

**FOURTH
SERIES**

Compact and High Performance
**AIR-COOLED Transmitters
and Gap-Fillers** for Digital TV
Networks



low, medium & high power





TRedess **Fourth Series** is a family of **air-cooled VHF & UHF Transmitters, and Gap-Fillers covering Low, Medium & High Power** needs in DTT broadcasting networks, which brings together flexibility, outstanding compactness, high efficiency and smart installation and operation.

Fourth Series Family covers a wide range of output power going from 10W up to 5000W, based on one single and unified product design and two system architectures: standalone for Low Power, and modular for Medium and High Power.

Fourth Series works in DVB-T, DVB-T2, ISDB-T, ATSC 1.0 and ATSC 3.0 standards, for both MFN and SFN networks: Transmitters can also work as Re-Transmitters. Gap-Fillers can work both as MFN Transposer and in SFN On-Channel-Repeater mode, using TRedess' DEEC, the best echo canceller performance available in the market.

Fourth Series compact units are especially suitable for use in scenarios with space limitations. The units include complete local and remote control, plus all the optional functionalities that the particular scenario may need, such as GNSS receiver, satellite receiver (DVB-S/S2) with CAM and BISS 1/E, terrestrial signal input (DVB-T/T2), and built-in 1+1 and N+1 redundancy functionalities. In terms of efficiency, TRedess Fourth Series Transmitters incorporate symmetrical and also the new asymmetrical Ultra-Wide-Band Doherty technology, achieving top class efficiency figures and consequently obtaining very important cost reductions in energy consumption without impacting normal operation and maintenance.

Fourth Series has been designed by TRedess gathering our experience as the European Specialist in Air Cooled (Low, Medium and High) DTT Transmitters. The solution combines high quality and cost effectiveness, giving our customers a product, which is fully adapted to their needs and capable to cover ALL the AIR COOLED customer needs (in low, medium and high power range) in a homogeneous way. The product series has the same look and feel from 10W to 5000W and is designed to make onsite and remote tasks as simple as possible.

Medium & High Power equipment



POWER RANGES:

600W to 5000W (6000W for ATSC 1.0)

TECHNICAL SOLUTION:

Fourth Series **Medium & High Power** Transmitters

Output power (Before filter) COFDM	600W	1200W	1800W	2400W	3000W	3600W	4800W
Amplifiers Number	1	2	3	4	5	6	8
Pallet Type	UWB Symmetrical Doherty / UWB Asymmetrical Doherty						
Efficiency (Typical)	37% (COFDM Modulation) / 41% (COFDM Modulation)						
Frequency range	BIII (174-254 MHz) or UHF (470-790 MHz) / UHF (470-700 MHz)						

Low Power equipment



POWER RANGES:

10W to 400W (500W for ATSC 1.0)

TECHNICAL SOLUTION:

Fourth Series **Low Power** Transmitters & Gap-Fillers

Output power (Before filter) COFDM	25 W	75 W	150 W	275 W	120 W	400 W
Pallet Type	LDMOS AB Class				UWB Symmetrical Doherty	
Efficiency (Typical) COFDM modulation	17%		23%		33%	
Equipment height	1 HU		2 HU	3 HU	2 HU	3HU
Frequency range	470-860 MHz				470-790 MHz	

Benefits & key features

01 | Flexibility & Compactness

Fourth Series provides Transmitters, Retransmitters/Translators, Transposers and Gap-Fillers in a single product family, all of them working in MFN or SFN mode.

Fourth Series is a multi-standard solution working in DVB-T, DVB-T2, ISDB-T, ATSC 1.0 and ATSC 3.0 upgradable standards, and running on the same HW platform and based on just different SW and FW packages and some optional HW modules.

In terms of inputs, the Transmitters count by default with four fully seamless-switching inputs for input signal redundancy: two TS over IP inputs and two ASI, two BTS or two SMPTE inputs. Optionally the Transmitter unit can incorporate a built-in satellite (DVB-S/S2) receiver with CAM and BISS 1/E or a built-in DVB-T/T2/ISDB-T/Tb input (allowing the Transmitters to work also as Re-Transmitters. As a retransmitter, in DVB-T2 environments, it is capable to operate in SFN using T2-MI + Mode A encapsulation, allowing the signal regeneration (demodulation & modulation on the Transmitter unit) in sites with a simple repeater infrastructure, hence optimizing the output signal quality.

