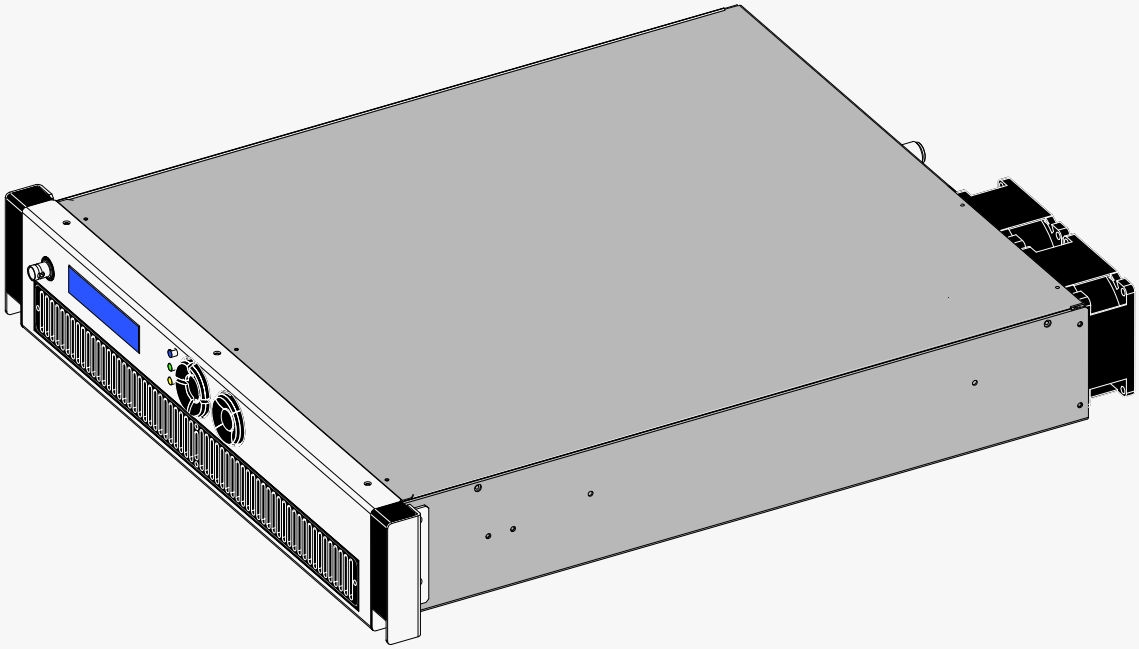
IEC LINE

DAB *COMPACT TRANSMITTERS*



2HE

VHF **air cooled**

Itelco recently renewed its range of compact solid state transmitters for DAB broadcasting market, in VHF frequencies (band III).

The IEC compact transmitter line, that perfectly meets low power solution requirements, is capable to perform the DAB/DAB+/T−DMB modulation standards, delivering up to 250W$_{avg}$ with high RF and MER performances.

The unit, fully complying with the requirements for the safety of personnel as specified in IEC 215 rules, is arranged in a single 2HE−19" standard frame, which guarantees an optimum mechanical rigidity.

The DAB/DAB+/T−DMB modulation core has been developed on the same world recognized hardware platform, utilized for digital TV standards. Therefore with a simple software upgrade the modulator can be reconfigured into any Digital TV standard as for example DVB−T/T2 or any digital radio standards developed such as ***T 2 Lite radio over 1.7MHz****.*

All operations necessary for the generation of a high quality RF signal, in accordance with EN 300 401 V2.1.1 (2017−01) standard, are completely performed by a Real Time Digital Signal Processing using a FPGA.

The IEC compact transmitters are also endowed with digital adaptive linear and non linear precorrection which increase the power efficiency.

The DAB/DAB+/T−DMB features redundant ETI inputs, two EDI ethernet, Gigabit IP ports providing seamless switching of data inputs and two TCP/IP control ports. Seamless switching between any combination of inputs (ETI and/or EDI) is fully supported in SFN mode.

The unit is equipped with an internal 10 MHz reference that can be locked to an external one. *In case of external reference loss, the system keeps on generating the internal reference maintaining the accuracy of the external one without discontinuity.*

A software routine estimates the frequency and time drift allowing the RF muting when these drifts overcome a settable threshold. When the external reference returns, a software procedure assures a soft re−lock without discontinuity. An internal GPS receiver is available to provide a high accuracy frequency reference and to allow IEC operation in a Single Frequency Network (SFN).

