

ET15000-5 - ET10000-5

(the list is in the manual)

SOLID STATE FM TRANSMITTER

Rev.01 - 17/05/2011
Cod. MAN1002UUK

ELENOS®
broadcast @xperience

USER MANUAL



Operative Office : via G. Amendola 9, 44028 Poggio Renatico (Fe) ITALY
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C.Fisc. e P.IVA IT00415540384

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E-mail for general information info@elenos.com

E-mail for support support@elenos.com

Or via Website :

www.elenos.com (in On line Support page)

Please, always you give us information about the device serial number (shown on the identifying label).

Elenos s.r.l. declares that the equipment in this documentation complies with 1999/05/CE Directive.



For details see "CE Marking" Section.

Revision

N°	Date	Description
00	20/09/2010	First release
01	17/05/2011	Used ETG Indium series as exciter

Family variants

Transmitter	Amplifier	Intermediate Power Amplifier module	N° way combiner	Max output power	Driver
ET15000-5	E15000-5	E5000	3	15 KW	ETG 500.1 o ETG 500.7 o ETG 500.5
ET12000/15-5	E12000/15-5	E4000/5	3	Maximum output power limited to the nominal value	ETG 500.1 o ETG 500.7 o ETG 500.5
ET10000/15-5	E10000/15-5	E3500/5	3		ETG 500.1 o ETG 500.7 o ETG 500.5
ET8000/15-5	E8000/15-5	E3000/5	3		ETG 500.1 o ETG 500.7 o ETG 500.5
ET7000/15-5	E7000/15-5	E2500/5	3		ETG 500.1 o ETG 500.7 o ETG 500.5
ET5000/15-5	E5000/15-5	E1800/5	3		ETG 500.1 o ETG 500.7 o ETG 500.5
ET2500/15-5	E2500/15-5	E1000/5	3		ETG 250.1 o ETG 250.7 o ETG 250.5 o ETG 250.3
ET2000/15-5	E2000/15-5	E800/5	3		ETG 250.1 o ETG 250.7 o ETG 250.5 o ETG 250.3
ET1000/15-5	E1000/15-5	E500/5	3		ETG 250.1 o ETG 250.7 o ETG 250.5 o ETG 250.3

ET10000-5	E10000-5	E5000	2	10 KW	ETG 500.1 o ETG 500.7 o ETG 500.5 o ETG 300.3
ET8000/10-5	E8000/10-5	E4000/5	2	Maximum output power limited to the nominal value	ETG 500.1 o ETG 500.7 o ETG 500.5 o ETG 300.3
ET7000/10-5	E7000/10-5	E3500/5	2		ETG 500.1 o ETG 500.7 o ETG 500.5 o ETG 300.3
ET5000/10-5	E5000/10-5	E2500/5	2		ETG 500.1 o ETG 500.7 o ETG 500.5 o ETG 300.3
ET2500/10-5	E2500/10-5	E1500/5	2		ETG 250.1 o ETG 250.7 o ETG 250.5 o ETG 250.3
ET2000/10-5	E2000/10-5	E1000/5	2		ETG 250.1 o ETG 250.7 o ETG 250.5 o ETG 250.3
ET1000/10-5	E1000/10-5	E500/5	2		ETG 250.1 o ETG 250.7 o ETG 250.5 o ETG 250.3

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1 Information note

Dear Customer,

thank you for choosing an Elenos product.

Elenos s.r.l. realizes solid state Transmitters for broadcasting radio in the VHF FM ranging from a minimum power of 10W to a maximum of 30kW, Exchange Unit, Remote Control Units, etc..

The product is designed to ensure good performance over time, provided periodic checks and the required simple maintenance are carried out.

The use is very easy and intuitive. Nevertheless it is recommended to carefully read this manual and its attachments, before performing any operation.

ELENOS s.r.l Management

1.1 Operating Staff

This manual is a part of the product and **must be easily found by staff with the task of installation, operation and maintenance.**

Device installation, operation and maintenance must be **allowed exclusively to trained and qualified person**, who be aware all risks related to the fact of working with an equipment connected to dangerous power lines, employing high voltages, which generates high-power radio frequency.

This manual is not a security rules complete collection, but at **the user is required to know the contents of this document and its annexes.**

This product must be used only by holders of Government Grant and is subject to National Regulations.

AVISO IMPORTANTE

Il presente apparato è utilizzabile solo da
titolari di Concessioni Governative
e/o Autorizzazioni Ministeriali

Elenos Srl

WARNING

The use of this device
is subject
to National Regulations.

Elenos Srl

1.2 Responsibility

Elenos is not responsible for damage or injury to objects or to people if caused by improper procedures or actions conducted by users not sufficiently trained or without experience.

Descriptions and illustrations contained in this publication are not binding: without prejudice to the product essential characteristics described, Elenos reserves the right to make changes to parts, accessories and details that it deems necessary for the improvement of equipment, or for manufacturing or for commercial requirements, at any time, without warning and without promptly update this publication.

1.3 Warranty

Elenos products are covered by warranty. With the order confirmation or the purchase you agree to the terms and conditions thereof.

The warranty excludes faults caused by lightning, power supply voltages wrong, negligence, incompetence or abuse by the user, from tampering or repair by unauthorized people, and uses other than those for which they sold the equipment . The warranty is excluded for damage by fire, acts of war and unrest.

The warranty does not cover in any case the risk arising from transport.

1.4 Jurisdiction

We inform you that, in case of litigation, the jurisdiction court is the Ferrara Court.

2 CE conformity

Elenos follows, to the marketing of all its products, **the Directive 1999/5/CE**.

This means:

- Technical file, made available, exclusively at the Control Authority, for 10 years after the last sale on the market of that product type. This file contains the product description, drawings, wiring diagrams, circuits, etc., standard and technical solutions list that ensure compliance, test reports, manufacturing process warranty.
- Declaration of Conformity, supplied with the product.
- CE marking is affixed to the product and to documentation.
- Technical opinion, in writing issued, by an European Notified Body, included in the Technical Dossier.
- Notification to the member countries where to distribute the product.

Elenos products meet the essential requirements of standard:

- a) user or any other person health and safety protection, including the objectives with respect to safety requirements prescribed by law October 18 1977 n. 791, amended by Legislative Decree 25 November 1996 n. 626, but without application of voltage limits;
- b) the requirements for protection as regards the electromagnetic compatibility, provided by Legislative Decree 12 November 1996 n. 615;
- c) radio equipment in compliance with national frequency allocation, are built to effectively utilize the radio spectrum allocated to land and spatial and orbital resources, so as to avoid harmful interference;
- d) are also essential requirements those set by the European Commission providing, for the devices within certain categories or particular types, the requirement of the construction so as to:
 - interact via networks with other devices and can be connected to appropriate interfaces;
 - not harm the network or its operation and do not use wrong network resources, thereby causing an unacceptable degradation of service;
 - contain security features to ensure privacy and personal data protection of user and subscriber;
 - supports certain features ensuring avoidance of fraud;
 - supports certain features ensuring access to emergency services;
 - supports certain features that facilitate their use by disabled users.

EC Declaration of Conformity

According to Directive 1999/5/EC (R&TTE)



We : ELENOS s.r.l. - via G.Amendola, 9 – 44028 Poggio Renatico (FE) - Italy

Declare under our sole responsibility that the product:

ET15000-5, ET12000/15-5, ET10000/15-5, ET8000/15-5, ET7000/15-5, ET5000/15-5, ET2500/15-5, ET2000/15-5, ET1000/15-5, ET10000-5, ET8000/10-5, ET7000/10-5, ET5000/10-5, ET2500/10-5, ET2000/10-5, ET1000/10-5, E15000-5, E12000/15-5, E10000/15-5, E8000/15-5, E7000/15-5, E5000/15-5, E2500/15-5, E2000/15-5, E1000/15-5, E10000-5, E8000/10-5, E7000/10-5, E5000/10-5, E2500/10-5, E2000/10-5, E1000/10-5

With intended purpose: VHF FM broadcast transmitters and amplifier
And manufactured by: ELENOS s.r.l.

To which this declaration relates is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/CE).

The product is in conformity with the following standards and/or other normative documents:

Health and safety requirements pursuant to Article 3.1.a

Standards applied: EN60125: 1989/A1:1992/A2:1994

Protection requirements concerning electromagnetic compatibility pursuant to article 3.1.b

Standards applied: EN301 489-1 V 1.8.1 ; EN301 489-11 V 1.3.1;

Measures for the efficient use of the radio frequency spectrum pursuant to article 3.2

Standards applied: EN302 018-2 V1.2.1

Supplementary information :

Notified body involved: Nemko Spa

Technical file held by : Elenos s.r.l and Nemko S.p.a

Place and Date: Ferrara April 12, 2010

Responsible person: Leonardo Busi (Amministratore unico)
Tel. +39 0532 829965
e.mail: leonardobusi@elenos.com

Signature:

LIST OF COUNTRIES WHERE THIS APPARATUS CAN BE USED

AT	◇	DE	◇	MT	◇	GB	◇
BE	◇	GR	◇	NL	◇	IS	◇
CY	◇	HU	◇	PL	◇	LI	
CZ	◇	IE	◇	PT	◇	NO	◇
DK	◇	IT	◇	SK	◇	CH	◇
EE	◇	LV	◇	SI	◇	BG	◇
FI	◇	LT	◇	ES	◇	RO	◇
FR	◇	LU	◇	SE	◇	TR	

AUTHORIZATION IS REQUIRED TO USE THIS EQUIPMENT

3 Security

Elenos products meet the safety standards required for this type of equipment.

3.1 Precautions

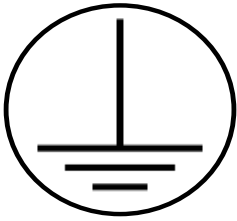
However, the user must also observe the precautions listed below:

- Original equipment configuration must not be altered. Upon receipt it you must check that it correspond to the order and in case of non-compliance you must immediately inform Elenos.
- The protective devices should not be disconnected (except to replace), altered, or changed without permission.
- Check periodically and after the occurrence of a fault the protection devices (such devices against overvoltage, overcurrent, breaker circuit, etc...)
- For safety and to ensure the device integrity is absolutely forbidden to put it in function and/or to handle it with open doors and/or without protection panels and/or devoid earth connection, which must be always top quality and in accordance with standards. It is also forbidden to disconnect and/or to modify the means protection instruments of equipment.
- Before starting work, the equipment must be isolated from the network. Disconnecter must be verified by inspection.
- The equipment should operate only at expected voltage. Incorrect voltage can cause irreparable damage to the equipment and operator. That statement is on the label of the product, usually located in the wrapping. This should not be removed for any reason, even if the equipment was resold.
- The equipment must be powered by an electrical system that is in compliance with all standards.
- Pictograms are applied on the equipment, indicating safety precautions that must be carefully respected by anyone who is about to use it. Failure to comply with the requirements raises the Manufacturer to be liable for any damage to persons or thing which may arise and makes the operator himself solely responsible.



Dangerous voltage





The device is directly connected to the "building installation"



Among the device and "building installation" there is a structure interposed

- To ensure a correct function you must not obstruct the fans. Do not place the unit near heat sources, near flammable materials, or in closed installations without proper air circulation.
- You must observe the rules relating to fire and security of the station.
- To avoid contamination by liquids. For cleaning to disconnect the power supply. Do not use liquid or spray cleaners.
- Some components contain TOXIC SUBSTANCES, including BERYLLIUM OXIDE. Be careful because some countries may have rules governing the storage and disposal of dangerous materials.
- If after an inspection some component is damaged or broken, you must proceed with caution to any physical contact with hands or otherwise.
- You must ensure that any person who uses a transmitter with dangerous voltage knows artificial respiration and cardiac massage, and you must train users on first aid in case of need. In station with electrical equipment you should hang in a visible position instructions of the phases of assistance to persons involved in an accident and equip the station of a first-aid kit. It is advisable to have a plan of action for any operations connected to the emergency, public or private, institutions, that are readily available to all persons in the room.

3.2 First aid

This paragraph is NOT a complete guide to first aid procedures, but only a summary that can be used as a reference.

It is the responsibility of all personnel who use this equipment to be ready to administer adequate first aid and thus prevent avoidable loss of life.



3.2.1 Treatment of electrical burns

3.2.1.1 Major burns and cuts

- Cover the area with a clean cloth.
- Do not burst blisters, remove clothing and any particles of clothing that may be stuck to the skin. Apply a suitable cream.
- Treat the casualty according to the type of shock.
- Get the casualty to hospital as quickly as possible.
- If arms or legs have been affected, hold them in an elevated position.

WARNING:

If medical assistance is not available within one hour, and the casualty is conscious and is not trying to vomit, to give them a solution of salt and soda: 1 full teaspoon of salt and half teaspoon of bicarbonate of soda (sodium bicarbonate) for every 250 ml of water (neither hot nor cold). To allow the casualty to sip slowly 4 times (1/2 glass) over a period of 15 minutes.

Stop if the casualty was vomiting. Do not give alcohol.

3.2.1.2 Less severe burns (1st and 2nd degree)

- Apply a cold (not freezing) gauze, using a cloth which is as clean as possible.
- Do not burst blisters, remove clothing and any particles of clothing that are stuck to the skin. Apply a suitable cream.
- If necessary, give the casualty clean and dry clothing.
- Treat the casualty according to the type of shock.
- Get the casualty to hospital as quickly as possible.
- If arms or legs have been affected, hold them in an elevated position.

3.2.2 Treatment of electric shocks

3.2.2.1 If the casualty has lost consciousness

Lay the casualty on his back on a rigid surface.

A) Air ways (fig. a) :

- if unconscious, open the airways
- push back the forehead
- if necessary open the mouth
- check the breathing

fig.a



B) Breathing (fig. b) :

- if not breathing, start artificial respiration
- incline the head
- close the nostrils
- apply mouth to the casualty's mouth
- perform 4 quick respirations
- remember to start breathing again immediately

fig.b



fig.c1



fig.c2



fig.c3



C) Circulation (fig. c1) :

- check the heart beat (fig. c1)
- in the absence of a heart beat, start cardiac massage (fig. c2)
- press the sternum every 1.5 - 2 seconds
- if there is one first aider, perform 15 compressions in about 80 seconds and 2 quick respirations.
- if there are two first aiders, perform 5 compressions in about 60 seconds and one respiration (fig. c3)

WARNING :

Do not interrupt the rythm of cardiac compression when the second person is performing artificial respiration.

3.2.2.2 If the casualty is conscious

- cover the casualty with a blanket
- ensure the casualty is calm
- loosen clothing and lay the casualty flat

WARNING:

IN ANY CASE CALL A DOCTOR IMMEDIATELY

3.3 Station features

3.3.1 Environment features

To be able to operate freely on the equipment and be able to make installation or maintenance it is necessary to maintain a minimum distance from the walls on each side of the machine.

The room must be equipped with an adequate fresh air and filtered from dust, with adequate capacity with the characteristics of the equipment working in space.

The output exhaust air must be conveyed directly to the outside.

If the size or the duct length are such that assume a significant air flow drop it is necessary to add an extraction device.

At the conveyor exit shall be provided devices against intrusion (compared to insects or other animals) and precautions should be taken to prevent entry of liquids or other materials.

The device can operate properly if the temperature is between -5 °C to +45 °C, with relative humidity to 95%, non-condensing to +40 °C.

3.3.2 Wiring features

The mains system shall be in accordance with all current rules. The power supply should enable to provide adequate power in accordance with regulations of the installation country about the service quality of electricity supply.

It's recommended the use of a network isolating transformer and of an energy reduction network for high voltage discharges.

Provide a protected switchgear (circuit breaker or fuse) with breaking and flow properly related to the device absorption characteristics.

Use cables properly sized related to current input.

Security

The earth connection must be implemented according to current standards. Particular attention must be used to grounding of the antenna system, because it is exposed to atmospheric electrical phenomena.

Remember that despite the ground link it is always dangerous to operate on the apparatus in case of bad weather, with the presence of lightning; in fact, because of inductance ground connections it is possible, in case of high energy discharge, that the apparatus reaches dangerous instantaneous levels of voltage.

It is, therefore, appropriate that the equipment is installed in accessible area only to maintenance people and only for the time necessary to repairs and inspections.

4 General information

4.1 Intended use

The products described in this document are solid state transmitters with an output power adjustable from 0W up to the maximum rating (see "Family variants" section), using in FM band between 87.5 and 108MHz, at 10kHz steps.

The main transmitters of this series are ET15000-5 and ET10000-5, based on SCALABILITY concept.

It provides the reuse of resources employed on a base model, to obtain higher power transmission.

The difference of these transmitters, compared to previous Elenos equivalent in terms of power output, is that in this case the amplifier module is the E5000.

Moreover, it includes the use of exciter of Indium series.

Same technology, same interfaces, same components within each module, it means economy in the management of spare parts and repairs, economy in staff training, experience transferable more easily.

The options are : MPX, STEREO, AES/EBU, according with exciter type.

4.2 Shipment

The shipment may only be performed in its original packaging.

However, although this is designed to avoid product damages, even in mishandling case, it is recommended to respect the "UP/DOWN" side and to not give shocks.

To make sure that the type of transport and lifting equipment type are capable to support the weight.

4.3 Unpacking

The staff, handling the product, should operate with gloves and shoes against injury.

Before lifting or handling equipment to verify that you have done to clear the area of operation, considering a safety area large enough to avoid damage to persons or objects that may be in the range of maneuver.

4.4 Storage

If you wish, for whatever reason, store the product it is necessary that:

- the temperatures, in the storage, are not exceeded -20° - $+55^{\circ}$ C, with humidity not exceeding 90% at 55° C;
- the equipment must be disconnected from the sources of energy;
- the equipment is clean and there are any dust;
- the equipment is covered with a waterproof sheet.

4.5 Off line and disposal

For all aspects concerning the product disposal, reference should be made the specifications required by European Directives.

However, please note that **the equipment DOES NOT CONTAIN OILS POLLUTION.**

4.6 Purchased product verification

Please note, before installing the equipment, to verify that it has not been damaged during transportation or storage conditions.

Check that all standard components and accessories ordered have been delivered correctly, and if not please contact Elenos for material adjustment.

In this case the package must contain at least :

- n°3 E5000 (n° 2 in ET10000-5);
- n°1 ETG Indium series (or family variants);
- n°1 ETG Indium series (or family variants) in "Dual exciter";
- n°1 CB15000 3-way (n°1 CB10000 2-way in ET10000-5);
- n°1 cabinet;
- cables;
- n°3 "Identification and Quick Start" manuals, which should be kept at station, always attached to the product (in addition to manual related to the system, even those relating to individual machines exciter and E5000);
- n°3 "User" manuals (in addition to manual related to the system, even those relating to individual machines exciter and E5000);
- n°1 cd with documentation;
- n°1 interface cable for exciter and to activation in case of problems during exchange phase;
- n°1 cable to PC connection.