Transmitters' DVB-T2 modulator supports multiple PLP's, handling up to 8 PLPs. The ISDB-T modulator supports BTS-rate-lock, allowing operation in SFN mode without the need of a GPS.

Besides, a built-in GNSS receiver is also available as an option, as well as the embedded OCXO functionality for higher frequency stability & MFN operation.

For ISDB-T/Tb networks, an optional embedded Remux Lite software functionality is available for the adaptation of TS 188 bytes into BTS 204 signal (avoiding the need of additional equipment for conversion), as well as PID and program filtering functionalities.

Besides, Gap-Filler units can operate as transposers in MFN and as on-channel repeaters in SFN mode. For SFN scenarios, TRedess Gap-Fillers incorporate the Doppler Enhanced Echo Canceller (DEEC), an outstanding high-performance echo canceller which is able to resolve the most challenging echo conditions obtaining the most optimum RF output performance on a Gap-Filler site.

So, in conclusion, TRedess Fourth Series is a very flexible platform where several modular and built-in HW options are available that can also be combined with several SW options and SW activation licenses, allowing the unit to be very easily adapted to all possible scenarios at a Transmitter site. Also, the fact that all these optional functionalities are based on built in modules and SW options make the solution also very compact, with the very relevant cost savings this implies for the network operators in terms of site occupation and also by counting with built in functionalities (replacing the need of counting with additional external units in the system) and consequently making the system more compact and cost effective.



DVB-T/T2, ISDB-T, ATSC 1.0/3.0 supported. MFN and SFN operation.

2xTS over IP inputs and 2xASI inputs (default) or two SMPTE inputs with fully seamless switching.

Optional built-in Satellite (DVB-S/S2) with CAM and BISS 1/E input and terrestrial (DVB-T/T2, ISDB-T/Tb, ATSC 1.0/3.0) input.

Embedded GNSS or OCXO options.

Embedded REMUX software functionality for ISDB-T/Tb.

Linear and Non-Linear digital adaptive precorrection (DAP).



High-efficiency Doherty amplifiers as from 120W.

.....
Overall Transmitter efficiency of up to 40% (system level).

.....
Key advantage of using the same Power Amplifier module for the entire UHF TV band.

02 | High efficiency

Cost efficiency is assured throughout the equipment lifetime minimizing OPEX, as amplifiers from 120W output power count on Ultra-Wide-Band Doherty technology. For 600W amplifiers Symmetrical and also NEW ASYMMETRICAL Doherty technologies are available.

The energy cost of a Transmitter site is one of the most relevant costs in the lifetime of a Transmitter, and for that reason, network operators worldwide are clearly paying special attention to the efficiently figures reached by the different Transmitter manufacturers, especially for the medium and high-power sites.

And TRedess has clearly understood that message and has been dedicating a very good part of our own R&D resources and R&D investment to achieve top class efficiency figures and keeping track of all the latest trends of new Doherty solutions by developing also our own new TRedess Asymmetrical Doherty solution

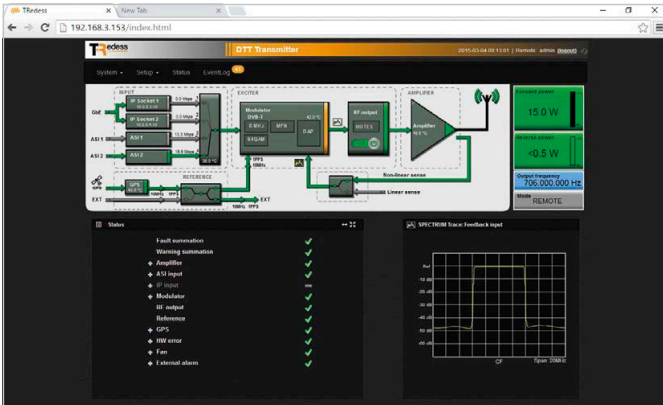
Both, the TRedess Symmetrical and Asymmetrical Doherty amplifiers are based on Ultra Wide Band Doherty technology, with the clear advantage of reaching top class efficiency figures and using the same power amplifier module for the entire UHF TV band (470 - 790 MHz for Symmetrical and 470 - 700 MHz for Asymmetrical). Meaning that no adjustment or power amplifier replacement is required to change the RF channel, so channel changes remain a simple configuration task. This also simplifies and reduces costs in spare parts management.