The IEC line is also endowed with an integrated Multi Standard Global Navigation Satellite System (GNSS) receiver for time and frequency reference based on GPS and GLONASS system (optional).

The control and supervision of the unit are guaranteed locally with graphical display and keyboard, remotely through a user friendly intuitive web GUI control allows the use with standard web browser (Internet Explorer, Mozilla Firefox, Google Chrome and Opera compatible).

The unit is regulated by three access levels that determine the action possibilities based on the user level:

− Administrator: full control;

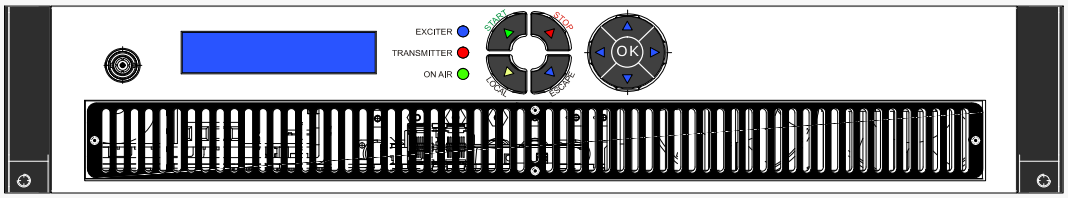
− Operator: operative settings;

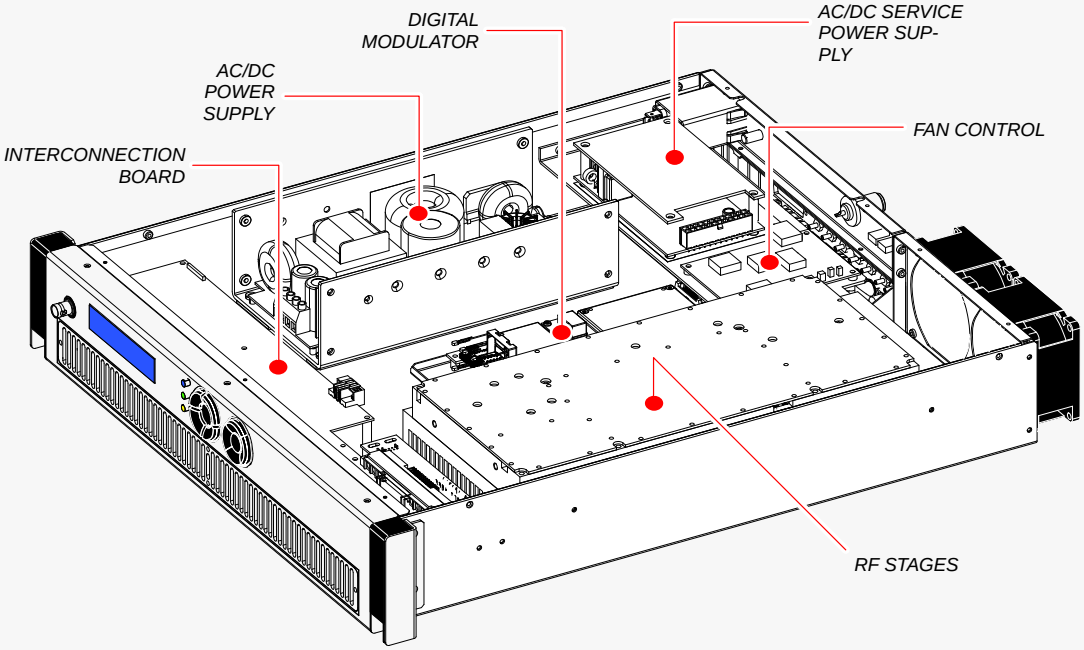
− Observer: exciter check and some simple settings.