The transmitter can be provided within a rack comprising:

- n°1 fan ;
- n°4 mounting stirrups to the rack.

Cables, spare parts and other accessories can be obtained by Elenos or Elenos dealers.

5 Product description

5.1 Marks and labels location and type

The transmitter ET15000-5 consists of three modules E5000 combined using a three-way combiner.

The transmitter ET10000-5 consists of two modules E5000 combined using a two-way combiner.

In both the RF power is generated by an Indium series exciter.

It's possible the presence of a second exciter (for Dual Driver configuration) with the function of reserve exciter. This is activated automatically. (fig.9 - fig.10 - fig.11 - fig.12)

On the transmitter and on the individual machines the following identifying marks and labels are present :

INDIUM SERIES ® - Transmitter series name. Indium series indicates the range of devices that use the precious metal indium. Indium has adaptability and thermal conductivity properties, with benefits of exchange efficiency that remain unchanged in an infinite time. (fig.1)

ICEFET ® - RF module design is such to ensure very high efficiency in the entire range of power output, low temperatures and thus a MOS devices life extension. (fig.2)

LIFEXTENDER ® - Apparatus optional system. Once operative it permits safe operation even in extremely harsh environmental conditions. (fig.3)

ECOSAVING ® Reduction of energy consumption – The device operative characteristics can ensure a great benefit to the ecology and operating costs. (fig.4)

IDENTIFICATION LABEL – There is a label on each machine (and therefore the data are specific to that machine) and on the rack (and therefore the data are related to the complete transmitter). This label contains the main features : manufacturer name, model, power supply type, power consumption, CE marking, serial number, test date, tester name. Warning: do not remove this label. (fig.5)

SERVICE LABEL – This label contains the main references for Elenos assistance. (fig.6)

DISPOSAL LABEL – This label highlights how the equipment should be disposed in an appropriate manner, in accordance with the regulations. (fig.7)

WARNING LABEL – This label highlights how the equipment should be used in an appropriate manner. (fig.8)

fig.1



fig.2



fig.3



fig.4



fig.5



fig.6



fig.7

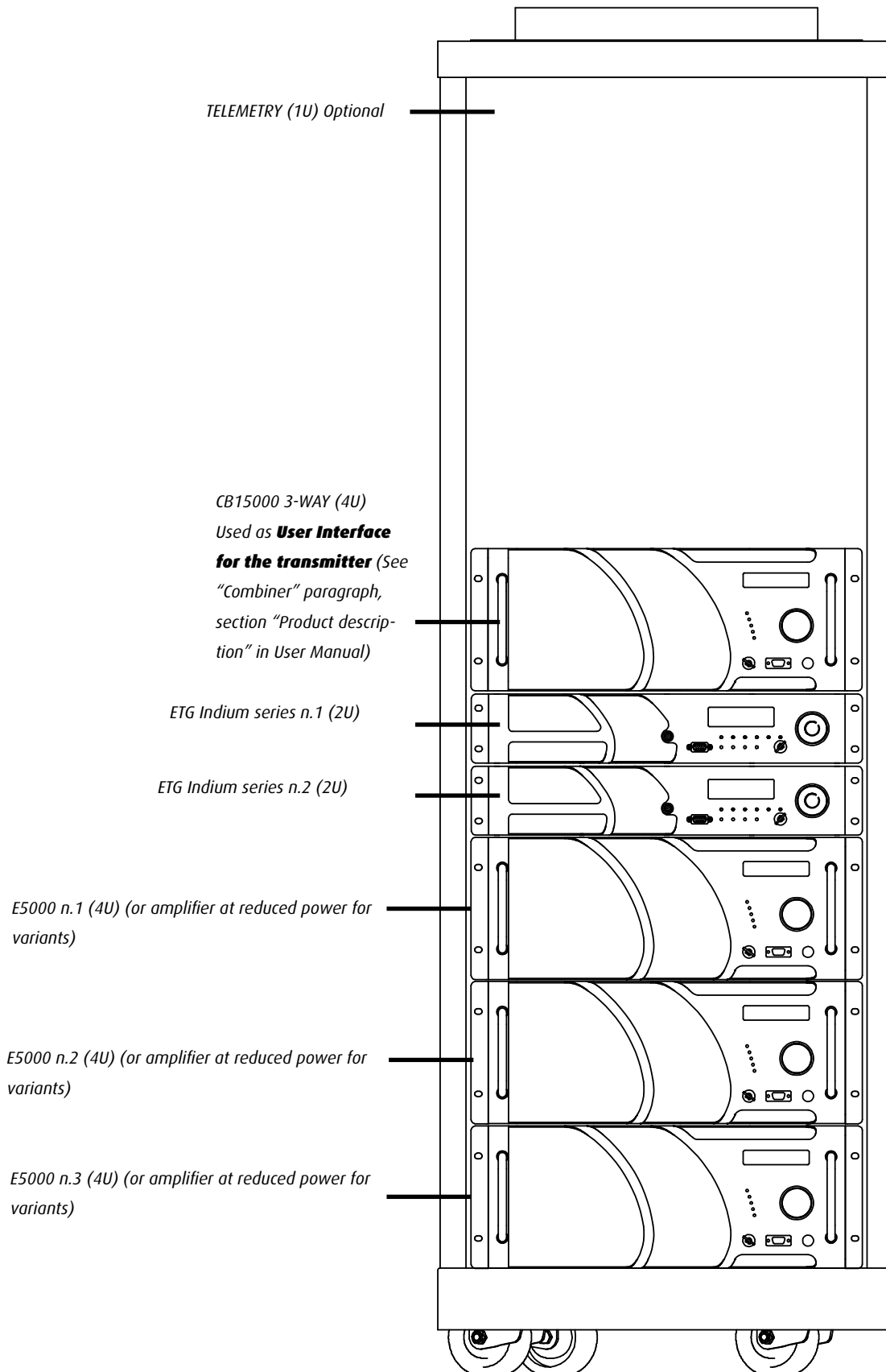


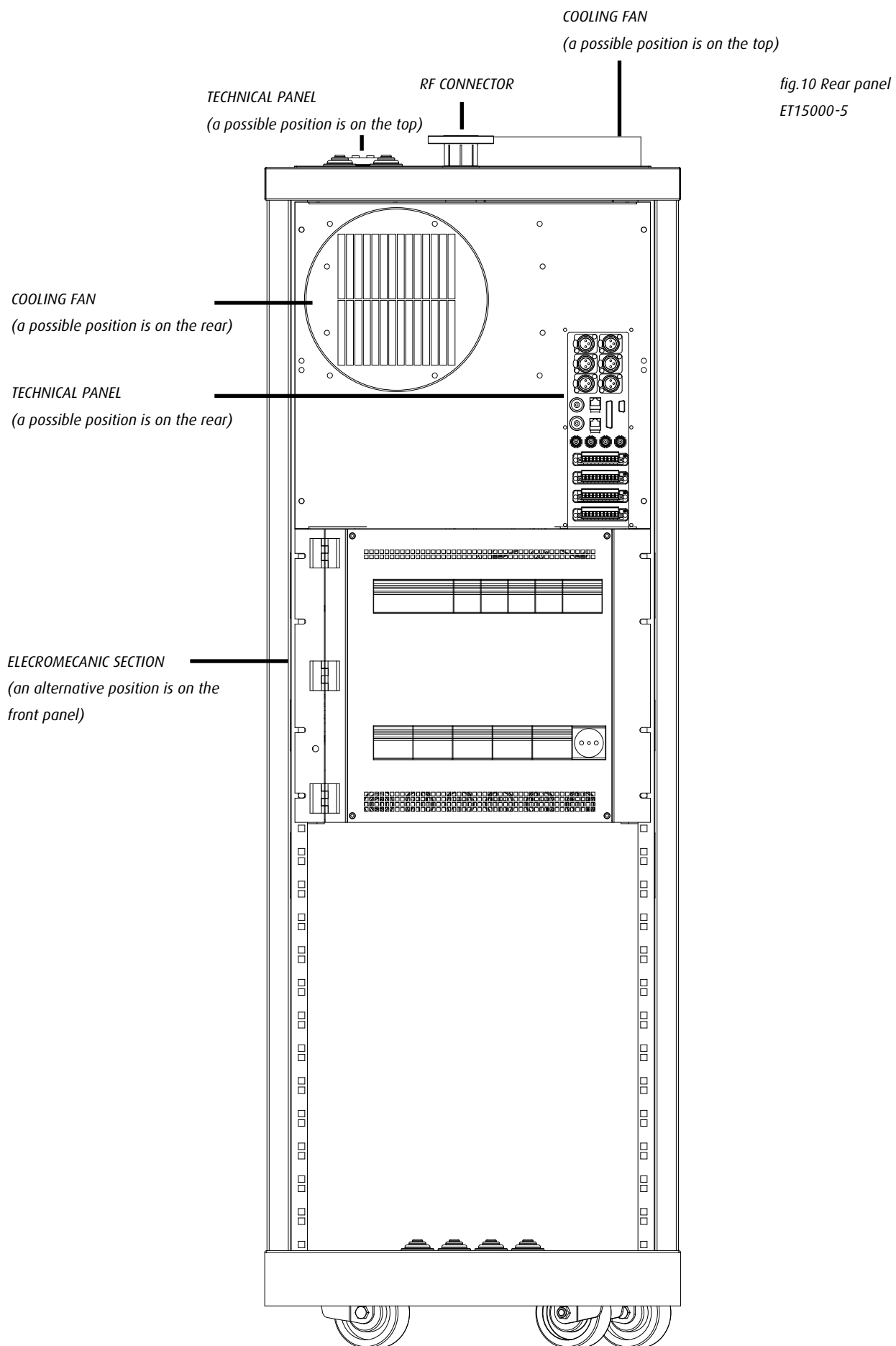
fig.8



5.2 ET15000-5 and family variants composition

fig.9 Front panel
ET15000-5

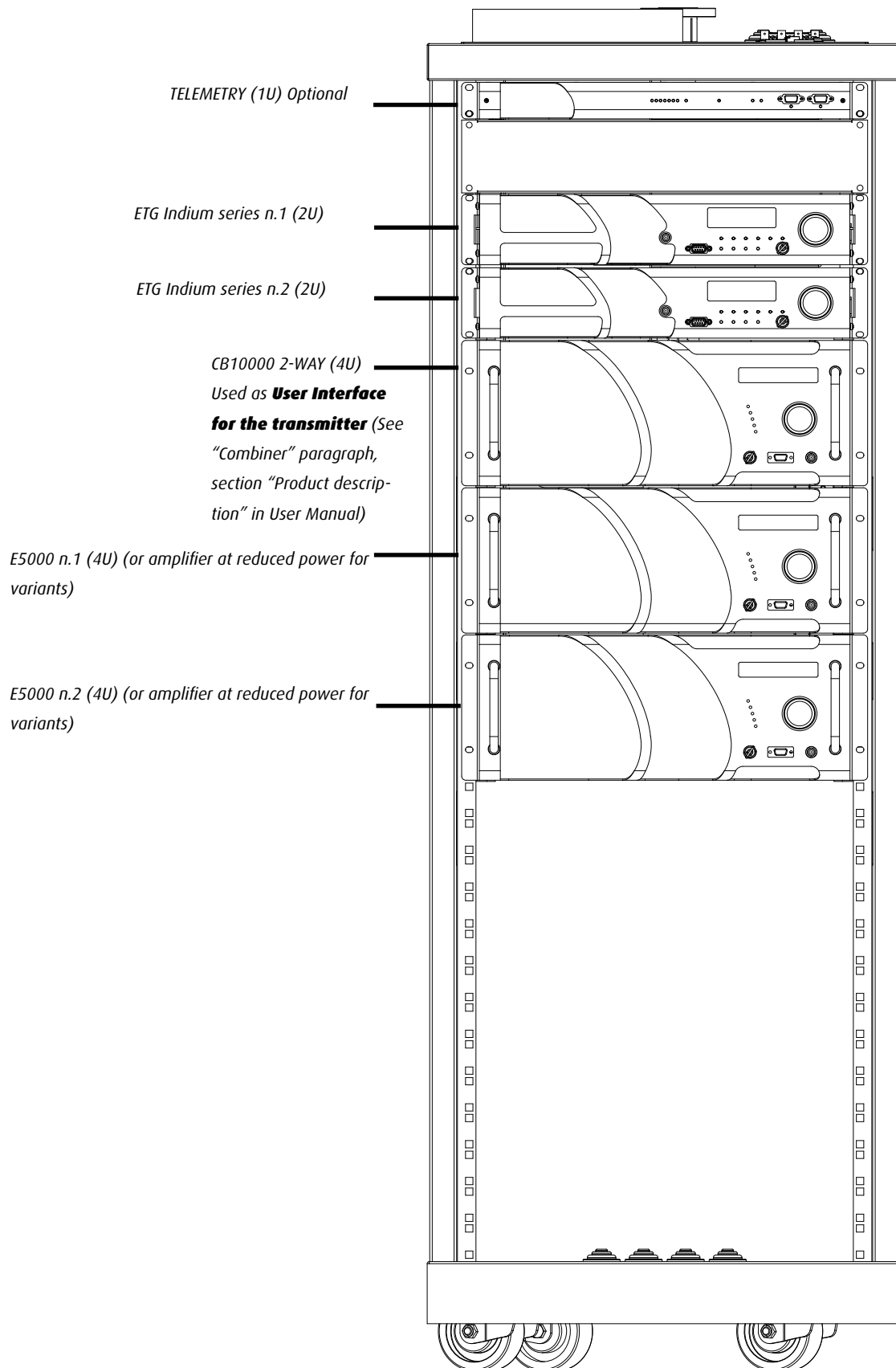




5.3 ET10000-5 and family variants composition

fig.11 Front panel

ET10000-5



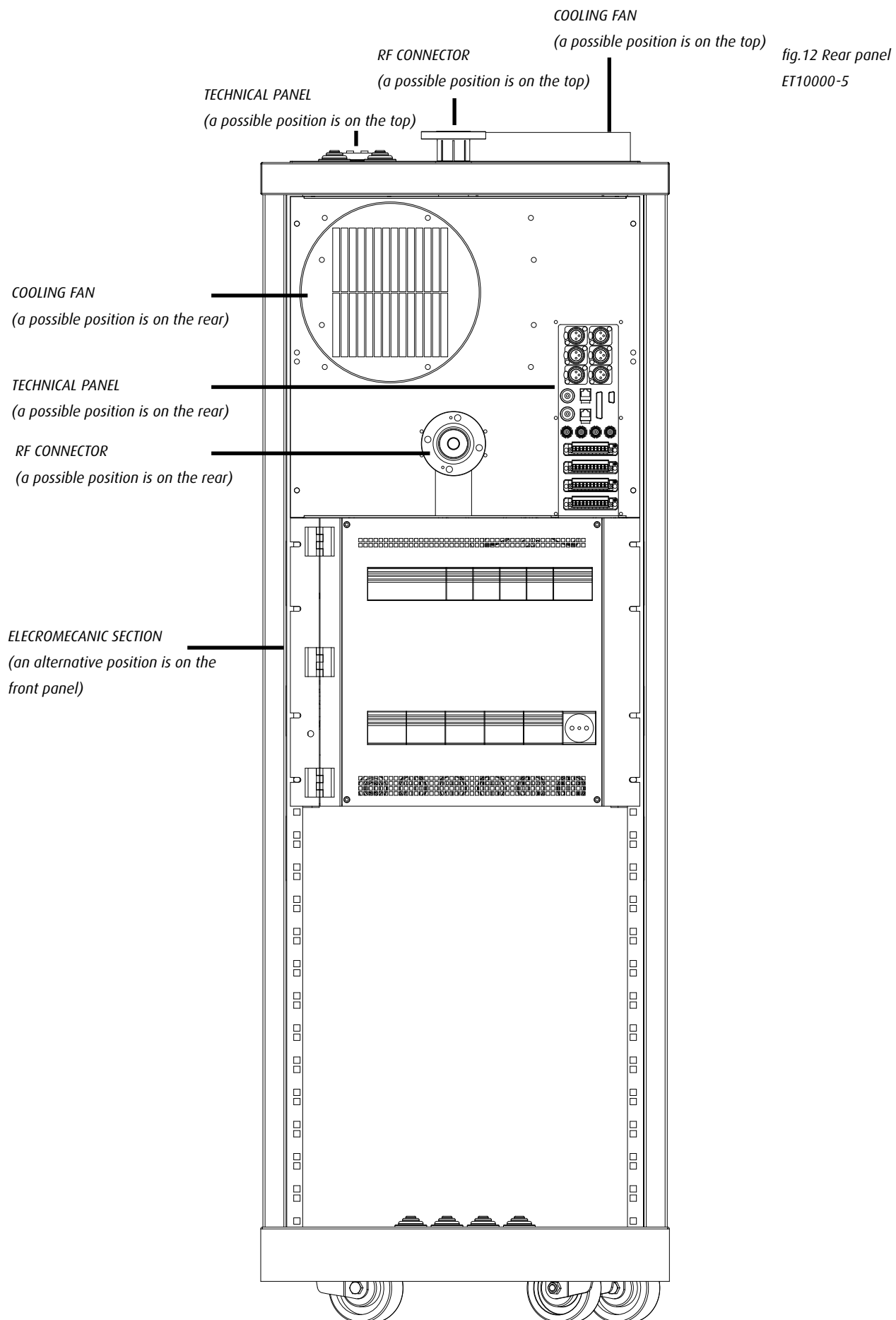
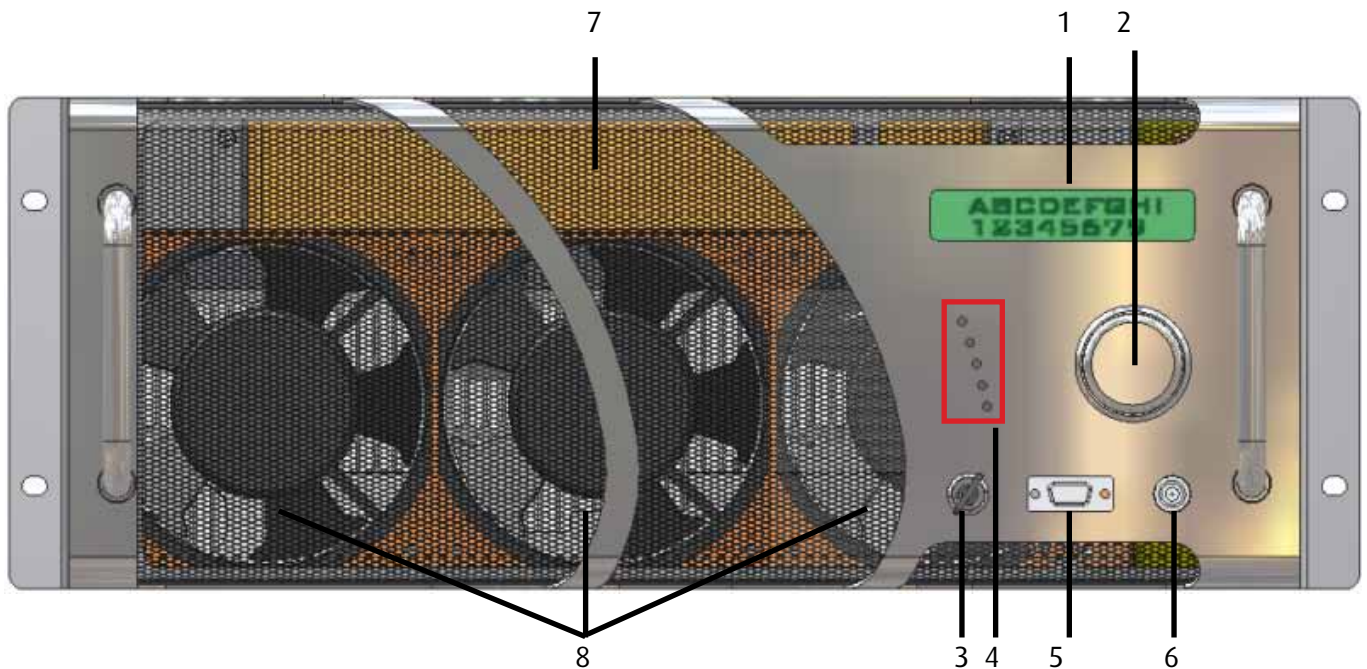


fig.12 Rear panel
ET10000-5

5.4 Combiner

5.4.1 Front panel and external connectors description



1 LCD display - graphic display that shows operative parameters and functions selected by encoder.

2 Encoder – multi-function knob that allows to see functions menu and to modify operative parameters:

- SELECT HIGHLIGHTED ITEM_short pressure of the knob;
- SCROLL ITEM_rotation of the knob clockwise / counterclockwise;
- INCREASE / DECREASE_rotation of the knob clockwise / counterclockwise;
- RETURN TO MAIN MENU_long pressure of the knob (at least 1 second).

