

UHF Transmitters TT-U/L Series

Liquid-cooled transmitters

**READY FOR DIGITAL
TELEVISION**



- ✓ Frequency range
470MHz to 860MHz
- ✓ Advanced LDMOS
technology for power
amplifiers
- ✓ Precorrection
- ✓ High redundancy
- ✓ Touch Screen
Control Logic
- ✓ Highly compact for
minimum space
requirements
- ✓ Cost-effective
installation
- ✓ All stand-by concepts
possible (single
transmitter, active or
passive output stage
stand-by, exciter
stand-by).
- ✓ Web and SMS
Remote Control

Description

The TV Transmitter series TT from ITEL is a new generation of air cooled UHF transmitters for analog and digital TV (DVB-T/H - ATSC Ready). They consist of the following main components:

- Single Driver (Dual on request)
- Power RF Amplifiers included power supply
- Microprocessor transmitter control
- Band Pass Filter

The UHF transmitters are available for analog TV with powers from 100W to 10kW and for DVB-T with powers from 30W to 3kW rms.

All transmitter can be equipped with a second Driver and the associated automatic switch-over unit (Option).

Power amplifier

Thanks to the advanced LDMOS technology, the power amplifiers present high linearity, excellent efficiency and compact design. The two power supplies are integrated into the amplifier module, which is an enclosed unit. The amplifier is equipped of one cooling system composed by two fans that are able to dissipate the heat and to maintain constant the temperatures of the junction of the transistors around the 95°C to a environment temperature of 25°C.

General characteristics

Very compact size: simplifies transportation and installation.
Modular design: increases reliability and simplifies maintenance operation.
Low operating cost.
RF output obtained from the parallel of the amplifiers modules, each module with its own individual power supply to maximize the reliability.
High performance linearity corrector.
Very high MTBF.
Broadband RF amplifiers, full band coverage without any adjustment.
Synthesized local oscillator facility with external reference input for precision off-set.

Graphic LCD Panel

Revolutionary new generation driver with graphic LCD panel for full control and measurement.
Front panel instant frequency programmability, RF power settings, audio settings, deviation controls, alarms status are only some of the main facilities available in the graphic display.

Protection against

Missing input video signal.
Overload and short-circuits.
Inefficiency of the cooling system.
Missing mains AC (phase control).
Automatic reduction of the RF output power in real time for excessive VSWR.
RF amplifier over drive.

Options

Dual Driver
Serial interface IEC 864-2
Stereo (IRT - NICAM - BTSC).
Dual Mains AC input line.
Interactive control with data storage (data can be elaborated by PC).



TT-U-5k/OPT2A

Touch Screen Control Logic

The control logic allows full remote control capability thanks to the microprocessor on the front panel control board: power output adjustment, deviation adjustment, general on/off, alarm reset, forward and reverse power measure, frequency deviation measure and alarm status are the main possibilities of remote control function.

The display touch screen can change the colour depending on the operation state of the equipment. The colours are:

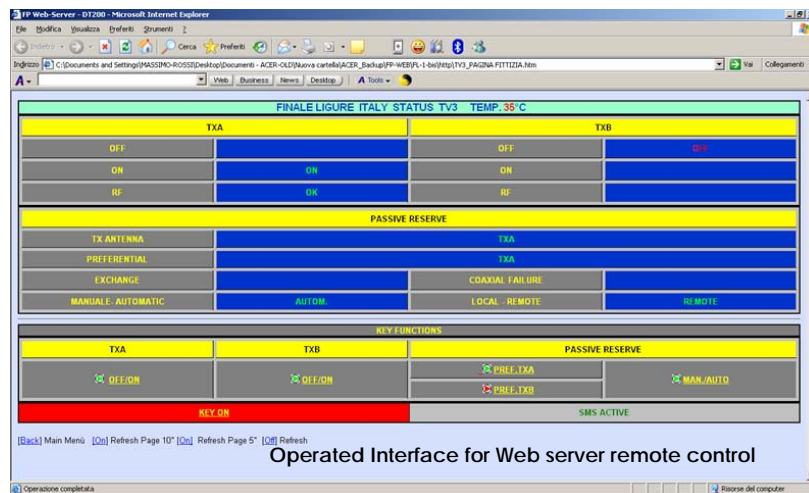
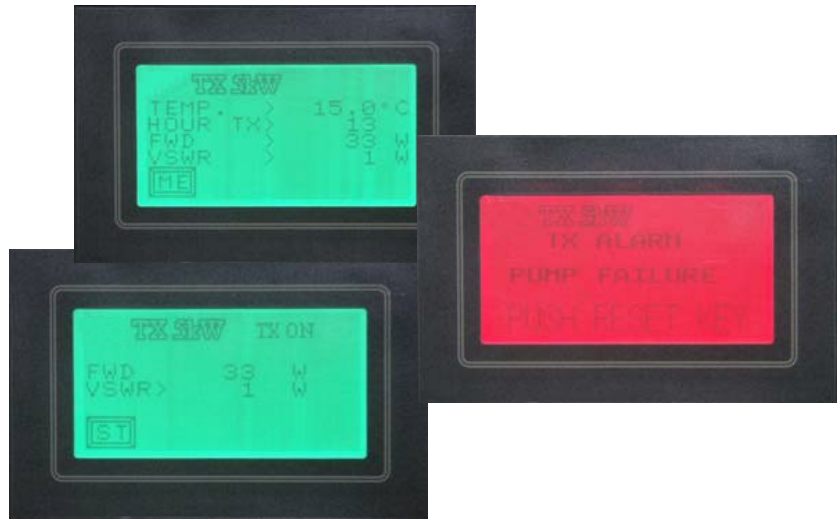
- ▶ Green perfect operation of the equipment
- ▶ Red generic alarm
- ▶ Orange Stand-by of the equipment

Operation mode

Automatic or Manual (Local or Remote)
Parallel interface according to IEC 864-1.
Serial interface RS232 or 485.

Options

Web server – TC/IP remote control
SMS remote control



TC/IP WEB server (option) and SMS Remote Control (option).

Full monitoring and control of the equipment via Intranet or Internet and via SMS message. It is possible to have a complete view of the status of the equipment periodically or on request by a direct connection with an Internet browser or sending a SMS.

The system automatically contacts via mail (fax) or via SMS the user in case of alarm and can repeat the call more than one time until its alarm status is present.

Password protection present to access the system: using this password it is possible to access all the control functions of the equipment.

Comparison between liquid and air-cooling systems in solid-state Broadcast Radio and TV Transmitters

The transistors of the new generation become every day more powerful having the same dimensions and this forces the designers to adopt cooling systems more effective.

The traditional air cooling systems become insufficient with environment temperatures >30°C and they need to be helped by expensive and complicated systems of air conditioning.

The most reliable and less expensive solution to this problem is ITEL Telecommunication and Broadcasting Service new generation of liquid coolers.

The main substantial differences between liquid cooling and air cooling are:

Longer device's life .. With the liquid coolers even with environment temperatures of 45°C the temperature of the flange of the devices does not overcome the safety limit of 55°C, this increases the device's life.

Acoustic Noise. This is very low because of the absence of airflow inside the transmitter cabinet and above all it is possible to install the liquid/air heat exchange elsewhere; even outside the building as long as antifreeze is added to the cooling liquid.

No corrosion. The continuous presence 24/24 hours of forced air on the electric and mechanic parts causes salty deposits and corrosions that reduce the life of the parts. This corrosion is avoided using the liquid cooling systems.

The liquid of cooling is normal water, not treated. The hydraulic circuit is a closed type with a capacity of about 30 litres (for a 10 kW radio): thanks to this characteristic it does not need continuous additions of water and it is only necessary an addition of about 2 litres every 6 months.



Operating Temperature. With the liquid cooling system, an environmental temperature of up to 45°C is acceptable whereas with the air-cooling system the maximum environmental temperature would be 30°C. The liquid cooling systems, in fact, have a higher efficiency in the transfer of heat.

