic overhaul

After a few years of continuous service, it is advisable to have the system overhauled in our factory or in a specialized Sielco Srl laboratory, where its characteristics can be checked against the initial parameters. On these occasions, if necessary, the regular maintenance operations can also be carried out.

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

8.1.d Periodic overhaul of the COV23 control unit batteries

The COV23 unit is equipped with two buffer batteries: the first one is installed directly on the **telemetry via GSM network board** [18], whereas a second **12 V lead buffer battery** [19] is mounted directly on the COV23 subrack. In the event of a mains power failure, these two accumulators provide the unit with the power reserve necessary to send an alarm notification via an SMS message and to allow the CPU to complete the latest computing activity. To be sure a notification of 'mains power failure' is correctly transmitted, it is good rule to perform a periodic maintenance check (once a year) of the two batteries.

8.1.e Maintenance

In order to avoid any risk of electric shock or damage to the equipment, do not disconnect or modify the protective devices of the system during maintenance operations.

8.2 Warranty

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



Notes:

- *The warranty will become null and void if a device is tampered or if the failure is due to improper use or maintenance, or external causes such as a mains overvoltage.*
- *The warranty is valid when only original spare parts have been used and when the intervention have been carried out by Sielco Srl authorized personnel.*
- *Products shall be delivered to the laboratory carriage prepaid, and will be returned by freight forward.*
- *The warranty doesn't cover any indirect damage caused by non-operation or faulty operation.*

9 INDEX

1 + 1 System

- block diagram; 17
- electrical diagram; 51
- front view; 13
- general description; 12
- reset of the switching; 19
- switching mode; 19
- switching sequence; 19

Antenna; 46

Buttons

- ESCAPE; 22
- ON/STAND-BY; 22

Coaxial diagram – connections; 18

Commands

- ENTER; 32

Commands sent via SMS; 43

Connectors

- Antenna; 46
- LEFT/RIGHT; 46
- mains power supply; 46
- MPX; 46

Control unit

- connection with modules; 20
- main components; 21
- mains power failures; 20
- switching criteria; 20

COV23 – boards wiring diagram; 25

Declaration of conformity; 50

ESCAPE button; 26

General safety rules; 45

GSM connection status; 37

Indicators

- ALARM; 22
- GSM; 22
- ON; 22
- STAND-BY; 22

Initial start-up; 47

Installation; 45

- connection to modulation signals; 46
- electrical conditions; 45
- external connections; 16
- wiring into the antenna; 46
- wiring into the mains; 46

Introduction; 5

Mains; 46

Maintenance; 48

Menu

- accessing fields; 26
- commands; 26
- common features; 32
- Default screen; 32
- Diagram; 42
- GSM Status; 37
- how to set entries; 26
- initial startup; 31
- Password; 40
- setting default values; 27
- setting numeric values; 28
- SMS numbers; 38
- SMS settings; 38
- Switch Setup; 33
- System Alarms; 35
- System Status; 33
- TxA; 34
- TxB; 34

Modulation; 46

Multifunction knob; 26

Password; 40

Power and RF frequency settings; 47

Putting the main transmitter back in on the air; 19

Rack

- cable pass-throughs; 16

Reset of the switching; 19

Safety; 6

- general; 45

SMS; 38

SMS numbers; 38

SMS –remote commands; 43

Switching mode; 19

Switching sequence; 19

Symbols; 10

System alarms; 44

System modules

- coaxial relay; 14
- control unit; 20
- dummy load (optional); 15
- main power panel; 15
- transmitters; 15

Transmitters settings; 47

Warning symbols; 10

Warnings; 8

Warranty; 48

10 CE CONFORMITY DECLARATION

In fulfillment of the official provisions:

2006/95/CE (Low Voltage)

2004/108/CE, 92/31/CEE (Electromagnetic Compatibility)

1999/05/CE (R&TTE)

We hereby declare, under our responsibility, that the products:

Compact Transmitters series:

- EXC5GT	- EXC50GT	- EXC250GT	- EXC1000GT	- EXC3000GT
- EXC10GT	- EXC100GT	- EXC300GT	- EXC1500GT	- EXC4000GT
- EXC25GT	- EXC120GT	- EXC500GT	- EXC2000GT	- EXC5000GT
- EXC30GT	- EXC150GT	- EXC700GT	- EXC2500GT	

Amplifiers series:

- RFB500GT	- RFB1000GT	- RFB2000GT	- RFB3000GT	- RFB5000GT
- RFB700GT	- RFB1500GT	- RFB2500GT	- RFB4000GT	

Combined Transmitters series:

- TX250GT	- TX1000GT	- TX3000GT	- TX6KGT	- TX12KGT
- TX300GT	- TX1500GT	- TX4000GT	- TX8KGT	- TX15KGT
- TX500GT	- TX2000GT	- TX5000GT	- TX10KGT	
- TX700GT	- TX2500GT	- TX5KGT	- TX10KGT+	

❖ **Conform to the following Safety Standards:**

EN 60215:1989+A1:1992+A2:1994 and EN 50385:2002

EN 62311 (2008)

❖ **Conform to the following Specific Technical Standards:**

ETSI EN 301 489-1 v 1.9.2 (2011-09); ETSI EN 301 489-11 v 1.3.1 (2006-05);

ETSI EN 301 489-7 v 1.3.1 (2005-11)-(EMC)

❖ **Conform to the basic series of Radio tests (art. 3.2 1999/05/CE) defined inside the Technical Standard:**

ETSI EN 302 018-2 v1.2.1 (2006-03) - (Radio) and ETSI EN 301 511 V9.0.2 (2003-03) - (GSM)

Notified Body: NEMKO AS identification number: 0470

Buccinasco 12/02/2013

Timbro e Firma

SIELCO S.r.l.

Amministratore delegato

Dott. Emilio Cernuschi

11 1+1 SWITCHING SYSTEM GENERAL ELECTRICAL DIAGRAM