3 Keyswitch – by rotating the key supplied with the apparatus. It can be placed in LOCAL mode (front panel-manageable) or REMOTE mode (PC-manageable).

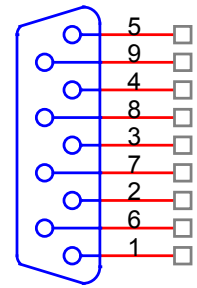
4 Leds – leds list :

- FAULT (red) _ it is on when the transmitter is in a fault condition;
- ON AIR (green) _ it is on when the transmitter is on air;
- ST-BY (yellow) _ it is on when the transmitter is in stand-by;
- LOCAL (blue) _ it is on if the transmitter is in local mode;
- MAINS (green) _ it is on and fixed in the presence of power supply.

5 Interface connector – DB9 female connector, to connect a PC.

Connector	Pin	Description	Note
With a flat to CN3 on E3K 7A044 board	1	TX_1	Filtered output 485 Differential signal positive

2	/TX_1	Filtered output 485 Differential signal negative
3	RX_1	Filtered input 485 Differential signal positive
4	/ RX_1	Filtered input 485 Differential signal negative
5	Common ground	
6	Common ground	
7	Common ground	
8	Common ground	
9	Common ground	

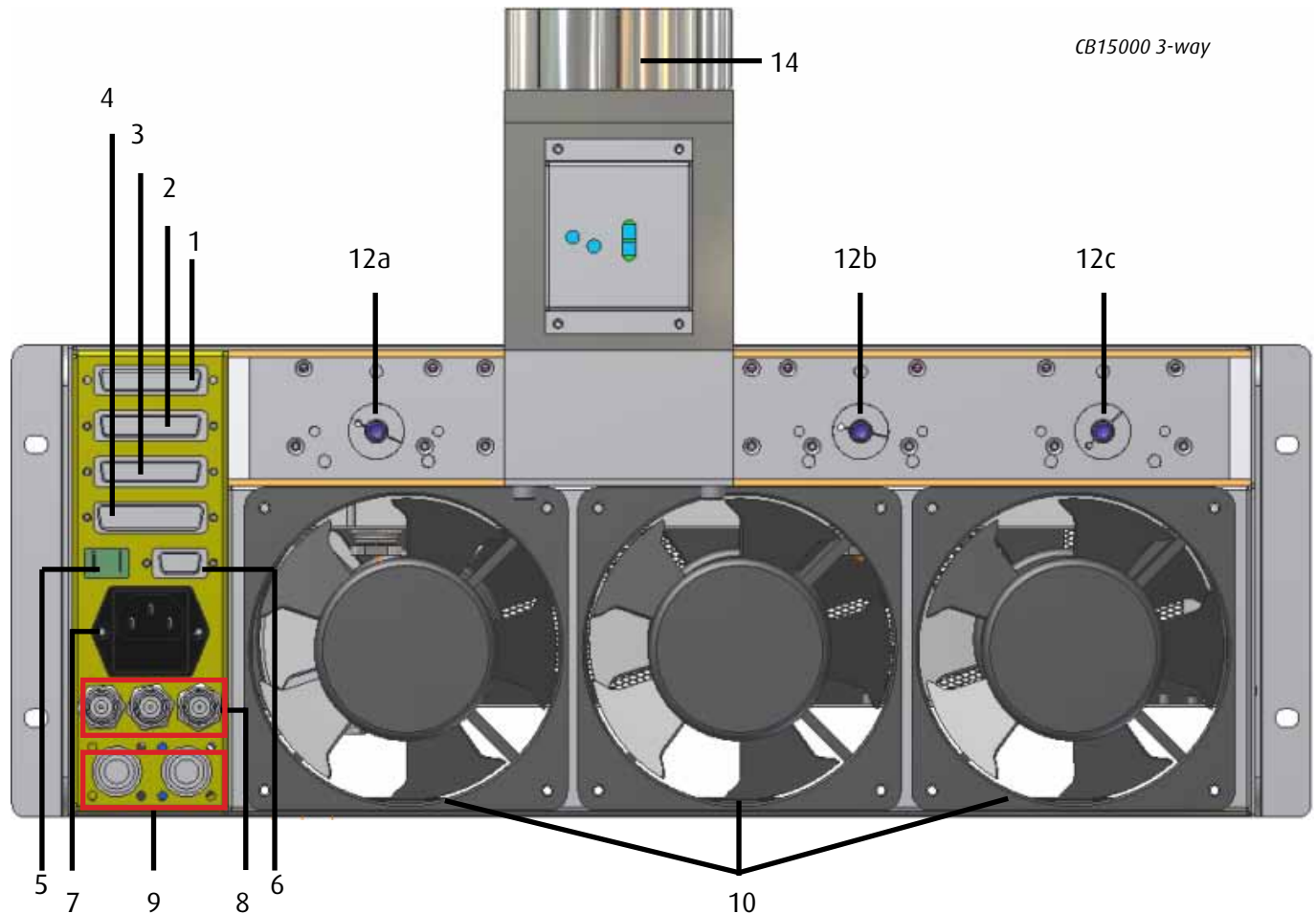


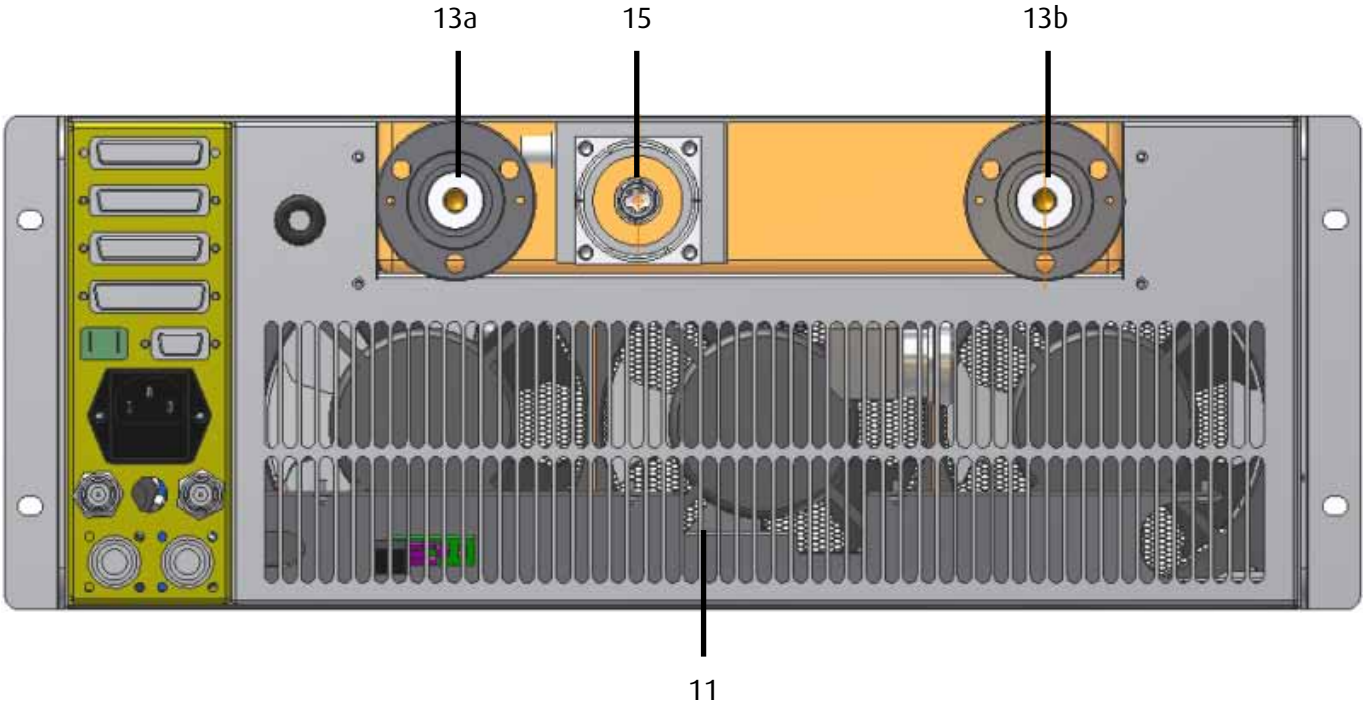
6 RF Monitor connector – BNC connector to connect external measuring devices, it allows the measure of low level RF signal (0dBm full scale). Warning: this monitor is not calibrated, so a perfectly constant output level, with frequency, is not guaranteed. It must NOT used to measure the output power, nor to measure harmonic components.

7 Ventilation grid – to protect the front fans.

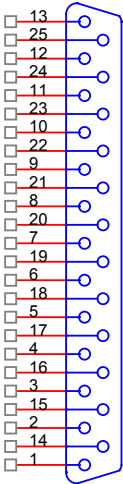
8 Fans – Fans to air intake. They are 3 and their technical characteristics are 12-28VDC, 441Mc/h max.

5.4.2 Rear panel and external connectors description





1 SPI connector - DB25 female connector to select the stored profiles. There is only in reserve machine.

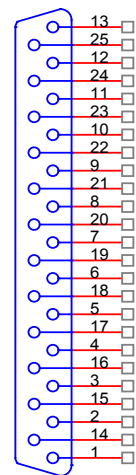


Connector	Pin	Description	Note
CN1 on board E10K5A070	1	TC_CH1	F_TC_CH0
	2	TC_CH3	F_TC_CH2
	3	TC_CH5	F_TC_CH4
	4	-	No connected
	5	Common ground	
	6	TS_E_M_CH6	Common ground if JP4 is in shot circuit
	7	-	No connected
	8	TS_E_M_CH3	Common ground if JP2 is in shot circuit
	9	Common ground	
	10	Common ground	
	11	TS_CH5	F_TS_CH4
	12	TS_CH	F_TS_CH2
	13	TS_CH1	F_TS_CH0
	14	TC_CH2	F_TC_CH1
	15	TC_CH4	F_TC_CH3
	16	TC_CH6	F_TC_CH5
	17	-	No connected
	18	Common ground	
	19	TS_E_M_CH5	Common ground if JP3 is in shot circuit
	20	TS_E_M_CH4	Common ground if JP1 is in shot circuit

	21	Common ground	
	22	Common ground	
	23	TS_CH6	F_TS_CH5
	24	TS_CH4	F_TS_CH3
	25	TS_CH2	F_TS_CH1

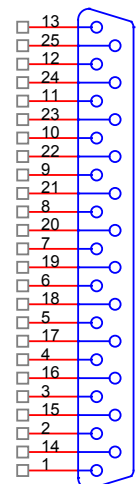
2 TC/TS connector - DB25 female connector to remote TeleControl and TeleSignal.

Connector	Pin	Description	Note
P1 on board E3K GA044	1	TC_INTLCK	TC5
	2	TC_TX_ON	TC3
	3	TC_TX_OFF	TC1
	4	DTM_REFL_PWR	DAC1
	5	Common ground	
	6	RXOUT-	
	7	+12V	
	8	TXOUT-	
	9	Common ground	
	10	DTM_I_PA	DAC2
	11	TS_FLT_MAIN	TS4
	12	TS_TX_ON	TS2
	13	TS_WARNING	TS0
	14	TC_ALM_RST	TC4
	15	TC_PWR_LWR	TC2
	16	TC_PWR_RSR	TC0
	17	DTM_FWD_PWR	DAC0
	18	Common ground	
	19	RXOUT+	
	20	TXOUT+	
	21	Common ground	
	22	DTM_V_PA	DAC3
	23	TS_FLT_AUDIO	TS5
	24	TS_FLT	TS3
	25	TS_REMOTE	TS1



3 Master connector (local Bus) - DB25 female connector to machines interfaces (amplifiers and exciters).

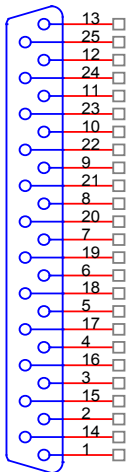
Connector	Pin	Description	Note
P2 on board E3K GA044	1	TS_INTLCK	TS7
	2	TS_INHIBIT	TS6
	3	EXT_INTLCK1	TC11
	4	TC_TX2_STATUS	TC9
	5	TC_TX1_STATUS	TC7
	6	TX0-	
	7	-	No connected



	8	RX0-	
	9	EXT_INTLCK3	TC15
	10	TS_MOD_ON	TS12
	11	TS_COAX_TX1	
	12	TS_TX2_OFF	TS10
	13	TS_TX1_OFF	TS8
	14	TS_ALM_RST	TS15
	15	EXT_INTLCK2	TC12
	16	TC_TX2_FAULT	TC10
	17	TC_TX1_FAULT	TC8
	18	Common ground	
	19	TX0+	
	20	RX0+	
	21	Common ground	
	22	-	No connected
	23	TS_COAX_TX2	
	24	TS_TX2_ON	TS11
	25	TS_TX1_ON	TS9

4 Slave connector - DB25 male connector (private).

Connector	Pin	Description	Note
P3 on board E3K GA044	1	TC_INTLCK	TC5
	2	TC_INHIBIT	TC6
	3	-	No connected
	4	TS_TX2_STATUS	TS9 (if JP14 is in short circuit)
	5	TS_TX_ON	
	6	RXOUT-	
	7	-	No connected
	8	TXOUT-	
	9	-	No connected
	10	TC_MOD_ON	TC15(if JP10 is in short circuit)
	11	TC_COAX_TX1	TC11(if JP12 is in short circuit)
	12	TC_TX2_OFF	TC9(if JP11 is in short circuit)
	13	TC_TX_OFF	
	14	TC_ALM_RST	TC4
	15	-	No connected
	16	TS_TX2_FAULT	TS10(if JP15 is in short circuit)
	17	TS_FLT	
	18	Common ground	
	19	RXOUT+	
	20	TXOUT+	



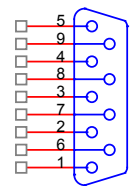
	21	Common ground	
	22	-	No connected
	23	TC_COAX_TX2	TC12(if JP9 is in short circuit)
	24	TC_TX2_ON	TC10(if JP8 is in short circuit)
	25	TC_TX_ON	

5 Interlock connector - Faston male connector 6.3.

Connector	Pin	Description	Note
J1 on board E3K GA044	1	Interlock combiner	
J2 on board E3K GA044	1	Interlock combiner	

6 IEEE485 connector - DB9 female connector to connect a telemetry.

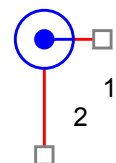
Connector	Pin	Description	Note
CN8 on board E3K GA044	1	TX1+	TTelemetry
	2	TX1-	
	3	RX1+	
	4	RX1-	
	5	Common ground	
	6	Common ground	
	7	Common ground	
	8	Common ground	
	9	Common ground	



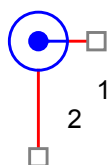
7 Mains connector - socket 230Vac 50/60Hz single-phase.

8 Splitter OUT connector - BNC female connector to RF outputs from splitter. They are 2 in ET10000-5, 3 in ET15000-5.

Connector	Pin	Description	Note
J2 on board 2PCB0443	1	RF Amp1	Output
	2	Common ground	
J3 on board 2PCB0443	1	RF Amp2	Output
	2	Common ground	
J4 on board 2PCB0443	1	RF Amp3	Output
	2	Common ground	



9 Exciter IN connector - N female connector to RF inputs from exciter. They are 2.



Connector	Pin	Description	Note
J1 on board 2PCB0443	1	RF Exc1 or Exc2	Input
	2	Common ground	

10 Fans - fans for cooling, only in CB15000 3-way. They are 3 and their technical characteristics are 12-28Vdc, 306Mc/h max.

11 Ventilation grid - to protect the rear fans.

12a,12b, 12c Amplifier IN- on ET15000-5 it is 7/8 type.

13a,13b Amplifier IN - on ET10000-5 it is 7/8 type.

14 RF OUT - on ET15000-5 it is 3" 1/8 type.

15 RF OUT - on ET10000-5 it is 1" 5/8 type.

5.4.3 CB15000 3-way and CB10000 2-way technical brochure

COMPOSITION

Control and measurement electronic section	Yes
Combiner exchange section	Yes
Dummy load section	Yes
Low power splitter section	Yes
High power combiner section	Yes

GENERAL DATA

Operating band	87.5 - 108 MHz
RS232/RS485	Yes
Points of measure	RF Sample
Displayed Parameters	More than 50 parameters displayed on a wide graphic LCD
Adjustments	From the frontal panel through LCD/from PC
Dimensions: Rack units	4U
Dimensions: W - H - D	48.5 - 17.5 - 70 cm
Weight	40 Kg
Number of cooling fans	6

INSTALLATION REQUIREMENTS

Power supply	230 Singlephase Version 50-60Hz VAC
Power consumption	35W (normal condition), 180W (with active fans)

COOLING SYSTEM

Cooling system	Forced air-cooling
----------------	--------------------

ENVIRONMENT

Temperature range (operating)	-5 - +45 °C
Temperature range (non operating)	-20 - +55 °C
Humidity range (operating)	95% @ 40 °C
Humidity range (non operating)	90% @ 55 °C
Altitude range (operating)	<3000 meters
Altitude range (non operating)	<15000 meters

TELECONTROL & TELEMETRY

Remote control	Yes
Remote Control at clean contacts	Yes
SNMP option	Yes (external)
Hostlink Protocol	Yes
Dual Driver option	Yes

5.5 Connections

Following pages shows connections scheme of the various units within the rack.
For Pin-Out connectors details you can find information in “User Manual” of each device.
For a better understanding of the scheme refer to the map below.