Instant installation. It is not necessary to install any bulky air ducts at the input as well as at the output of the Amplifier cabinet. The air/liquid heat exchanger can be easily placed outside the room where the transmitter is installed and it is connected to the transmitter only with standard flexible water's pipes.

Radiation of heat into the environment. In the liquid cooling system there is practically no radiation of heat into the environment, if one takes into consideration the possibility of installing the heat exchanger in a different place to the transmitter. Thus the use of costly air conditioning installations is avoided.

Specifications	
Frequency range	470MHz to 860MHz
Power supply	230/415V ±15% 50/60Hz ±2%
Max. installation altitude	2000m above sea level (>2000m on request)
Operating temperature range	+5°C to +40°C
Outside temperature range	-30°C to +50°C
Permissible relative air humidity	95%
Inputs	
Analog TV	2 x video (BNC, 75Ω), 2 x sound (XLR, 3 contact)
DVB-T	2 x ASI (in pairs, prepared for hierarchical modulation)
ATSC	2 x SMPTE-310 (BNC, 75Ω)
Interfaces	
RS-232C / RS-485	for remote control of transmitter, at transmitter top, D-Sub female 9 contact

Optional	Parallel remote control interface floati messages and commands; SNMP inte and/or TCP/IC WEB server
Analog TV	
TV Standards	B, G, D, K, M, N, I
Colour transmission	PAL, NTSC, SECAM
Sound transmission	Dual sound coding to IRT or FM single NICAM 728 (-13dB/-20dB) of FM single 10dB)
DVB-TTV coding and modulation in line with EN300744	
IFFT mode	2k and 8k
Useful symbol period	224μs (2k) or 896μs (8k)
Modulation	QPSK, 16QAM or 64QAM
Guard interval	1/4, 1/8, 1/16 or 1/32 of useful symbol
Inner code rate	1/2, 2/3, 3/4, 5/6 or 7/8
Hierarchical coding	Option on request
ATSC in line with Doc. A53/1995	
Modulation	8VSB
Symbol rate	10.76MHz
Data rate	19.39 Mbits
Reed-Solomon encoder	207/187/10

Analog TV	* /L for Liquid version							
	TT-U-1k*	TT-U-1k5*	TT-U-2k*	TT-U-2k5*	TT-U-5k	TT-U-10k	TT-U-20k*	TT-U-30k*
RF output power	1kW	1.5kW	2kW	2.5kW	5kW	10kW	20kW	30kW
Number of amplifiers	1	1	2	1	2	4	10	14
Power consumption kVA	4	5.25	6.5	7.5	15	26.5	51.5	76.5
Bandwidth	6MHz - 7MHz - 8MHz							
RF connectors EIA	7/8"			1+5/8"			3+1/8"	
Reference frequency	5 or 10MHz							
Dimensions	28 U – 19"	28 U – 19"	28 U – 19"	28 U – 19"	28 U – 19"	41 U – 19"	2x41U-19"	3x41U-19"
Weight kG.	~300	~300	~350	~300	~350	~650	~1500	~2300
Exchanger Air/liquid Module kG.	~100			~165			~2x165	~2x185

Digital DVB-T/H - ATSC	DT-U-300*	DT-U-500*	DT-U-1k*	DT-U-1k5*	DT-U-2k*	DT-U-3k*	DT-U-4k*	DT-U-5k*
	RF output power	300W	500W	1k	1.5kW	2kW	3kW	4kW
Number of amplifiers	1	1	2	3	4	6	8	10
Power consumption kVA	750	1.15	1.5	1.9	3.75	7.5	15	22.5
Bandwidth	7MHz - 8MHz DVB-T /H - 6MHz ATSC							
RF connectors EIA	7/8"			1+5/8"			3+1/8"	
Reference frequency	5 or 10MHz							
Reference pulse	1Hz							
Dimensions	28 U – 19"	28 U – 19"	28 U – 19"	28 U – 19"	28 U – 19"	41 U – 19"	2x41U-19"	3x41U-19"
Weight kG.	~300	~300	~350	~300	~350	~650	~1500	~2300
Exchanger Air/liquid Module kG.	~100			~165			~2x165	~2x185