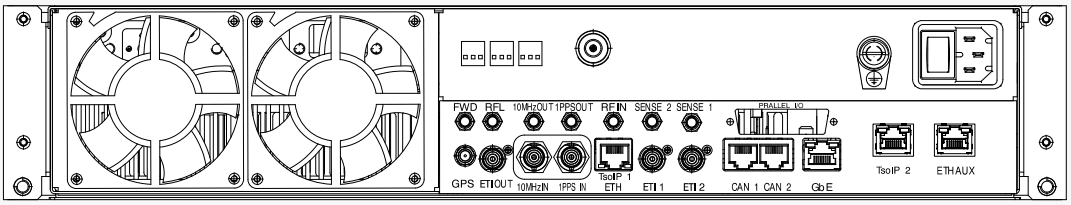
All IEC firmware are upgradable via Ethernet port (also remotely).

MAIN FEATURES

- **Multi−Standard operation** (DAB/DAB+/T−DMB)
- **2 x EDI inputs** (RJ45 connector)
- **2 x ETI inputs** (BNC connector/50 Ω)
- **4 x Ethernet Gigabit interfaces** (for control and data transport)
- **SFN and MFN** operation
- **Adaptive pre−correction** (linear and non−linear)
- **SNMP** client Get/Set/Trap
- **Web GUI** control user friendly and intuitive for use with standard web browsers (*Internet Explorer, Mozilla Firefox, Google Chrome and Opera compatible*).
- **GNSS (*G*lobal *N*avigation *S*atellite *S*ystem)** integrated receiver for time and frequencyreference based on ***GPS*** and ***GLONASS*** systems
- **Seamless switching** between any of the ETI and/or EDI inputs
- **Remote** software/firmware upgrade
- **SCPI** control over RS232/RS485 and over IP
- **CAN−bus** internal communication
- **Easy installation** and maintenance
- **Latest LDMOS** technology for RF stages
- **Low power consumption**
- **High efficiency** air cooling system


EXCITER
TRANSMITTER
ON AIR
START
STOP
OK
LOCAL
REMOTE

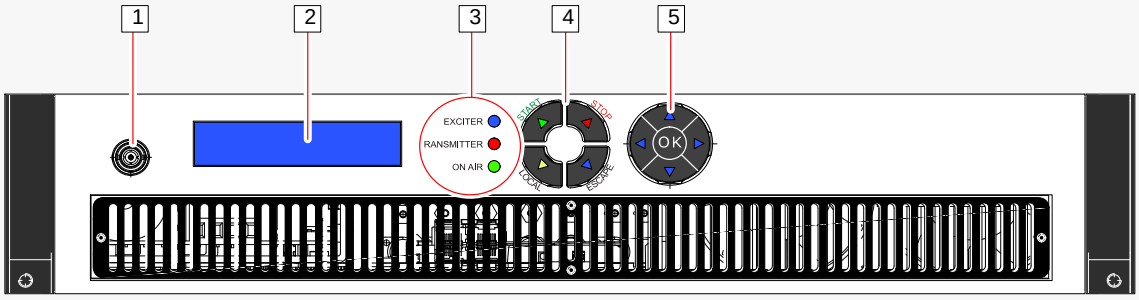

DIGITAL MODULATOR
AC/DC SERVICE POWER SUP-PLY
AC/DC POWER SUPPLY
FAN CONTROL
INTERCONNECTION BOARD
RF STAGES


FWD
RFL
10MHzOUT
1PPSOUT
RF IN
SENSE 2
SENSE 1
PRALLEL I/O
GPS
ETI OUT
10MHzIN
1PPS IN
TsoIP 1 ETH
ETI 1
ETI 2
CAN 1
CAN 2
GbE
TsoIP 2
ETHAUX