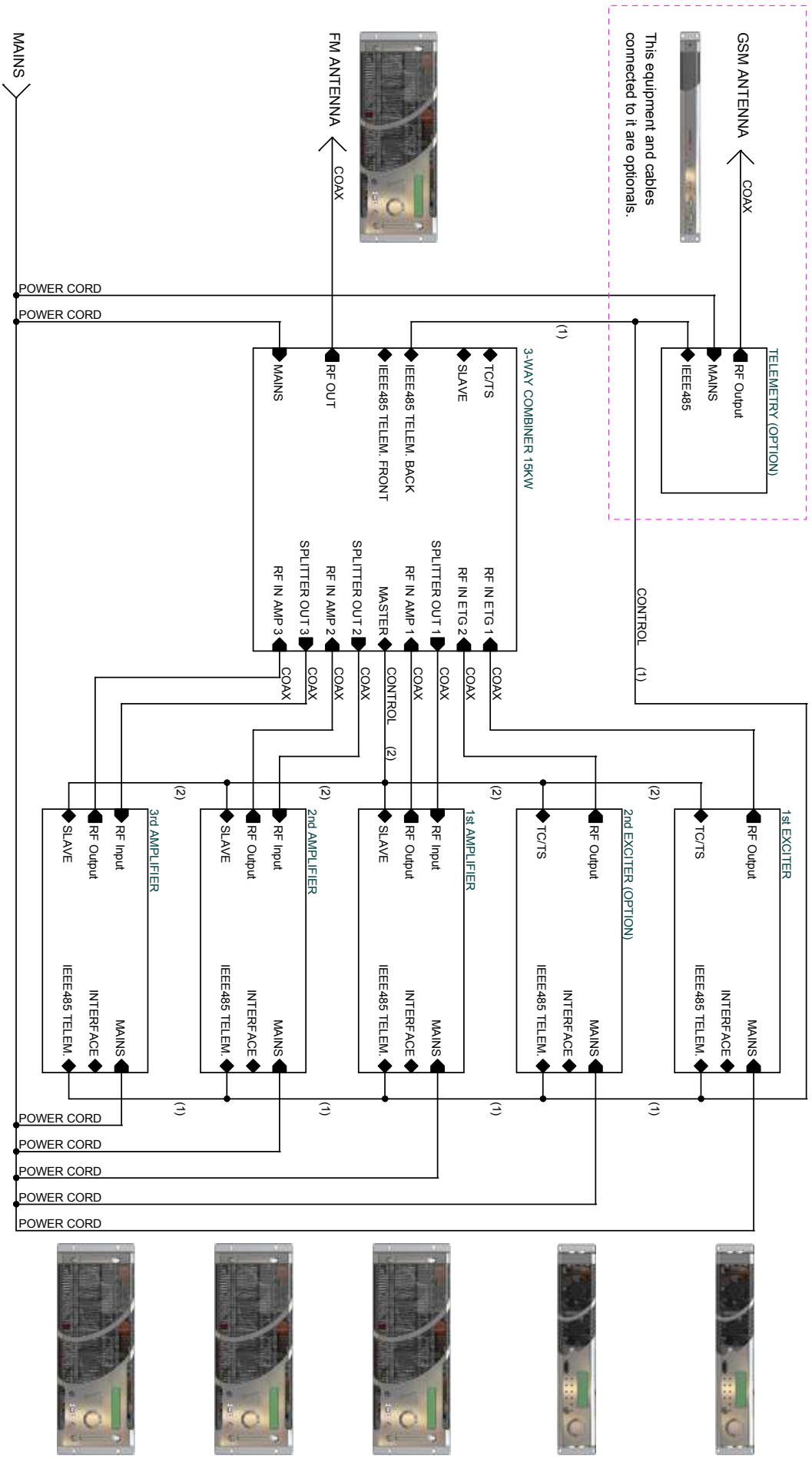
NOTES

POWER CORD : POWER CABLE CONNECTED TO EACH EQUIPMENT

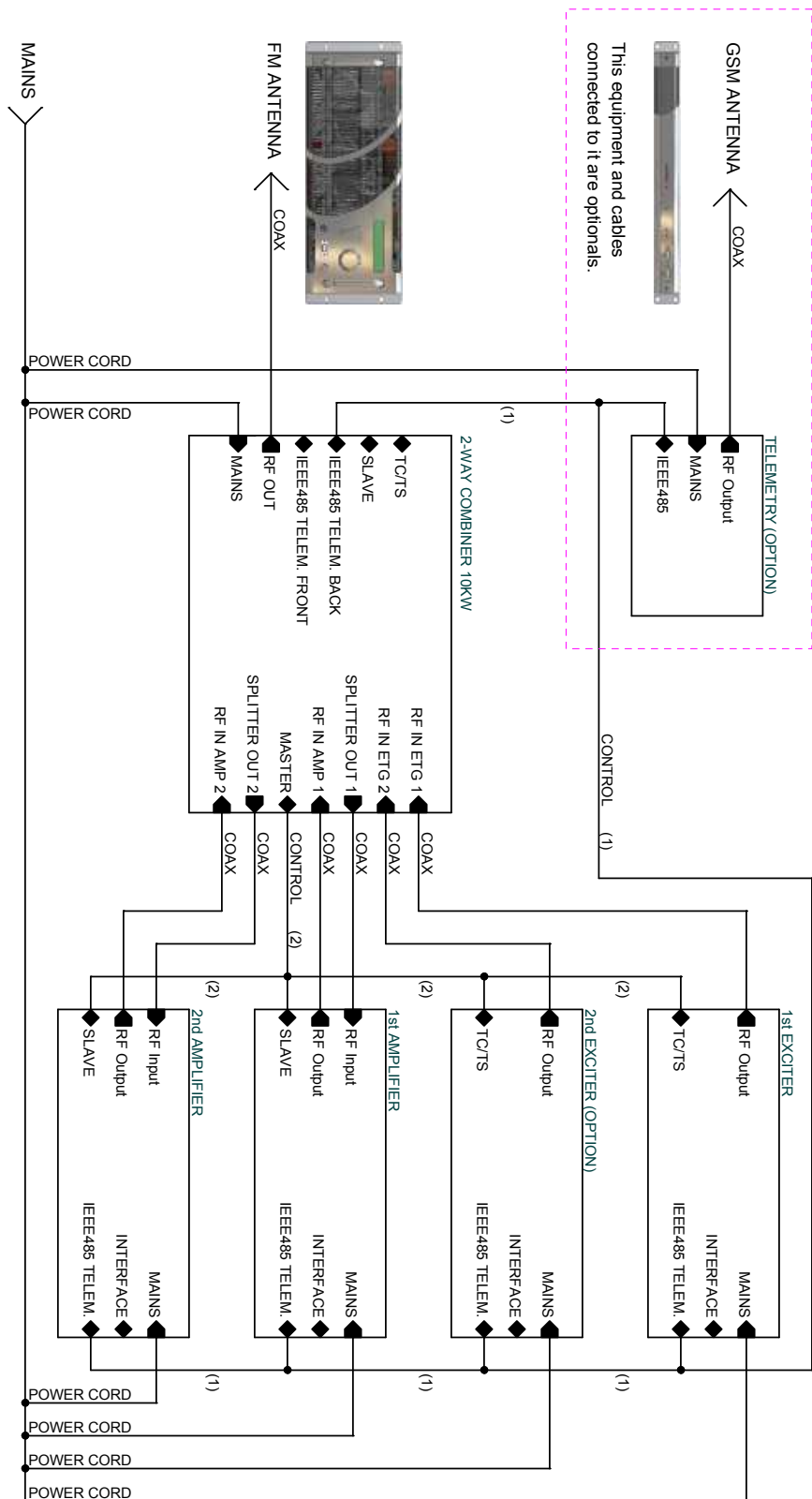
COAX : CONNECTORIZED COAXIAL POINT-TO-POINT CABLE

CONTROL : MULTICORE AND MULTI-CONNECTOR CABLE FOR SIGNALS

(1) and (2) : CABLES WITH MORE CONNECTORS



ET15000-5 connections



ET10000-5 connections

5.6 ET15000-5, ET10000-5 (and family variants) technical brochure

COMPOSITION	
Exciter	n°1 Indium series (depending on power)
Amplifier	n°3 Amplifier E5000-series (ET15000-5) n°2 Amplifier E5000-series (ET10000-5) (the specific power value of the amplifier depending on variants)
Combiner	n°1 3-way combiner IN 5000 - OUT 15000 with an internal load composed by 3 group of 6 resistance of 800W 50Ω (ET15000-5) n°1 2-way combiner IN 5000 - OUT 10000 with an internal load composed by 1 group of 6 resistance of 800W 50Ω (ET10000-5)
GENERAL DATA	
Output Nominal Power	15000W adjustable (ET15000-5) 10000W adjustable (ET10000-5)
Operating band	87.5 - 108 MHz
INSTALLATION REQUIREMENTS	
Power supply	230,380 Threephase Version 50-60Hz VAC
Power consumption	24KW (ET15000-5) 16KW (ET10000-5)
Current consumption @230VAC/Threephase	63A (ET15000-5) 42A (ET10000-5)
Current consumption @380VAC/Threephase	36A (ET15000-5) 24A (ET10000-5)
COOLING SYSTEM	
Cooling system	Forced air-cooling
ENVIRONMENT	
Temperature range (operating)	-5 - +45 °C
Temperature range (non operating)	-20 - +55 °C
Humidity range (operating)	95% @ 40 °C
Humidity range (non operating)	90% @ 55 °C
Altitude range (operating)	<3000 meters
Altitude range (non operating)	<15000 meters
TELECONTROL & TELEMETRY	
Remote control	Yes
Remote Control at clean contacts	Yes
SNMP option	Yes (external)

To details please see the specific datasheets of exciter and amplifier

5.7 Protections

The device has a protection system related to hardware and software.

5.7.1 Software protections

5.7.1.1 IPF (Intelligent Proportional Foldback)

Mechanism that is active on the combiner, acting at the level of each machine.

IPF is an intelligent system that reduces the output power in case of unbalanced load avoiding shutdown. This function is normally not activated, to act it is required activation by the user.

5.7.1.2 IPC (Intelligent Power Control)

It is in amplifiers modules. The IPC shall, under proper operation, to maintain constant output power of each amplifiers (and so of transmitter) by $\pm 1\%$ of target set, independent of changes in voltage, temperature or load.

The IPC also helps to optimize the RF efficiency, leading the MOSFET to work at maximum efficiency, minimizing the total power consumption.

5.7.1.3 Safety Management

The Safety Management is a set of algorithms that perform real-time analysis of transmitter functional state and operates to maintain the output power provided, depending on the type and extent of any anomalies (internal or environmental) to be arise. The Safety Management can command a reduction in output power depending on the anomaly seriousness that has occurred. The algorithms operate at different levels and in different sections of the apparatus: Thermal Management on RF group, Thermal Management on Dummy Load/Combiner, Current Management on power supply group, Thermal Management on power supply group, Fault management on RF group, Fault Management on power supply group, Cooling Management on fans group.

Thermal Management on RF group

It is in amplifiers and exciters modules.

If the temperature measured at the MOSFETs exceed the value of 72°C it involves an initial level of Derating, operating to reduce the temperature by reducing output power. The power reduction is the minimum possible to reach a thermal equilibrium at a temperature below 72°C . The reduction of output power, with this first derating, never exceeds 40%. In other words, the output power remains above 60% of that set by the user, and it does not activate “- 3 dB” alarm.

This first level of Derating is effective in almost all cases.

If this Derating is not enough (very rare), it involves a second level that, reducing the power, reaches a state of thermal equilibrium compatible with the safe operation of the device, even if under - 3 dB (the alarm is forwarded).

In case of ineffectiveness also of this second derating (case of external conditions that are not compatible with the safe operation of the apparatus) the transmitter is turned off.

In this case, THERMAL DERATING provides a hysteresis of 10°C before restore the apparatus to normal operation. After three unsuccessful attempts, the control logic block apparatus.

Thermal Management on Dummy Load and Combiner

It is in combiner.

If the temperature measured on Dummy Load or Combiner exceed the value of 90°C it involves an initial level of Derating, operating to reduce the temperature by reducing output power. The power reduction is the minimum possible to reach a thermal equilibrium.

brium at a temperature below 90 degrees. The reduction of output power, with this first derating, never exceeds 40%. In other words, the output power remains above 60% of that set by the user, and it does not activate “- 3 dB” alarm.

This first level of Derating is effective in almost all cases.

If this Derating is not enough (very rare), it involves a second level that, reducing the power, reaches a state of thermal equilibrium compatible with the safe operation of the device, even if under - 3 dB (the alarm is forwarded).

In case of ineffectiveness also of this second derating (case of external conditions that are not compatible with the safe operation of the apparatus) there is the shutdown. In this case, THERMAL DERATING provides a hysteresis of 10 ° C before restore the apparatus to normal operation. After three unsuccessful attempts, the control logic block apparatus.

If, however, splitter temperature exceed the value of 90 ° C a Derating mechanism is not operative, but there is an alarm.

Current management on power supply

It is in amplifiers and exciters modules.

It is activated when it exceeded the maximum current for continuous operation of power supply. This value is set below the limit of output current, and it represents the threshold that can be exceeded for short periods (up to 1 minute each time).

If this condition occurs, it is enabled “PSU current derating” and ALC management algorithm to normal operating condition is replaced by another in which the VDS and Bias control is given by power setting and, with even higher priority, by the current supplied from power supply.

The condition of current derating is turned off when the power supplied back to the value set by the user and if the maximum current supplied from power supply is less than or equal to the maximum allowable value for continuous operation.

Thermal management on power supply

It is in amplifiers and exciters modules.

The algorithm of power supply management, function of temperature, is the same as that in the RF group, and is connected logically “OR” to it.

The first level of Derating (which acts directly on the output power) is activated when the power supply temperature exceeds 75 ° C, while the second level is activated if, with the first ineffective, the temperature is not stable below this value. In this second case the output power is brought below the - 3 dB, with the same procedure already described in RF section.

Fault management on RF modules

It is in amplifiers and exciters modules.

It makes the maximum output power management depending on the number of RF amplifier modules being properly operated.

If one or more MOSFETs are considered failed (this happens when the current consumption is less than 10% of the average), RF output power is reduced to the expected value in the presence of failure experienced. The failure case histories and maximum power achievable are described in a complex table obtained through experimentation, and are designed to stop MOSFETs failure, that are still operating, by avoiding that are overly stressed by the mechanism of ALC (which would call these to supply the power output missing). To avoid an unnecessarily large number of alert SMS, during this stage are not sent: any alert SMS, if validated, will be sent only after the output power adaptation procedure, according to the parameters table, and only if -3dB condition is verified.

Cooling Management on fans group

The fan speed is adjusted, depending on the actual cooling needs, from a minimum of 60% to a maximum of 120% (these values may differ by different models of fan used). The cooling need is estimated on the basis of accurate temperature measurements that are made on RF MOSFETs and on power supply in the case of amplifiers and exciters, on Dummy Load/Combiner/Splitter in the case of combiner. The Cooling Management aims to extend the lifespan of the fans, to minimize the amount of dust that can be carried by the airflow, and to guarantee a safe operation of the apparatus, even under extreme conditions of temperature.

5.7.2 Hardware protections

The hardware protection system includes:

- fast electronic and fuse protection on power supplies;
- fast electronic protection on fans power supply ;
- fast protection against excessive reflected power (ROS/VSWR), caused by a strong mismatch of the load. This protection occurs when the value of reflected power exceeds 10% of the direct power;
- design based on redundancy, to eliminate the "SINGLE-POINT-FAILURE", those points which alone leads to a situation of OFF-AIR;
- construction of metal parts in aluminum or stainless steel, tropicalization of electronic boards, closure of air sensitive components with special screens, in order to have protection against corrosion.

5.8 Options

ET15000-5, ET10000-5 (and family variants) can be purchased with the different options.

- There are MPX, STEREO or AES/EBU options, according to exciter type (for details see ETG Indium series "User Manual").
- There are Dual Driver or Single Driver configuration, if the customer want or not a reserve machine.
- Telemetry in the rack.
- Rack with an electric discharger drawer.
- Rack with electromechanical drawer on top or on rear.
- Rack with cooling fan, technical pannel and output connector on top or on rear.

6 How to active

6.1 Antenna connection

Connect the combiner RF output connector to the antenna cable (to test the performance of the apparatus can be connected to a dummy load capable to consume the power supplied from the apparatus).

6.2 Essential connections to operation

Usually the equipment is sent to customer already installed and with connections between the individual machines made.

If, however, it's necessary to restore the structure, please to read "Front panel", "Rear panel" and "Connections description" paragraphs.

After checking the exact location in which to place these modules in the rack, insert these on stirrups and stop when you arrive at the side uprights. Secure the module with the screws provided.

About connections **you must always give priority to the grounding cable.**

For each module:

- enter phase and neutral conductors on the terminals. Secure the cables by tightening the screws with a screwdriver;
- engage RF output connectors and lock securely;
- engage RF input and signal cables into the connector.

Verify, on the rack, the presence of a connector already wired with a bridge (fig. 1).

Without this wiring (interlock) the device will not work.

fig.1



6.3 Mains connection/disconnection

The apparatus is designed for three-phase 380-400VAC power (as indicated on the label). It can, however, be transformed into a three-phase 230VAC.

Verify that the available power supply is adequate.

In the rack, we usually have electromechanical drawer and electric discharger drawer.

In the case of the type without electric discharger drawer, open the panel to access at the breakers compartment (the first at the top left is the general breaker).

Use cables with suitable section (please see installation parameters below), matching the correct sequence of phases and neutral.

Close the panel.

In the case of the type with electric discharger drawer, electromechanical drawer and electric discharger drawer are already electrically interconnected.

You must only do the electrical connection to the network station.

Here, however, the general supply voltage input of the entire system must be at the electric discharger drawer.

fig.2



Remove electric discharger drawer, use cables with suitable section (please see installation parameters below), matching the correct sequence of phases and neutral (fig.3).

Before operate, **ensure that the cabinet is strictly unarmed.**



Use, to phase and neutral conductors, ferrules; to ground connector an eyelet. For ground is better to create a mechanical and electrical contact that is as robust as possible (for example, be made to the metal frame of the breaker compartment or copper bar of electric discharger, if present).