In terms of efficiency levels, TRedess Transmitters based on Symmetrical Doherty feature an overall Transmitter typical thus delivering an excellent efficiency and enabling decisive energy costs reductions.

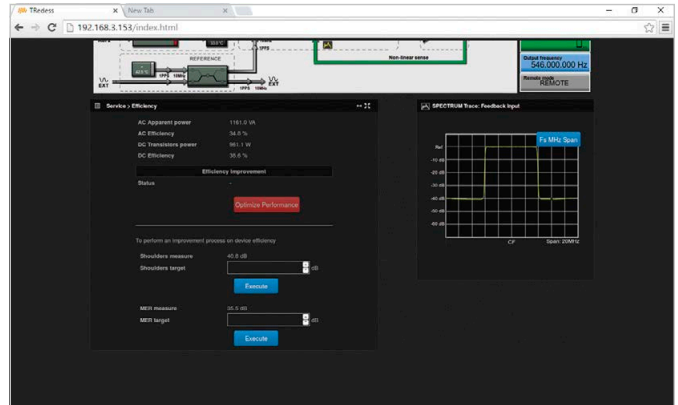
The TRedess New Doherty Amplifier of 600W based on ASYMMETRICAL Doherty technology provides in general an efficiency improvement of a 4% above the normal Symmetric Doherty solution (reaching a typical efficiency >40% for COFDM standards (43% in ATSC 1.0) with the counterpart that the frequency range is limited up to 700MHz (470-700 MHz).

And although in the low power range, the efficiency figures are not so critical, it could be relevant for networks counting with a very dense low power network, so for improving also the efficiency figures hence also the costs in the lower power range, TRedess has also designed a New Ultra-Wideband Doherty Solution for the 2HU Transmitter unit, providing a 120W Transmitter UWBD featuring a typical efficiency of 32%.

03 | Smart Operation: very intuitive and user-friendly interface for a complete control and monitoring of the Transmitter units from anywhere in the world.



Real time display of output Spectrum Graphs, MER and Shoulder values.



Efficiency vs MER optimization tool.

Local and remote interfaces incorporate advanced features as MER and Efficiency measurements, Output Spectrum view, Efficiency vs MER optimization tool, and an internal Monitoring tool to simplify and reduce costs in installation, operation and maintenance.

Each transmitting unit counts on a front LCD display with keyboard for local operation and configuration. Status LEDs show the overall functioning. A micro-SD card slot in the front panel is available to save system logs, configurations or load pre-saved configurations making full setup a simple one-step operation. Furthermore it can be used to locally run software upgrades.

Remote operation can be accomplished via an SNMP agent, using any SNMP-based network management system (a proprietary MIB and IRT MIB according to EBU Tech 3323 are available) and also via a very visual and easy to use webserver multi-session application, that allows full remote management of the system.

A Spectrum View on the web interface gives a real-time graph of the output signal spectrum. MER, Efficiency and Shoulder values are also available and displayed (via web server or SNMP), so it is possible to remotely supervise the quality and efficiency of the transmitted signal locally or remotely from the operation center without the need of an external analyzer device. Web interface also in-

cludes a tool for the optimization of the Transmitter efficiency by setting up a target value of the MER or Shoulders.

Transmitters and Gap-Fillers count on linear and non-linear Digital Adaptive Pre-correction (DAP), which automatically and in real time equalizes the Transmitter system in a quick and easy way, optimizing shoulders and MER values to ensure the highest quality in the transmitted signal.

An embedded Monitoring tool keeps a detailed long-term track of the key system internal parameters, both at service and at internal HW level, increasing the control and improving the preventive and corrective maintenance of the device. Also short-term monitoring can be launched in a precise time period, providing valuable information for troubleshooting and resolving any incident during operation. celler which is able to resolve the most challenging echo conditions.

Easy operation based on smart-design local and remote interfaces: LCD display and web server application.