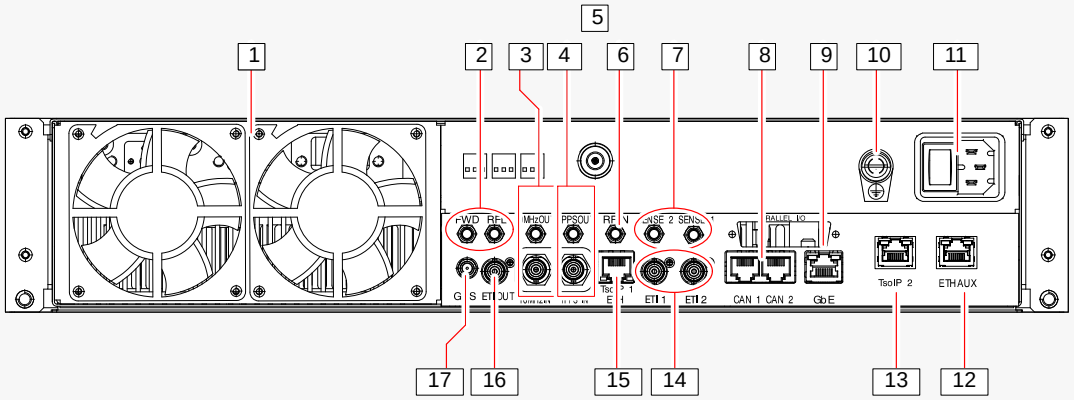
SPECIFICATIONS

GENERAL/ENVIRNOMENTAL CONDITIONS	
Operation temperature range	0°C to +45°C
Storage temperature range	−55°C to +70°C
Relative humidity	0%−95% (non condensing) @ 40°C
Altitude a.s.l.	up to 3000 m
Ambient air pressure:	65kPa to 105kPa
Safety	EN 60215 / EN 60950
EMC	EN 301489
AC REQUIREMENTS	
AC supply (Feller connector)	90 to 264V∼ 90 to 253V *for EC countries*
Frequency	50/60Hz
Power factor	0.9 min.
Efficiency (COFDM):	≥ 20%
MECHANICAL	
Frame:	standard 19" − 2HE
Overall Dimensions (w x h x d) (mm):	483x88x565
Weight (kg):	13
STANDARDS	
DAB+	EN 300 401 V2.1.1 (2017−01)
T−DMB+	EN 300 401 V2.1.1 (2017−01)
OUTPUT	
RF Output	
Frequency range	174 − 254MHz (VHF/BIII)
RF outptut power	40 W_{avg}/150 W_{avg}/250 W_{avg} (MER > 35 dB/shoulder > 37 dB)
Connector	N, female 50 Ω
Center frequency	Adjustable from 170−254 Mhz in steps of 1 Hz
Frequency stability	Intern ref 2 ppm−0.01 ppm or in accordance with external accuracy
Spectrum polarity	Inverted and non−inverted user selectable
Level	30 dBm (from −7 dB to +1 dB)
Stability	± 0.5 dB
Return loss	> 12 dB
Shoulders	< −45 dB
Spurious Emissions	< −60 dBc (< −70 dBc with filter)
Harmonic Emissions	< −60 dBc (< −70 dBc without filter)
In band spurious	< −70 dBc
Amplitude flatness	< ± 0.25dB
ETI Monitor Output	
No of ETI outputs	2
Interface	ETI (Channel out)
Connector	BNC, female
Return loss	> 12 dB
Internal frequecy reference	
Selectable Local Osscillator for customer's specific requirements	TCXO 2 ppm (OCVCXO 0.25 ppm or 0.01 ppm *optional*
CONTROL INTERFACE	
Ethernet Interface	
Connector	RJ45

ELECTRICAL SPECIFICATIONS	
Inputs	
ETI Inputs	
No of ETI inputs	2
Standards	ETS 300 799
Protocols	(NI,G703), (NA,G704) 5376, (NA,G704) 5592 and jitter tolerance according to G.823
Connector	BNC, 75 Ω
Return loss	> 20 dB
Capacity	2 Mbps
Redundancy	User selectable switching policy between “Primary” and “Secondary” ETI source
EDI Inputs	
No of EDI inputs	2
Standards	ETSI TS 102 693
Protocols	IP, RTP, UDP, IGMP (v2 & v3)
Connector	RJ45
Capacity	Gigabyte interface
Ridondancy	User selectable switching policy between “Primary” and “Secondary” EDI source
Ethernet Ports (Gbit/sec)	
No of Ethernet ports	2
Connector	RJ45
GNSS Receiver Input (option)	
Connector	SMA 50 Ω
Frequency	1.575 GHz (GPS)/1.602−1.603 GHz (GLONASS)
Antenna net gain range	0 a +32 dB
Antenna DC supply	OFF, 3Vdc o 5Vdc (± 0.5 V), user selectable
Antenna DC current max	50 mA
External Clock ref. (carrier freq. and SFN timing)	
Connector	BNC
Frequency	10 MHz
Level	10 mV − 3Vpp
Impedance	50 Ω/> 1K Ω, user selectable
Coupling	DC
Time reference (SFN timing)	
Connector	BNC
Frequency	1PPS
Level	0−5V, user selectable trigger point 1V or 1.6V
Trigger	Rising/Falling edge, user selectable
Impedance	50 Ω/> 1K Ω, user selectable
Coupling	DC