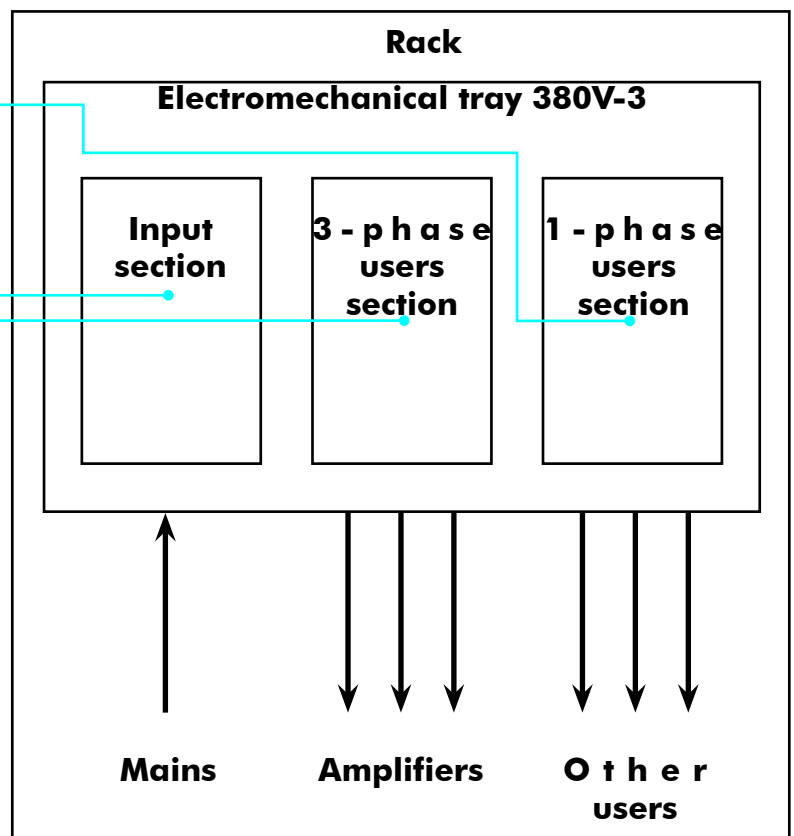
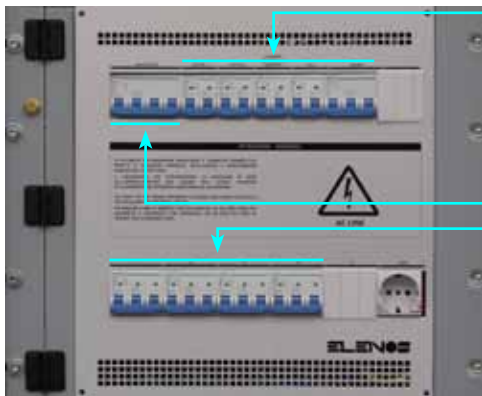
The blue cable is neutral connector, yellow/green is ground connector, the remainder are the phases.

Always the first must be ground cable.

Warning: if you had a need to disconnect the equipment from the network, do backwards, first disarming the cabinet of the workstation.

The cabinet is conceptually divided into three sections:

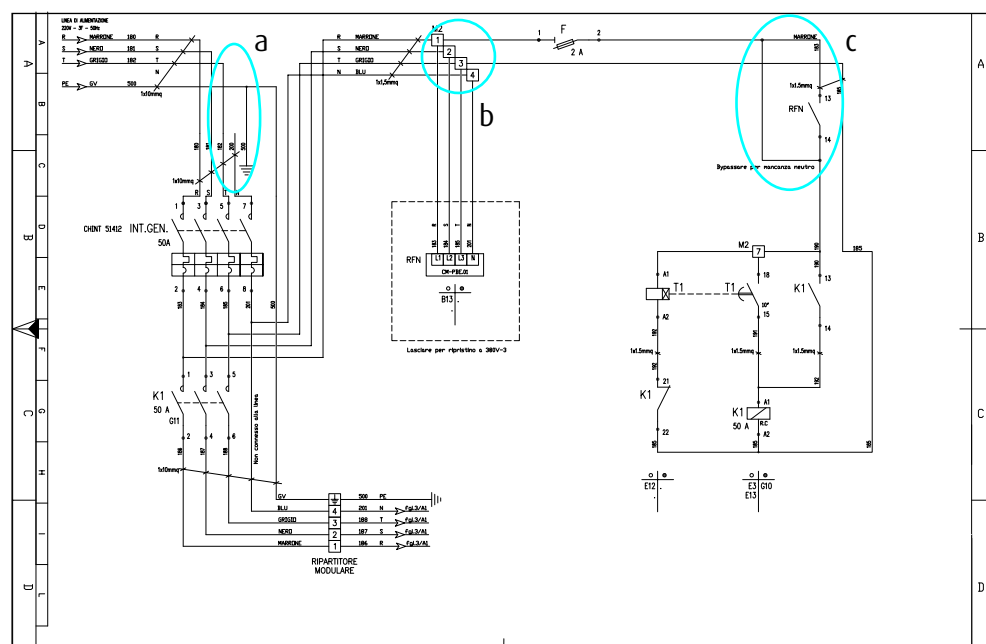
- Input section _ here there are the main power switch, the contactor, the detector of phases and neutral, the timer;
- Three-phase section _ here there are the breakers to supply single and three-phase equipment;
- Single-phase section _ here there are breakers to supply only single-phase equipment.



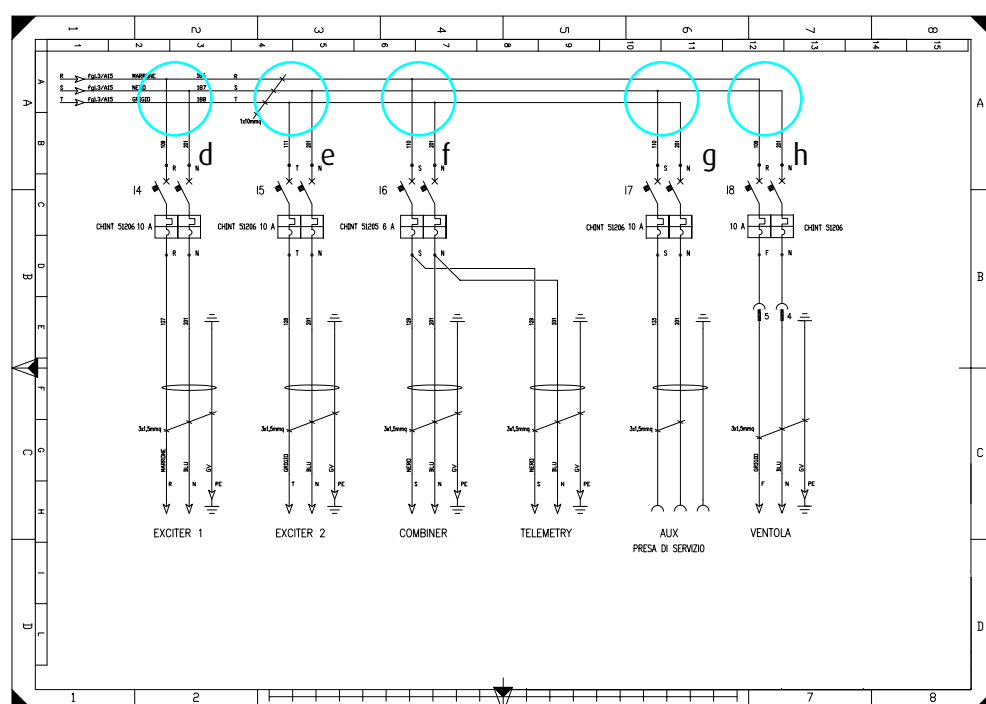
If you need to make the transformation to three-phase 230VAC, should proceed as follows (this can be done only by qualified personnel):

- Input section _ Must be eliminated the neutral (a), while the phases are linked. It should also be moved between two phases timer connection (b), which initially was between a phase and neutral. The neutral wiring can be left inside the electro-mechanical drawer, in order to allow the subsequent restoration.

The phase and neutral detector can not work properly, it must be bypassed with jumper (c).



- Three-phase section _ This section remains unchanged. The neutral wiring should not be used and, therefore, should not be transferred to the equipment. Instead, must be tested, with current clamp, that the current absorbed by amplifiers are lower reach of the breakers. For the adjustment of amplifiers refer to the specific apparatus manual.
- Single-phase section _ The neutral conductor is no usable because it does not electrically connected, so the voltage is taken between phases linked, making sure to spread as fairly as possible the various loads between phases R, S and T. "d", "e", "f", "g" and "h" shows the connections to be made for different users, but you can make changes if you should find a significant imbalance in the absorption. If there is no a knowledge of this possibility it's better follow this scheme.



	ET15000-5	ET10000-5
Typical consumption	24KW	16KW
Typical current absorption @230VAC/three-phase	63A	42A
Typical current absorption @380VAC/three-phase	36A	24A
Cable diameter @ 230VAC/three-phase (minimum recommended)	25mmq (3AWG)	16mmq (5AWG)
Cable diameter @ 380VAC/three-phase (minimum recommended)	16mmq (5AWG)	10mmq (7AWG)
Breaker flow @ 230VAC/three-phase	100A	62A
Breaker flow @ 380VAC/three-phase	63A	40A

fig. 4



Established the desired configuration, to verify the ventilation circuit. The fan must pull air from the rack regardless of its position in this. The direction of rotation (with three-phase motor) depends on the sequence in which phases are connected. Just make sure it turns blowing air out (fig. 4). If the rotation is in reverse mode to exchange terminal input of two phases. To turn temporarily the circuit breaker that controls the fan.

Warning: during this phase to ensure that nothing can slip into the protective grille of the fan.

Then proceed to arm breaker, starting with the general.

Warning: do not deliver RF power before you have connected to the antenna the apparatus.

6.4 Factory settings

Each unit in the system has standard factory settings. If they match with the needs of the user is sufficient to set powers and to activate the transmission. To know the factory settings of exciters and amplifiers refer to the specific equipment manuals. Regarding the combiner:

FACTORY PARAMETERS SETTING FOR THE COMBINER	
Output power	0W
Dual Driver configuration (if present)	TX1 : ANT (to antenna) TX2 : LOAD (to dummy load)

If, however, there is a need to modify these, please refer to "Main parameters setting" of this section.

6.5 Main parameters setting

6.5.1 Exciter setting

After have to arm the circuit breaker of the exciter, you proceed to check and set the frequency, power, level and signal audio parameters. For the procedure please see the specific exciter manual.

For these settings to leave the exciter in RF OFF status.

6.5.2 Amplifiers setting

After have to arm the circuit breaker of the amplifiers, it is sufficient to verify that the power comes to them, because after activation of the transmission, that occurs through the combiner, the power is already divided equally between amplifiers.

6.5.3 Combiner setting

After have to arm the circuit breaker of the combiner, you proceed to set the target power and Dual Drive flags (if this configuration is present).

With the apparatus in "LOCAL" and "STBY" rotate the encoder until to position the cursor below the last digit of the power target.
Press once to make this value editable.



Turn the encoder until the desired power, then confirm the new value by pressing once the encoder.



Now press the encoder to enter in the combiner menu. Found the Dual Drive item press again.



The default parameters are : first exciter (TX1) is to antenna, through the amplifiers, second exciter (TX2) to a dummy load.

Turn the encoder until to position the cursor under the word CHANGE.

Press to activate the exchange.



6.6 Turn on

The devices can operate both locally (Local) and remotely (Remote) and in both cases can go to power.

However, the local mode should be used in the presence of a technician in the station, example to repair or change some settings, while the remote mode is for the normal functioning.

For parameter settings described above to get in Local mode.

Warning : it's essential, **before proceed with the activation of the transmission, check that the amplifiers and exciters are in Remote mode, and before leaving the station, check that the combiner is set to that mode,** otherwise not be available SMS communication protocol and a good automatic management of transmitter modules.

The transition from one operating mode to another takes place rotating a quarter turn of the key. The local mode is signaled by a blu LED on the apparatus.

If all settings have been properly implemented and wiring inspection did not reveal any abnormality it can now give the RF ON command at the combiner.

This will involve that the "master" exciter get in power. The exciter will rise to power in a short time.

During this operation to see the combiner display and to check in real time that the

How to active

forward power is correctly and that will not occur unexpected phenomena of ROS.
Normal operating condition are :

Exciter 1	Led MAINS on Led ON AIR on Led PLL LOCK on Other led off
Exciter 2 (if present)	Led MAINS on Led ST-BY on Led PLL LOCK on Other led off
Combiner	Led MAINS on Led ON AIR on Other led off
Amplifier 1	Led MAINS on Led ON AIR on Other led off
Amplifier 2	Led MAINS on Led ON AIR on Other led off
Amplifier 3	Led MAINS on Led ON AIR on Other led off

In Dual Driver version can be a good rule, before leaving the station, a test to switch the reserve.

To do this, turn off the "master" exciter, disarming the breaker, and verify that the reserve exciter is activated, bringing the output power to target level.

Verify, then, the reverse step, turn on the "master" exciter and turn off the reserve.

Everything works properly when switching is performed on the first exciter and power levels return to those previous.

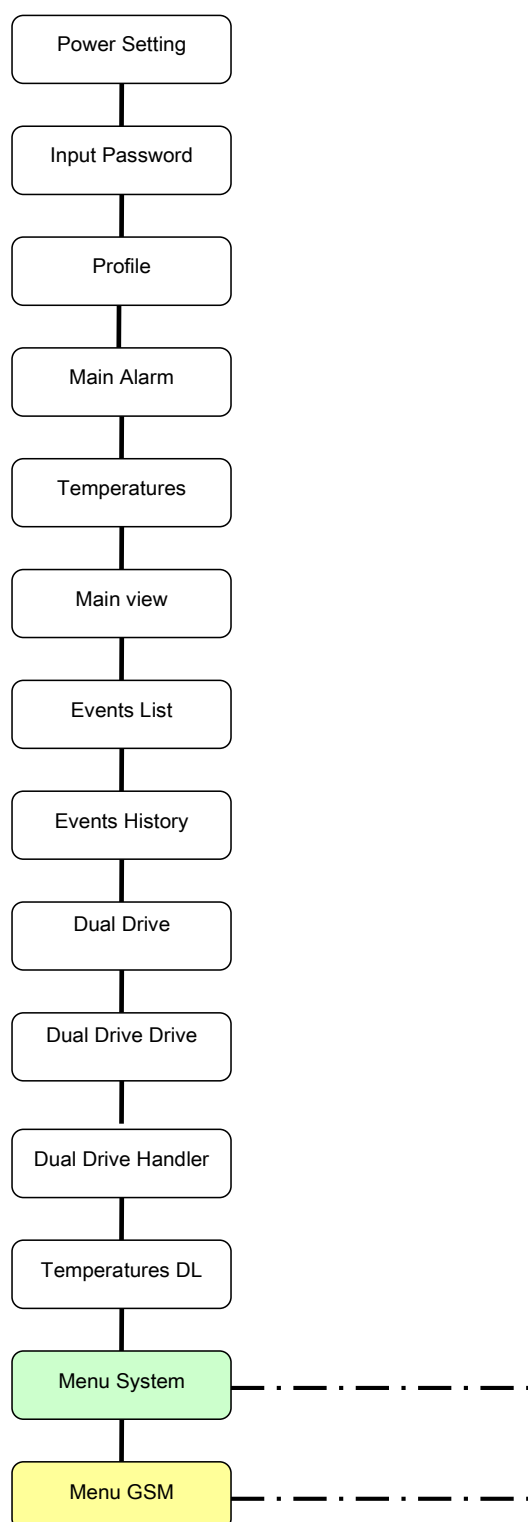
Now you can restore normal operation.

Warning: you should keep a copy of the key in a safe place of station.

7 Use instructions

7.1 User interface

ET15000-5 (ET10000-5) user interface is in CB15000 3-way (CB10000 2-way) combiner.
The menus displayed are the following:



Main Menu

7.1.1 Power Setting

The screen layout is :

< FWD: xxxxxW REF: xxxxW
TARG: xxxxxW RF: -ON- PR : x

Here are shown forward and reflected power and it is possible to set target power, to enable transmission, to enable the profile. The customer must be enabled as "USER".



7.1.2 Input Password

The screen layout is :

< E15000 ELENOS
Password: xxxx

Some items are confidential and therefore visible or editable only in accordance with authorizations. Here you can enter the password.



7.1.3 Profile

The screen layout is :

< CUR PR: x xxxxx xxxxx
xxxxx xxxxx xxxxx xxxxx

Here the profile is enabled and are shown power values of each profile.



7.1.4 Main Alarm

The screen layout is :

< 000 CORRECT WORKING
FWD: xxxxW RST A.: -----

Here are shown the last alarm or the correct operating condition. It is shown the forward power. From here you can reset the alarms.

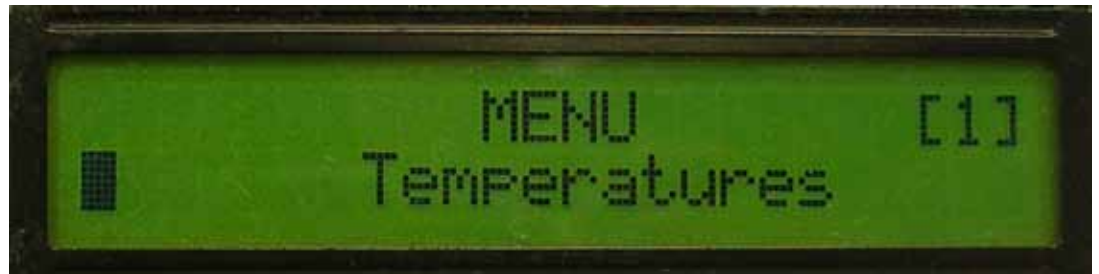


7.1.5 Temperatures

The screen layout is :

< T(C) DL: xxx.x Env: xx.x
Exc.R.Load: xxx.x Fan: x

Here are shown dummy load temperature, environment temperature, temperature of reserve exciter load, fans speed.



7.1.6 Main View

The screen layout is :

< FWD: xxxxxW REF: xxxxW
EF: xx.x% IDS: xx.xA VDS: xx.xV

Here are shown: forward power, reflected power, efficiency, current, voltage.



7.1.7 Events List

The screen layout is :

< 000 CORRECT WORKING
1) 006 -3dB CARRIER

Alarms list. Those marked with the letter "A" is still active at that time. For more detail, please see "Alarms/events list" paragraph.



7.1.8 Events History

The screen layout is :

< 000 CORRECT WORKING

1) xx/xx xx:xx:xx

For each alarm is given information about date and time at which it occurred.



7.1.9 Dual Drive

The screen layout is :

< D.D.Auto: x Retr. x Of x

Tx1: x Tx2: x CHANGE

Setting of exchange mode in manual/automatic and setting of maximum times number where you try to activate the exchange. Information of which exciter is on antenna and on load. From here you can force the exchange, by "CHANGE" command.