1	RF MON	Connector (BNC; female) for monitoring the RF output signal (level labelled below).
2		High contrast LCD display (blue−white with bright backlight).
3	EXCITER	Led indicator (green/red/blue); indicates IEC status according to the colours, as follows:*GREEN* indicates the unit is supplied and in *STOP* condition (*RF OFF*);*RED* indicates a failure condition of the unit (no RF ouput power);*BLUE* indicates the unit is delivering its nominal RF output power;
	TRANSMITTER	Led indicator (green/red/blue); it is active only when IEC operates also as control logic of the transmitter where it is housed (*MASTER* led is lit). According to the colour, it shows the transmitter status, as follows: *GREEN* indicates the transmitter is delivering its nominal RF output power; *RED* indicates a failure condition of the transmitter (no RF ouput power); *YELLOW* indicates a *warning* condition of the transmitter (transmitter is still working); *OFF* when the transmitter is in *STOP* condition or when IEC does not operate as transmitter control logic (*MASTER* led is *'off'*).
	ON AIR	Led indicator (green); indicates IEC is operating also as control logic of the transmitter where it is housed. ☞ *The led blinks during the warm−up period (approx. 30sec.; at IEC swicthing−on); within this time interval all alaavg are inhibited.*
4		Keyboard. It allows *starting/stopping* the unit and setting *local/ remote* operating mode. *ESCAPE* key allows quitting from current menu.
5		Controller keyboard. It allows accessing the menu (listed on right−hand side of the display) and setting the functioning parameters of the unit. Accessing the menu and setting of the parameter is as follows: − "◀" and "▶" arrows select the menus (shown between < and > symbols); once accessed the menu, they select the digit to be changed. − "▲" and "▼" arrows allow scrolling the parameters of each menu. − "OK" key is used to set the selected parameter and to enter the setting carried out. A confirmation is requested at the end of the operation, pushing "▲" arrow.



1		Extractor fans of the exhaust air. The two fans have different characteristics (performances) because the left one cools the RF section while the right one cools the modulator and the power section.
2	FWD	Connector (SMA female; 50Ω/0dBm; +3/−7dBm); input connector of the forward power signal outgoing from an external directional coupler (*before filter*; for relevant measurement displayed on the front panel display).
	RFL	Connector (SMA female; 50Ω/0dBm; +3/−7dBm); input connector of the reflected power signal outgoing from an external directional coupler (for relevant measurement displayed on the front panel display)
3	10MHz OUT	Connectors (SMA female); output of 10MHz reference signal.
	10MHz IN	Connector (BNC female); input of 10MHz reference signal.
4	1PPS OUT	Connectors (SMA female); output of 1PPS reference signal.
	1PPS IN	Connector (BNC female); input of 1PPS reference signal.
5	RF OUT	Connector (N female); RF signal output of IEC.
6		*NOT USED*
7	SENSE 1/SENSE 2	*NOT USED*
8	CAN1/CAN2	Connectors (RJ−45); allow the connection to a ***C**ontroller **A**rea **N**etwork* serial bus.
9	GbE	Connector (RJ−45); it can be used for *ethernet* control and monitoring over TCP/IP.
10		Grounding screw of unit frame.
11		Line socket with the associated mains breaker.
12	ETH Aux	Connector (RJ−45); it allows *ethernet* control and monitoring over TCP/IP of the *modulator*.
13	ETH/TSoIP 2	Connector (RJ−45); TSoIP 2 input. It also can be used for *ethernet* control and monitoring over TCP/IP.
14	ETI1/2	Connectors (BNC female); ingressi ETI.
15	TSoIP 1/ETH	Connector (RJ−45); it allows *ethernet* control and monitoring over TCP/IP of the *modulator* and TsoIP 1 input
16	ETI OUT	*NOT USED*
17	GPS	Connectors (SMA female);input of the signal from GPS.

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