7.1.10 Dual Drive Drive

The screen layout is :

< D.D.Auto: x Retr. x Of x
Tx1: x Flt: x Tx2: x Flt: x

Setting of exchange mode in manual/automatic and setting of maximum times number where you try to activate the exchange. Information if exciter are "On Air" or not, if there are alarms or not.



7.1.11 Dual Drive Handler

The screen layout is :

< Auto: x Coax P1: x P2: x
Go1: x On1: x Go2: x On2: x

Setting of exchange mode in manual/automatic, relay status, to set an exciter on antenna or an load.



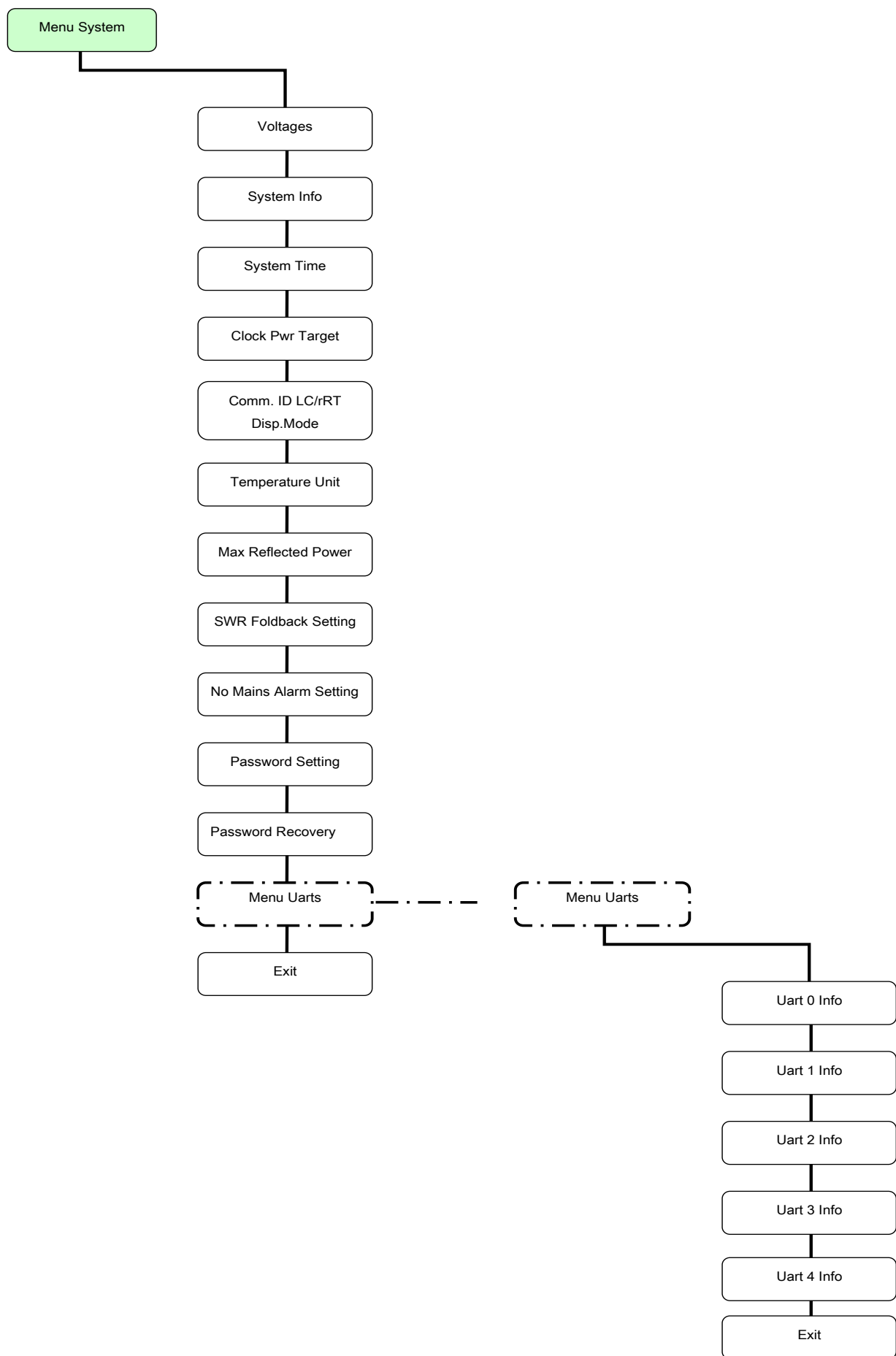
7.1.12 Temperatures DL

The screen layout is :

**< T(C)DL Max xxx.x Env xx
xxx xxx xxx xxx xxx xxx**

Here are shown maximum dummy load temperature, environment temperature, temperature measured on each module.





7.1.13 Voltages

The screen layout is :

< Voltages (V)

V.: x.xx xx.xx

Here are shown the voltages.



7.1.14 System Info

The screen layout is :

< VS: x.xx VP: x.xx

ON AIR TIME: xxxx:xx:xx

It is given indication on the software version, protocol version, operating time of the equipment.





7.1.15 System Time

The screen layout is :

< C: xx xx/xx/xx xx:xx:xx
 ==>xx xx/xx/xx xx:xx:xx

From this mask you can set the day of the week, date and time.



7.1.16 Clock Pwr Target

The screen layout is :

< Target Pwr Mode Fixed
 For All 24 Hours: xxxxx

< 00:00 am to 00:59 am

PWR TARGET (W): xxxxx

.....

< 11:00 pm to 11:59 pm

PWR TARGET (W): xxxxx

This item can be accessed only by "SYSTEM" password.

Besides standard adjustment of the power it is possible set the power in time slots, in order to save the energy.

To set the power in time slots it must be inhibited the option that makes fixed the power for the entire period of 24 hours.

To set "For All 24 Hours" as FALSE.

it displays the list of time slots that has divided the entire day. Each slot is of an hour.

To move on time slots field and press the knob to make it editable. Set the new target power by turning the encoder clockwise/counterclockwise to increase/decrease the power, then press again to confirm.



7.1.17 COMM. ID LC/RT DISP. MODE

The screen layout is :

< T.ID : xx A.ID : xx

SHOW DIP. ON REMOTE : xxxxx

From here you can set the addresses and activate the display so that the menus remain displayed even with the REMOTE mode.



7.1.18 Temperature Unit

The screen layout is :

< Temperature unit
xxxxxxxxxxxxx

To set temperature measure unit.





7.1.19 Max Reflected Power

The screen layout is :

< REFL PWR ENABLE: xxxxx
MAX REFL PWR (W): xxxxx

The maximum reflected power allowable is 10% of rated output. From here you can set a lower value.

Warning: in this case is not guaranteed correct operation of foldback.



7.1.20 SWR Foldback Setting

The screen layout is :

< SWR Foldback Settings
SWR Foldback Enable: x

From here you can enable foldback.



7.1.21 No mains Alarm Setting

The screen layout is :

< No Mains Settings

SMS Enable: x Time: xx

This item can be accessed only by manufacturer password. It is possible to set an alarm in the absence of electricity for a time period set.





7.1.22 Password Setting

The screen layout is :

< T.ID: xx A.ID:xx

Psw User: xxxx Sys.: xxxx

The unit comes with standard passwords.

The password can be used to increase the level of security are: the password called "USER", which is used to set the base settings (eg. all except those operated by the "SYSTEM" password); password called "SYSTEM" for make visible and accessible the following items:

- Clock Pwr Target
- Max Reflected Power
- SWR Foldback Setting
- Password Setting
- -3dB Allarm Setting
- a section of GSM menu

The user, through this mask, has the opportunity to re-set passwords than the standard values provided by the manufacturer. From here you can set the addresses.



7.1.23 Password Recovery

The screen layout is :

< Unlock Code : xxxx

Password Recovery: xxxx

If you forget your password you can contact Elenos. You must provide to Elenos the "Unlock Code", in this screen. Elenos provides a password for a period of 24 hours to be included in this screen in the "Password Recovery". Then you must define a new password in "Password Setting".



7.1.24 Uart Info

The screen layout is :

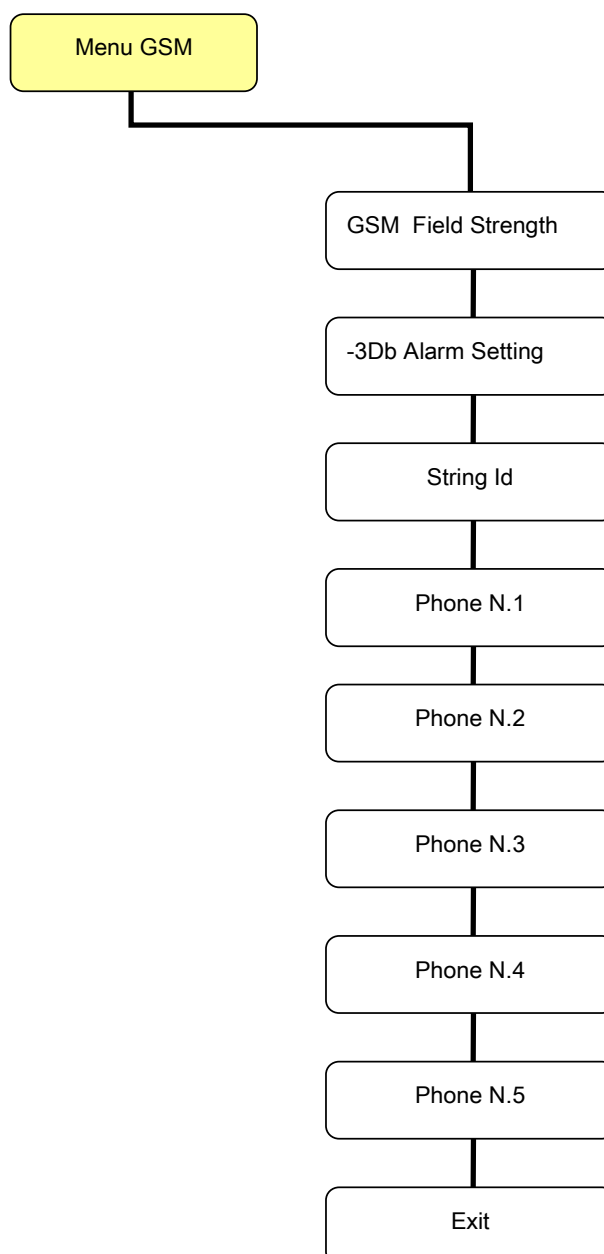
< tx In: xxx Out: xxx

Rx In: xxx Out: xxx Err: xx

Control menu (private) for testing the serial ports, read-only mode.







7.1.25 GSM Field Strength

The screen layout is :

< SMS En: x PSTN En: x
Field Strength dBm: - xxx

It is given information if the device is allowed to send and receive SMS, if it is in call mode through modem analog line. It is displayed the GSM coverage field. For more detail see the section "SMS List".





7.1.26 -3dB Alarm Setting

The screen layout is :

< -3Db SMS Settings

FWD OVER 2/3 (-1,76DB): x

This item is modifiable only by "SYSTEM" password.

In this screen you can enable sending -3dB alarm through SMS, that is no longer active to overcome the 2/3 of the power set.



7.1.27 String ID

The screen layout is :

< String Id: xxxxxxxxxxxx
Field Strength dBm: - xxx

This item can be accessed only by "SYSTEM" password.

Here you can set station name. It is shown the field strength of the GSM signal.



7.1.28 Phone N.1, Phone N.2, Phone N.3, Phone N.4, Phone N.5

The screen layout is :

< 1: xxxxxxxxxxxxxxxxxxxxxxxx
En: x Cm: x St: x Gl: x PC: x

This item can be accessed only by "SYSTEM" password.

With the transmitter can "talk" more SIM cards.

The number is defined with the customer.

In these masks are set phone numbers in international format and permissions.

The number can be enabled globally for transmission and reception of SMS (en.), to send commands (cmd.), to request and receive state machine (sts.), to receive the echo of commands sent by any other numbers (glb.), to get SMS text or digital (PC.).



7.1.29 Exit

To exit by the sub menu and go to the next level.

7.2 Alarms/events list

ET15000-5 (ET10000-5) alarms are managed by CB15000 3-way (CB10000 2-way) combiner, where there is the "Alarms Management" module.

To check the alarm conditions physical and logical digital inputs are used.

Each input status is sampled and then the condition is logically drawn by a combinatorial network, to define if the alarm or signal are active.

Response time is 100ms minimum.

This module is repeatedly performed with the same priority as the ALC management, in order to constantly monitor the occurrence of alarm causes, and thus to operate in good time.

In a register is stored the recent events sequence, with date and time of activation.

The possible alarms/events list is:

Alarm/event	Description
"000 CORRECT WORKING"	It indicates the correct functioning.
"001 SYSTEM RESET"	It indicates that the alarm reset is in progress. All the alarms stored and no longer active are removed from the list.
"002 EEPROM CHKSUM ERROR"	It indicates that the persistent data in memory are no longer reliable and the machine is reconfigured with the default parameters.

"003 BLOCKED"	It indicates that the machine is blocked after 6 attempts to restore every 5 minutes for 3 times, coming in an hour break and repeating the procedure within 24 hours. At the end of 24 hours is required a reset by the user to enable the apparatus restart.
"004 STOP"	It indicates that the device is in stand-by, ready to start without alarms.
"005 -3dB CARRIER"	It indicates that the device is providing at least 3dB less power than the set target, at least one minute in boot or five seconds steady.
"006 HIGH REF PWR"	It indicates the presence of a level of output reflected power too high, which means turning off the equipment in three block out.
"010 RF THERMAL DERATING"	It indicates a too hot temperature on amplifiers, which implies a reduction in maximum power output.
"011 RF OVER TEMPERATURE"	It indicates a maximum operating temperature overcoming for RF amplifier stage, resulting in shutdown of the machine in three blocks out. This protection occurs in extreme cases where the mechanism Derating was not enough to return to normal temperature values.
"021 EXTERNAL INTERLOCK"	It indicates that interlock is active.
"023 ON AIR"	It indicates that the device is functioning properly and is being transmitted.
"024 POWER UP"	It indicates that is being inserted in the storage an alert regarding the restart of the device.
"025 POWER DOWN"	It indicates that is being inserted in the storage an alert regarding the shutdown of the equipment.
"027 EXCITER EXCHANGE"	It indicates that there was an exchange of the exciter.
"028 EXCITER SYNC COAX"	It indicates that an assessment of relay position was made.
"029 INCORRECT COAX WORK"	It indicates that there is a relay problem.
"030 ON LOCAL SLAVE AMPLIFIER"	It indicates that one or more amplifiers are in LOCAL mode.
"031 TIMEOUT SLAVE AMPLIFIER"	It indicates that one or more amplifiers have communication problem.
"032 EXCITER 1 FAULT"	It indicates that exciter 1 is fault.
"033 EXCITER 2 FAULT"	It indicates that exciter 2 is fault.
"034 UPS ACTIVE"	It indicates that UPS is active.
"035 SW INTERLOCK INCORRECT WORK"	It indicates an interlock signals hardware failure.
"037 EXCITERS FAULT"	It indicates that both exciters are fault.
"038 WORKING MODE COMBINED"	It indicates the machine operation in a combined system.
"039 USER ENV TEMP OUT LIMIT"	It indicates a deviation from the conditions to set by user in relation to environment temperature measured from the apparatus.
"040 USER RF TEMP OUT LIMIT"	It indicates a deviation from the conditions to set by user in relation to RF modules temperature.
"041 USER FRW PWR OUT LIMIT"	It indicates a deviation from the conditions to set by user in relation to forward power.
"042 USER RFL PWR OUT LIMIT"	It indicates a deviation from the conditions to set by user in relation to reflected power.

7.3 SMS list

7.3.1 SMS command (send)

You can send SMS with the text set here, to run these commands:

Use instructions

Command	SMS text
Power setting to xxxxx	PWR xxxxx
Stand-by setting	STBY
Stand-by setting	OFF
On Air setting	ON
Status demand	STS
Reset demand	RES
Exciter 1 On air	EXC1
Exciter 2 On air	EXC2

7.3.2 SMS status/alarm (reception)

You can receive SMS with this text :

SMS text	Description
Exxxx ID xx	Device description with ID number
SMS String	10 bits customizable string
+39xxxxxxxxxx	Telephone number last command
STBY	The device is in Stand-By (Off)
-3dB Alarm	The device is under -3dB threshold
Status	Reply to status SMS
Command	Command confirmation
No mains xx m	The device was is Stand-by for the defined time (minuts)
RedPwr	The machine is working in power limitation due to the UPS
Exc.Exchange	There was an exchange of the exciter (Dual Driver)
xxx warning SMS	Stop cause or main signal
FWD yyyyy W	Direct power yyyyy (W)
REFL yyyyy W	Reflected power yyyyy (W)
TEMPMAX yyyyy F/C DUMMY LOAD	Max dummy load temperature yyyyy (F or C)
TEMPENV yyyyy F/C	Environment temperature yyyyy (F or C)
EXC.1	Exciter 1 status
EXC.2	Exciter 2 status
EXC.FAULT	Both the exciters are stopped

7.4 Optional equipment can be connected

Transmitter may be connected externally to the following units:

- PC;
- TELEMETRY;
- EXCHANGE UNIT and/or AUDIO MATRIX UNIT.

7.4.1 PC connection

This connection is useful to examine in detail the operating parameters, for example during the performance evaluation or repair activities.

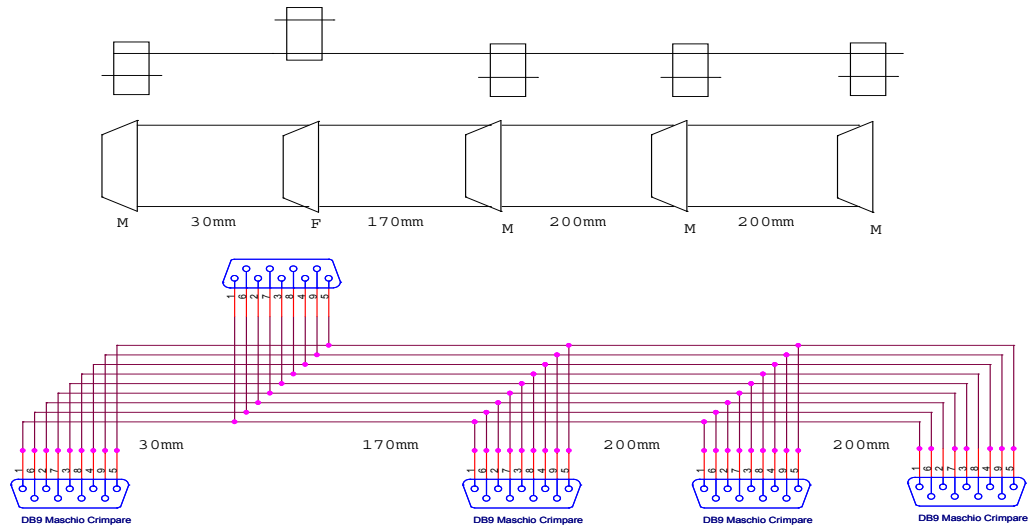
To PC connection an interface cable (ELENOS code CAB0365_0) must be inserted into the "Interface" connector, DB9, on the front panel of amplifiers and combiner; and add an other cable (ELENOS code CAB0068_0) to insert to PC. It will have visibility of all the machines. Otherwise connect directly the second cable, above, to combiner, so you only have access to the combiner interface.

This cable ships with the product.

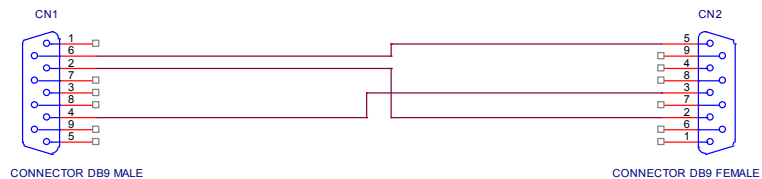
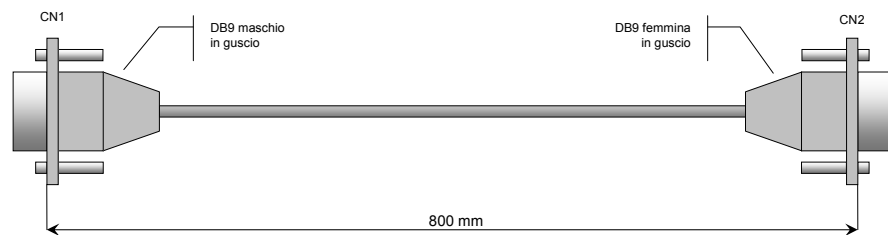
The link may also be a machine running.

Cable to PC connection

CAB0365_0

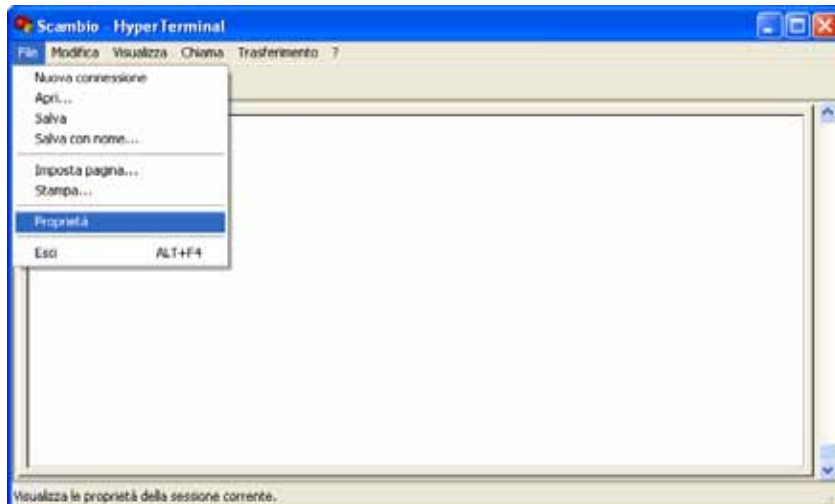


CAB0068_0

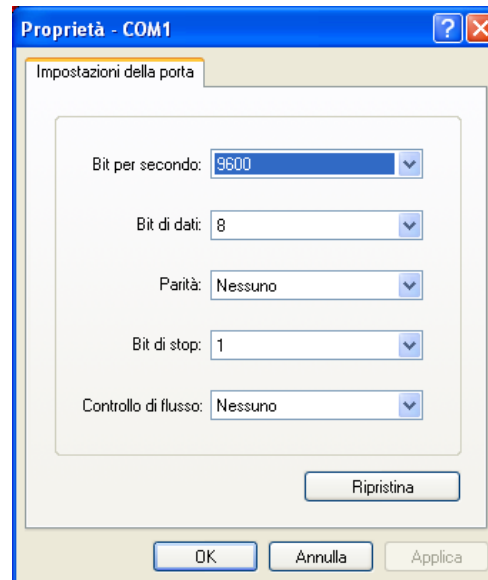
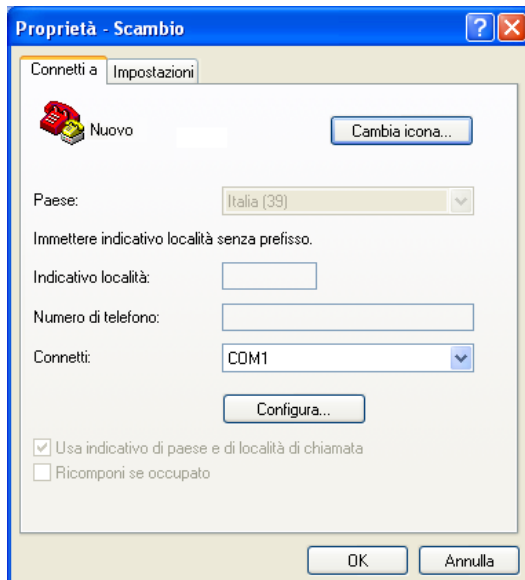


For viewing it's sufficient Windows HyperTerminal program.

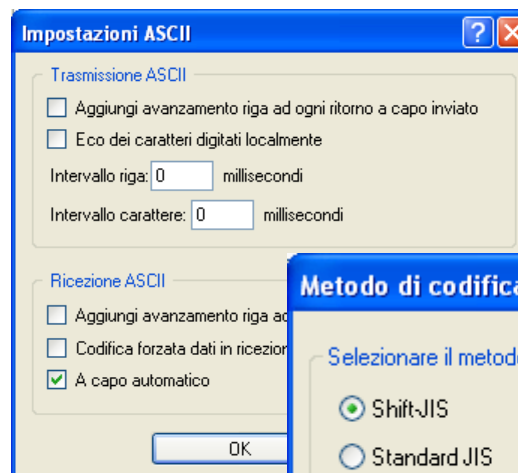
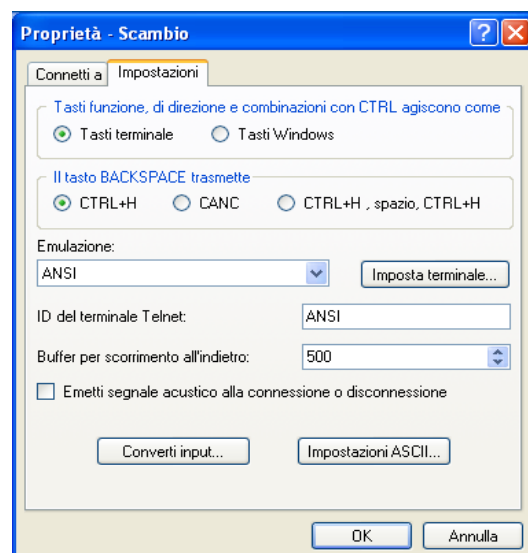
You must activate Hyperterminal from "Programs" -> "Accessories" -> "Notifications", or other equivalent program available. From the "File" menu select "Properties."



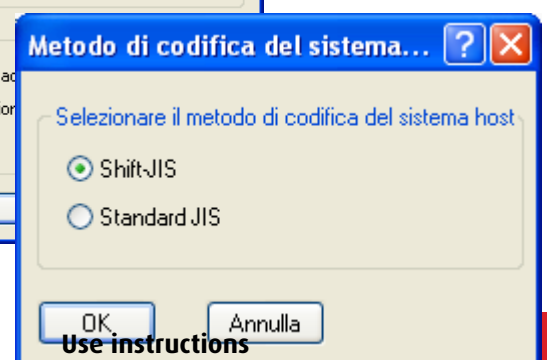
In the mask opens you select the port from which to communicate (in the current example is COM1), then press the Configure button to enter in the settings screen. The parameters to set are: 9600 bits per second, 8 data bits, no parity, 1 stop bit, no flow control.



To Verify that the other masks on Hyper Terminal contain the settings as below. Confirm by pressing the "OK".

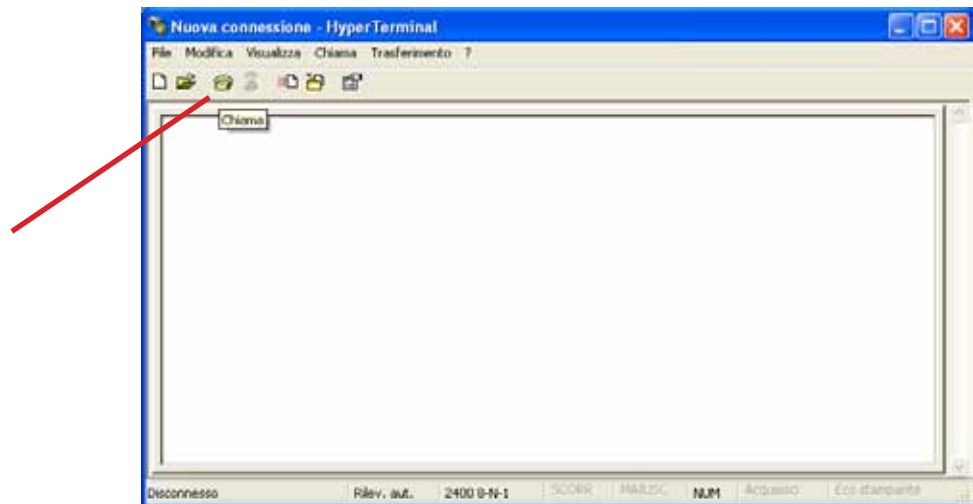


Hyperterminal settings



Use instructions

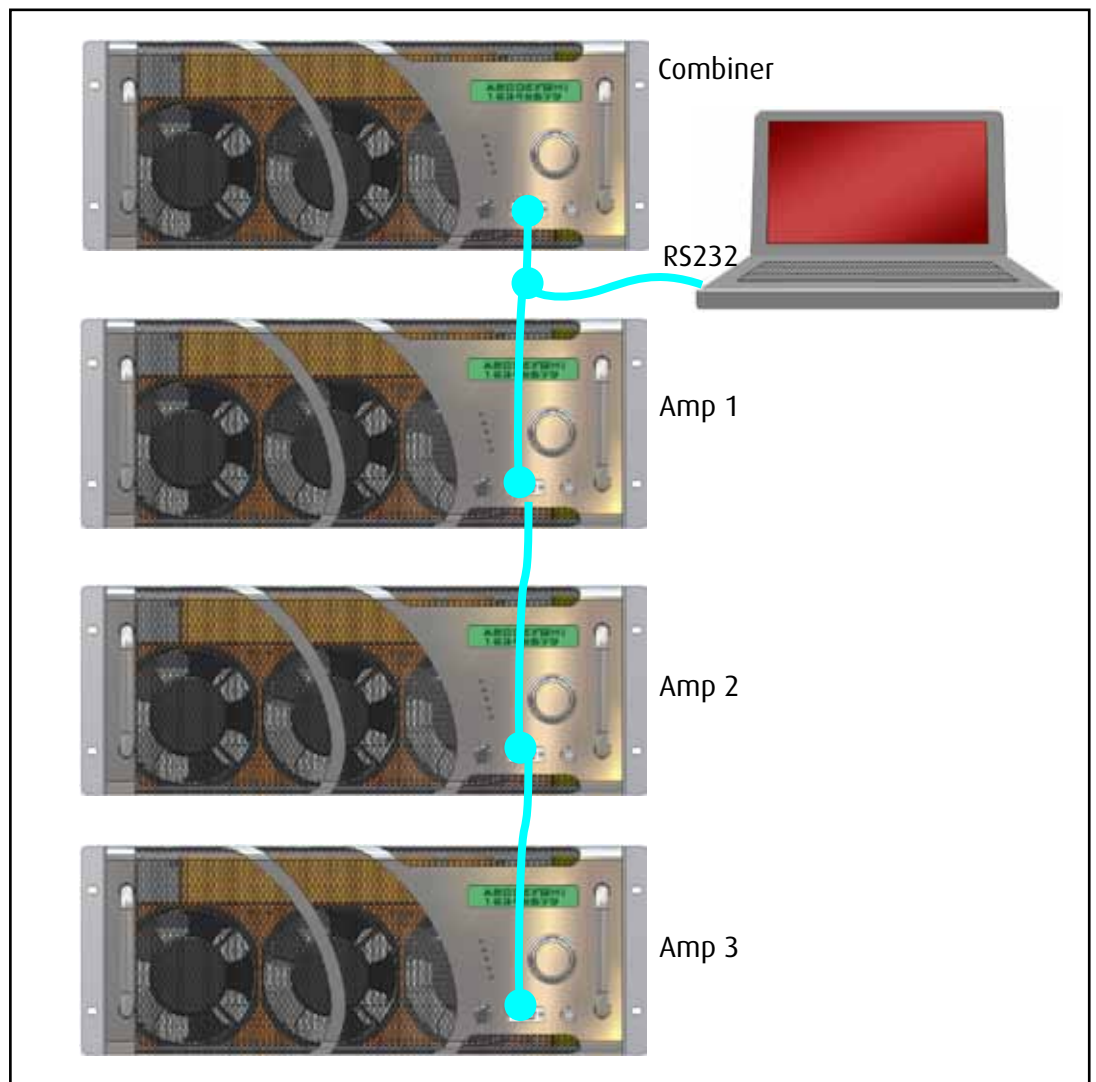
At the end, activate the connection by pressing the Call button.



To communicate with the equipment you need to make a final step, to put the address. This step is crucial because each device, to be queried and managed remotely, must be properly addressed. In this case, the following alpha-numeric sequence must be put: 2 1 i x x. With xx the address of the machine.

If the machine is in local mode you can only see data, if the machine is in remote mode you can also set the parameters directly from the PC.

Connection mode



7.4.2 Telemetry connection

In the rack can be inserted a telemetry unit.

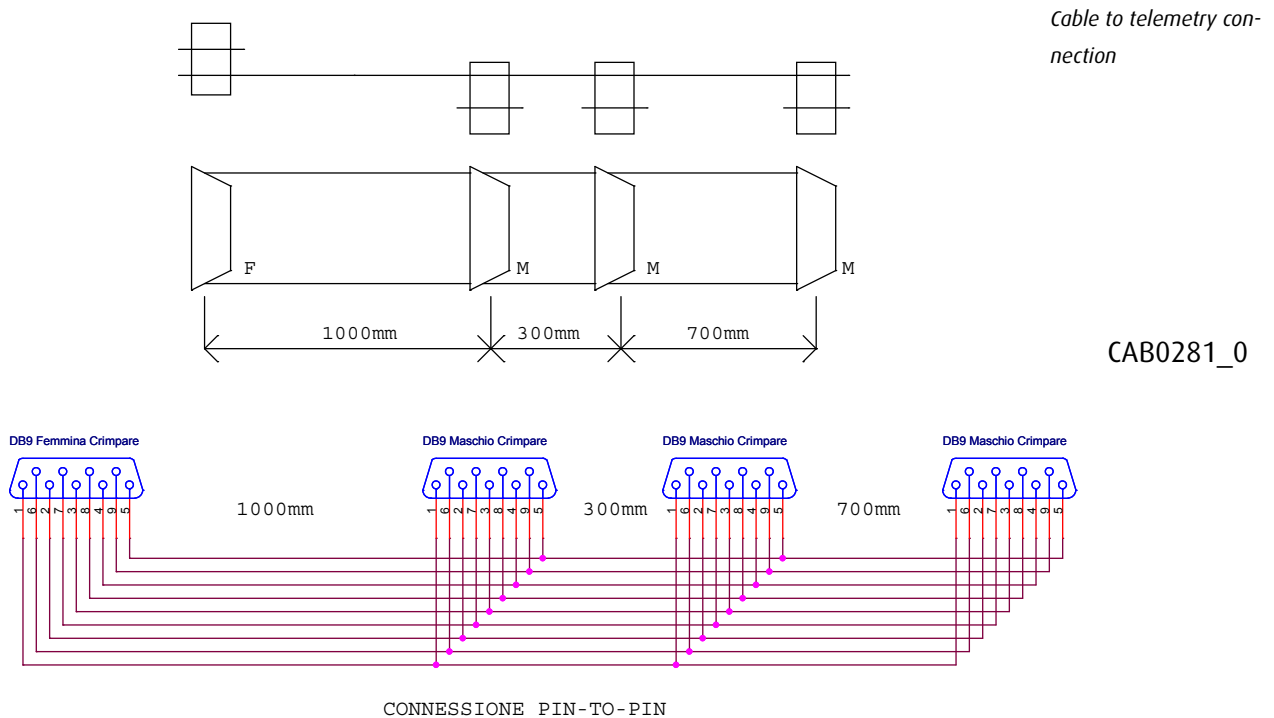
This connection allows remote control through the equipment specifically designed for that purpose. The telemetry unit provides backup energy for the continuous operation of the modem, and is equipped with all utilities for equipments and station parameters supervision.

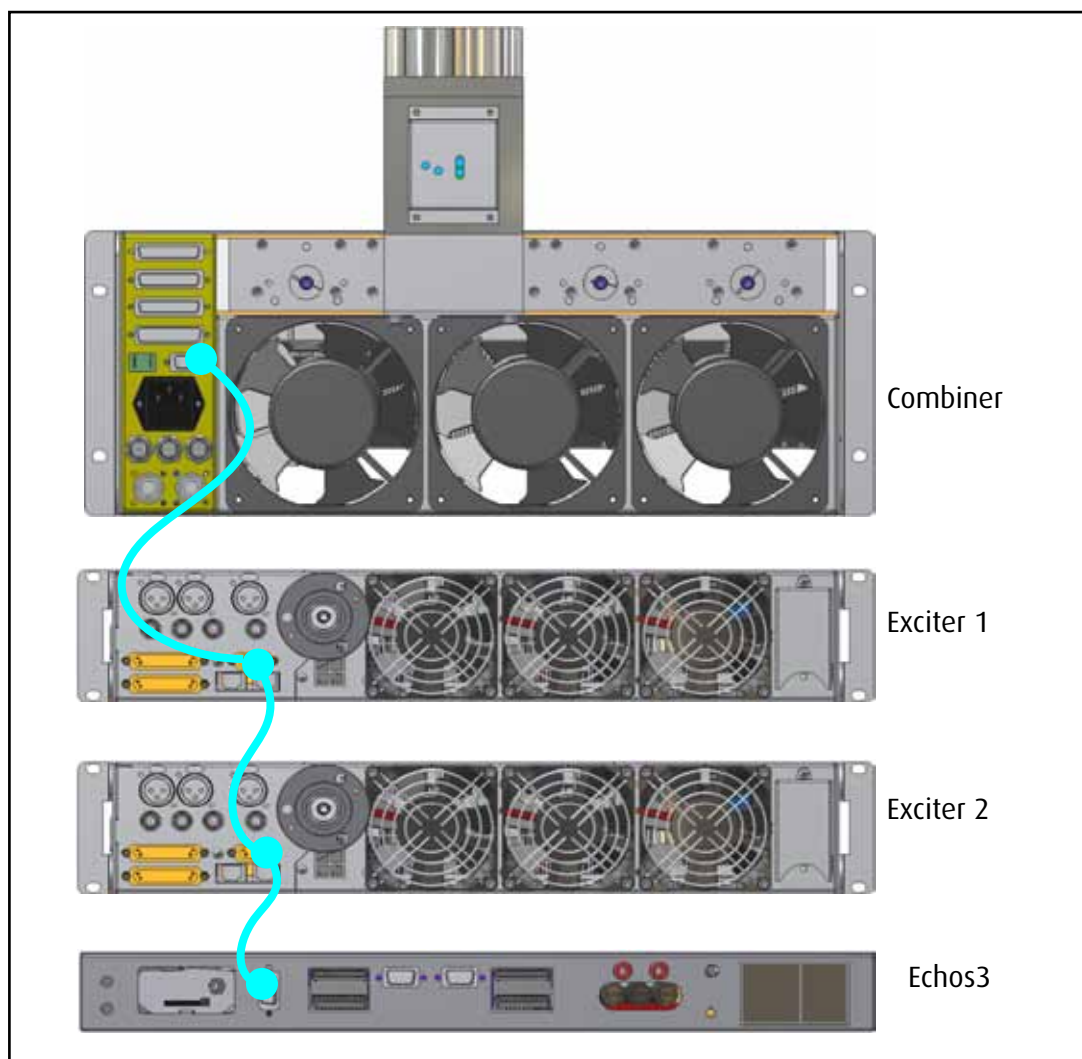
To telemetry connection a cable (ELENOS code CAB0281_0) must be inserted into "EIA485" connector, DB9, on the rear panel of exciters and combiner.

This cable ships with telemetry unit.

The link may also be a machine running.

For more information, please see "Telemetry" manual.





7.4.3 Exchange unit and/or Audio matrix connection

This connection allows to use the transmitter in a system that exchanges a fault transmitter failed with a reserve.

To exchange unit connection, if the equipment is not a reserve, a shielded cable (ELENOS code CAB0324_0) must be inserted into "TC/TS", DB25, on the rear panel of combiner.

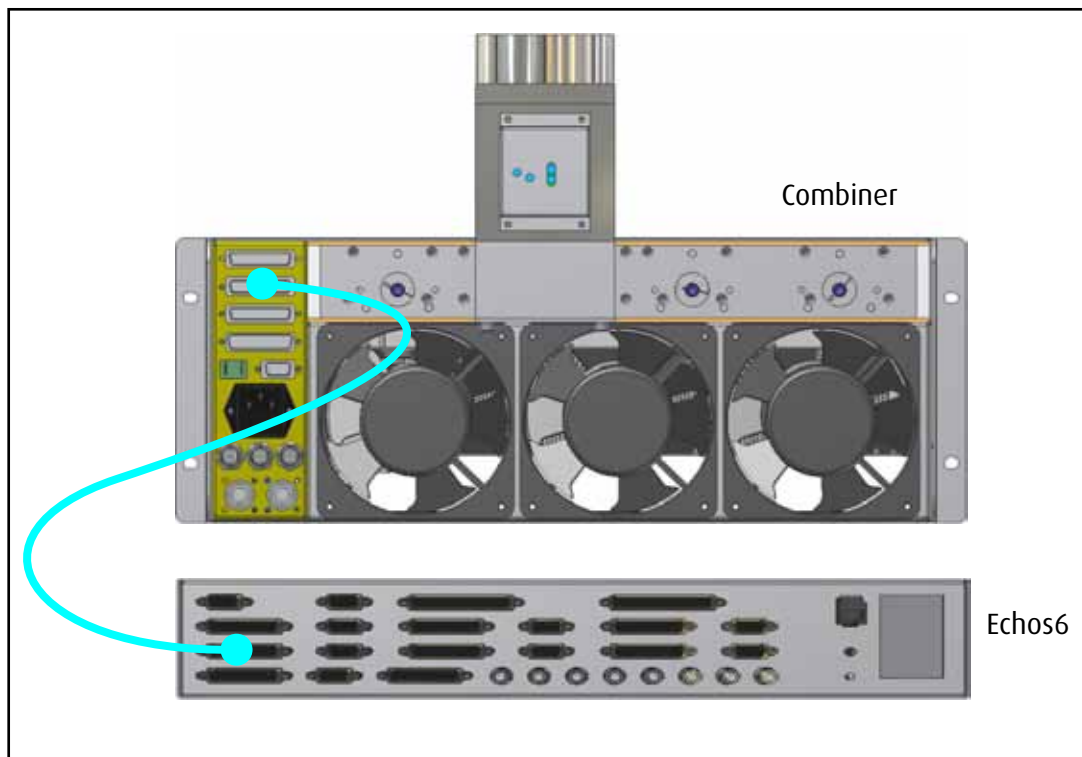
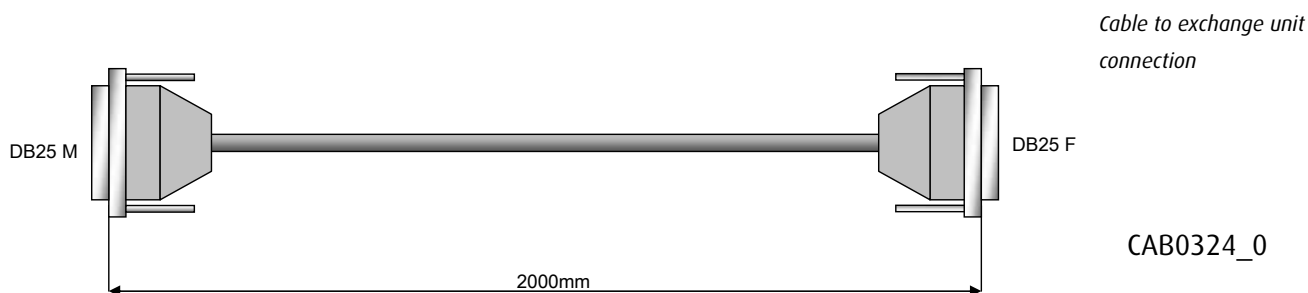
If the device is a reserve to use an additional shielded cable (as the previous) to insert in "SPI" connector, DB25, still in the rear panel of combiner.

This last cable will connect to the audio matrix, if there is an audio matrix.

These cables ship with the unit of exchange.

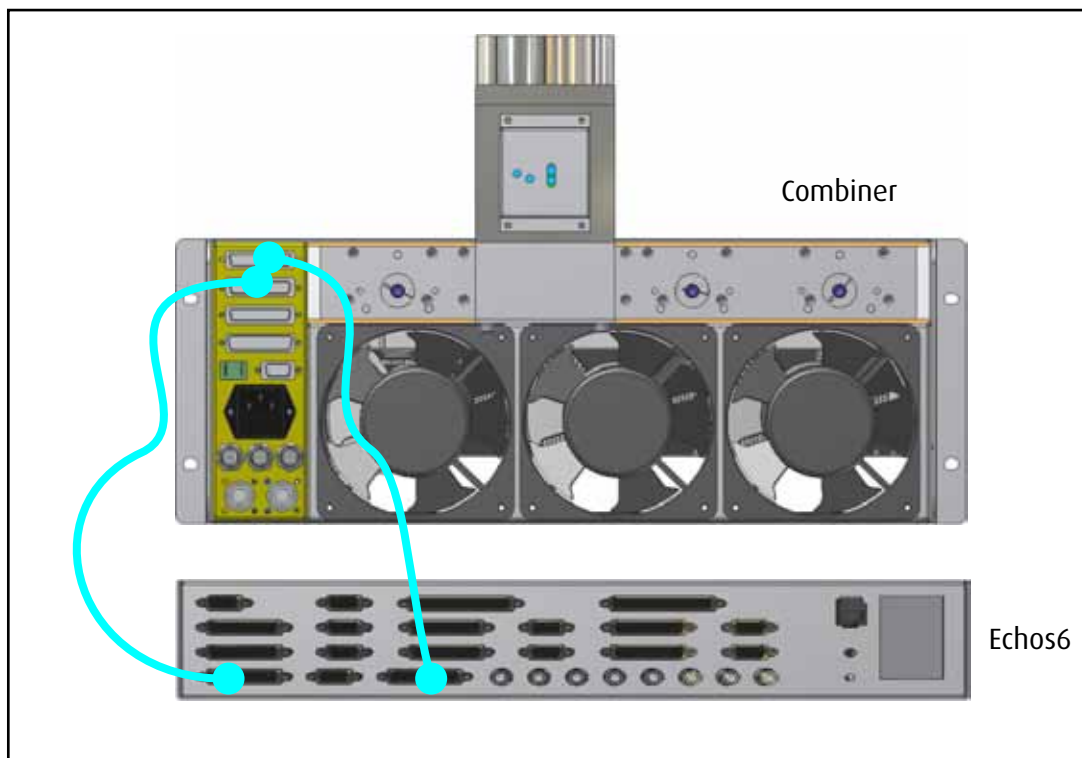
The signal link may also be a machine running, no the RF link.

For more information, please see "Exchange unit" manual.

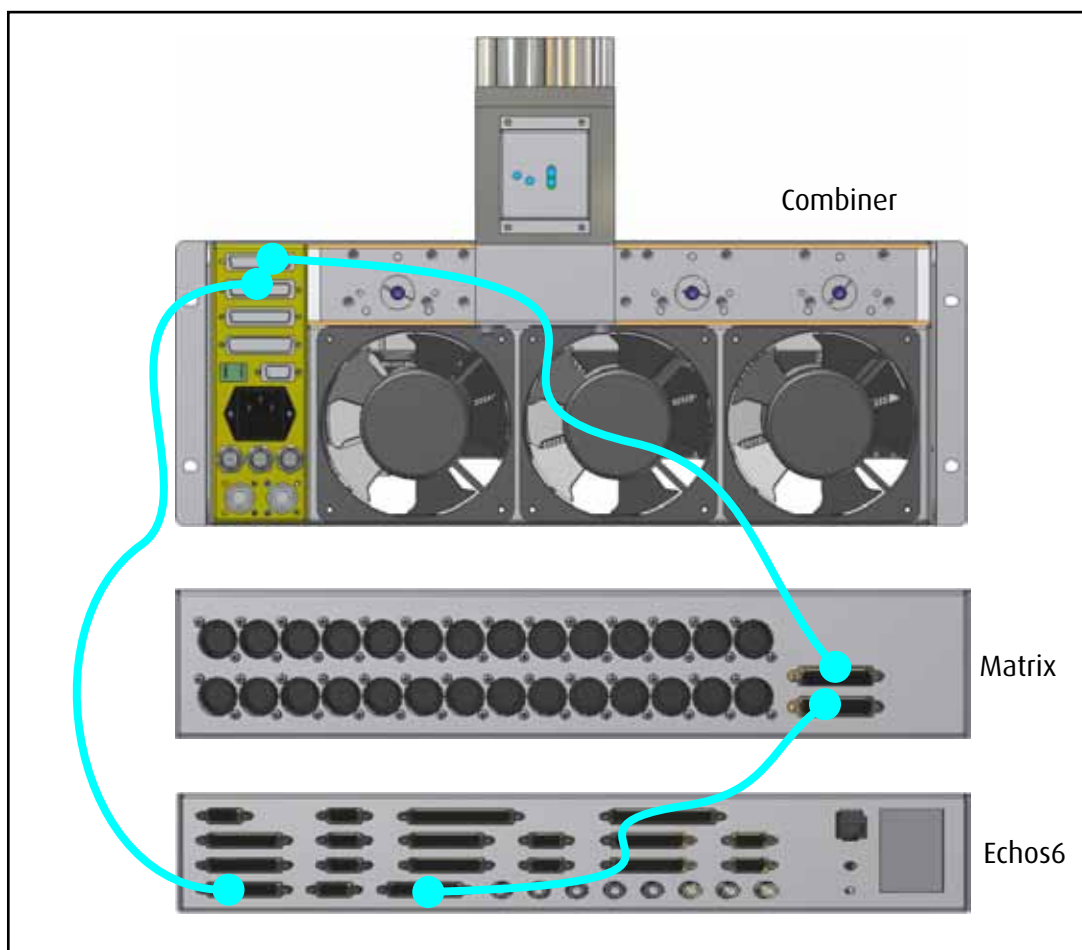


Connection mode if TX no reserve

Connection mode if TX reserve and no audio matrix



Connection mode if TX reserve and audio matrix



8 Maintenance

To details, please ask the Service Manual to Elenos.

8.1 Spare parts

The exciters and amplifiers spare parts list are in the manuals of the specific equipment. To complete the list are reported here the spare parts of combiner and and rack. Unless otherwise specified the component is in every ET15000-5 and ET10000-5 variant family model.

- **TG3K8A867** CPU BOARD
- **E3K IA044** RENESAS-CPU ADAPTER BOARD (BUS)
- **E3K FA044** TC/TS INTERFACE BOARD(MOTHERBOARD)
- **E3K GA044** TC/TS CONNECTORS BOARD
- **E3K 7A044** COMMANDS BOARD
- **E15K7A055** PIGGY BOARD
- **XNK 2A457** MEASURE POINT BOARD
- **E3K 6A044** AMPLIFIED TEMPERATURE PROBE BOARD
- **E10K5070** SPI PROFILES BOARD (TO RESERVE TRANSMITTERS)
- **2PCB0436** COMBINER
- **2PCB0442-2PCB0443** SPLITTER
- **1TERM008** 105° THERMOSTAT
- **ODCIN0002** "N" MOTORISED SWITCH, 12VDC
- **2RFC2550** 250W 500HM TERMINATION (ET10000-5 FAMILY VARIANTS)
- **2RFP0800** 800W 500HM TERMINATION
- **2RAF1012** 250W 500HM RESISTANCE (ET15000-5 FAMILY VARIANTS)

- **CSF-0013** RG316 CABLE, L=53.5CM (ET15000-5 FAMILY VARIANTS)
- **2DYL0001** ALPHANUMERIC LCD DISPLAY, 24X2 G/V
- **320W24VALIMSW** 320W-24V SWITCHING POWER SUPPLY
- **1VENT035** 120X120X38 12-28Vdc 441Mc/h MAX FAN
- **1VENT026** 120X120X38 12-28Vdc 306Mc/h MAX FAN (ET15000-5 FAMILY VARIANTS)
- **1VENT036** 230V 50/60Hz SINGLE-PHASE FAN (ET10000-5 FAMILY VARIANTS)

8.2 Maintenance (cleaning, replacement, control)

During normal operation periodic inspections are recommended, in order to verify the absence of critical operating conditions.

It is recommended to adopt the following program:

Frequence	Type of maintenance
15 days	To clean filter (very dusty environment).
30 days	To clean filter (slightly dusty environment).
	To check direct and reflected output power.
	To verify telemetry, if present.
	To verify RF modules.
	To verify power supplies.
6 months	To verify fans.
	To verify temperatures.
	To verify electricity consumption.
12 months	To verify tightening of the RF output connector.
	To verify mains connections.
	To verify fan blades cleaning and the air grid (dusty environment). To be made with the unit in standby.
	To wash filters (dusty environment).
24 months	To wash filters (slightly dusty environment).
	To change filters (dusty environment).

8.3 Malfunction (effects, causes and solutions)

Effect	Cause	Solution
Transmitter does not turn on	<ul style="list-style-type: none"> • Incorrect connection to the mains • Circuit breaker is not armed • Circuit breaker fuse fault and/or with flow not ok • Auxiliary power incorrect (MAINS LED on front panel off) • Fault in power stage 	<ul style="list-style-type: none"> • Replace the cables (if not ok) and fix its appropriately • Arm circuit breaker • Adapt circuit breaker • Call the manufacturer • Call the manufacturer
Amplifiers fault	<ul style="list-style-type: none"> • Amplifier is not properly connect to the mains • Amplifier is not in the correct position in the rack • No correct address • Amplifier is not correct wired 	<ul style="list-style-type: none"> • Replace the cable or connect to apparatus • Insert amplifier in the correct position (please see "Product identification" section, "ET15000-5 and family variants composition", "ET10000-5 and family variants composition" paragraphs, in Identification and Quick Start Manual) • Set the correct address (please see "Use instructions" section, "User interface" paragraph, in User Manual) • Adapt signal and interlock cable (please see "Product description" section, "Connection" paragraph, in User manual)
Exciters fault	<ul style="list-style-type: none"> • Exciter is not properly connect to the mains • Exciter is not in the correct position in the rack • No correct address • Incorrect parameters setting (power, frequency, Dual Driver configuration, exchange number exceeds the maximum allowable) 	<ul style="list-style-type: none"> • Replace the cable or connect to apparatus • Insert exciter in the correct position (please see "Product identification" section, "ET15000-5 and family variants composition", "ET10000-5 and family variants composition" paragraphs, in Identification and Quick Start Manual) • Set the correct address (please see "Use instructions" section, "User interface" paragraph, in User Manual) • Set the correct parameters (please see "How to active" section, "Main parameters setting" paragraph, in Identification and Quick Start Manual)

Transmitter does not reach the required power	<ul style="list-style-type: none"> • Transmitter in Stand By • No interlock connection • Not correct setting for target power • Amplifiers deliver a non-homogeneous power • Exciters deliver incorrect piloting power 	<ul style="list-style-type: none"> • Set the devices in RF ON • Connect interlock connection in technical panel • Set the correct parameter (please see "How to active" section, "Main parameters setting" paragraph, in Identification and Quick Start Manual) • Call the manufacturer • Verify the setting and, if necessary, call the manufacturer
There is reflected power	<ul style="list-style-type: none"> • RF connections problem to combiner • Unbalancing problem to antenna load 	<ul style="list-style-type: none"> • Adapt RF connections (please see "Product description" section, "External connector description" paragraph, in User manual) • Adapt antenna connection system
Rack fan stopped	<ul style="list-style-type: none"> • Fan is not properly connect to the mains • Circuit breaker is not armed • Fan fault 	<ul style="list-style-type: none"> • Replace the cable or connect it • Arm circuit breaker • Call the manufacturer
No communication with telemetria/PC	<ul style="list-style-type: none"> • Combiner address incorrect • Connection cable not suitable • Parameters setting incorrect • Connection cable fault or interrupted 	<ul style="list-style-type: none"> • Set the correct address • Verify that the cable used is that provided by Elenos or an equivalent • Check correct parameters in "Use instructions" section, "Optional equipment can be connected" (User manual) and to set them • Connect or change cable

For a more detailed analysis see also "Malfunctions" paragraph about each transmitter module, in this specific manuals of each machine.