SD card on the exciter front panel, for a fast Transmitter configuration.

Simple system configuration with fast start-up.

Outstanding Real-time DAP performance.

Real time display of output Spectrum Graphs, MER, Shoulder and AC Efficiency values (via Web server or SNMP).

Monitoring tool for smart equipment control and troubleshooting.

Tool available on web interface for Efficiency optimization versus MER.



04 | Low Cost of Ownership



Network operators nowadays are clearly focused in trying to **reduce as much as possible the total costs of ownership (TCO) of a network**. TRedess Fourth Series equipment clearly contributes to that goal as per the facts below:

On the CAPEX side: it is relevant to note that TRedess solutions are 100% designed and fully manufactured at our own TRedess/Televes Corporation manufacturing facilities, contributing to count with a full control of the design, development and manufacturing processes, hence keeping TRedess equipment at very cost competitive prices.

On the OPEX side: the full control of the manufacturing process plus the very strong quality control processes established in all stages of production at the Televes factory in Santiago de Compostela in Spain, bring as a consequence a very high product's reliability with very low failure rates (MTBF).

Also, Fourth Series solutions are very compact and provide very high Efficiency (Symmetrical and Asymmetrical Doherty Wideband solutions) optimizing costs of rack space and energy consumption.

Finally, the modularity of the solutions, the sharing of spare parts among the different Transmitter models, plus the very easy maintenance of the TRedess Fourth Series Transmitters, reduces also considerably the costs of operation.

TRedess products reliability is very high with very low failure rates (very low MTBF) due to the very strong quality control processes established in all stages of production at our own factory in Santiago de Compostela in Spain.

Aside of this product reliability, TRedess solutions also count with several redundancy options that help to increase the global reliability of the system.

1+1 and N+1 Redundancy

TRedess Fourth Series redundant solutions (1+1, N+1 and Dual Drive) are based on a distributed architecture with no need of an additional unit for the managing of the redundant system, as each Transmitter on the system knows at all times the status of all the remaining Transmitters on the system, so reducing the overall size of the redundant systems and increasing the reliability of the system by not centralizing the control of the redundancy in a single unit. Moreover, the control of the entire redundant system is done by using a unique and floating IP address.

In all cases, 1+1, N+1 and Dual Drive the exciter includes a DB25 connector that allows a direct connection to the electrical coaxial relays, so the Transmitters itself are configuring the electrical relay commutation. In case of an N + 1 redundancy system, an additional ASI MATRIX is used to select the ASI input feeding the Reserve Transmitter in the N+1 system.

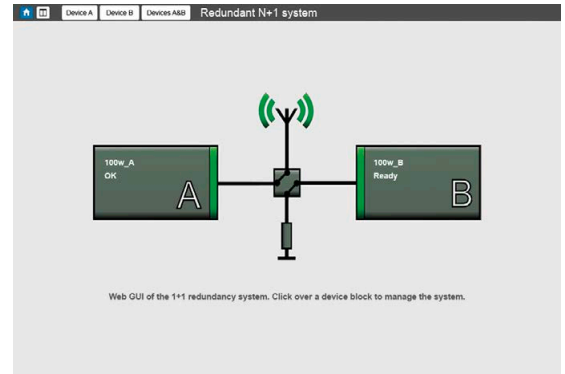
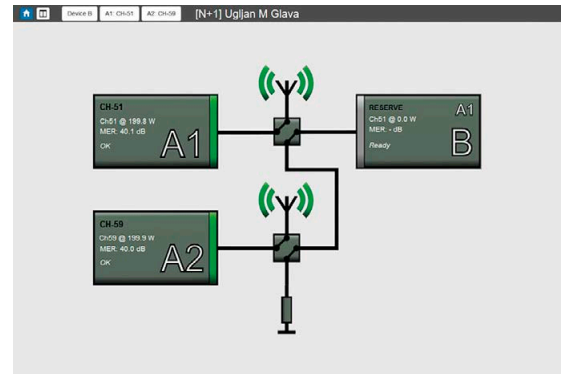


Diagram of the 1+1 system formed by a main Transmitter and a backup Transmitter.



Example of 2+1 system as is seen on web server.

It is possible to see at the same time 2 transmitters on the same web page in case of redundant systems.

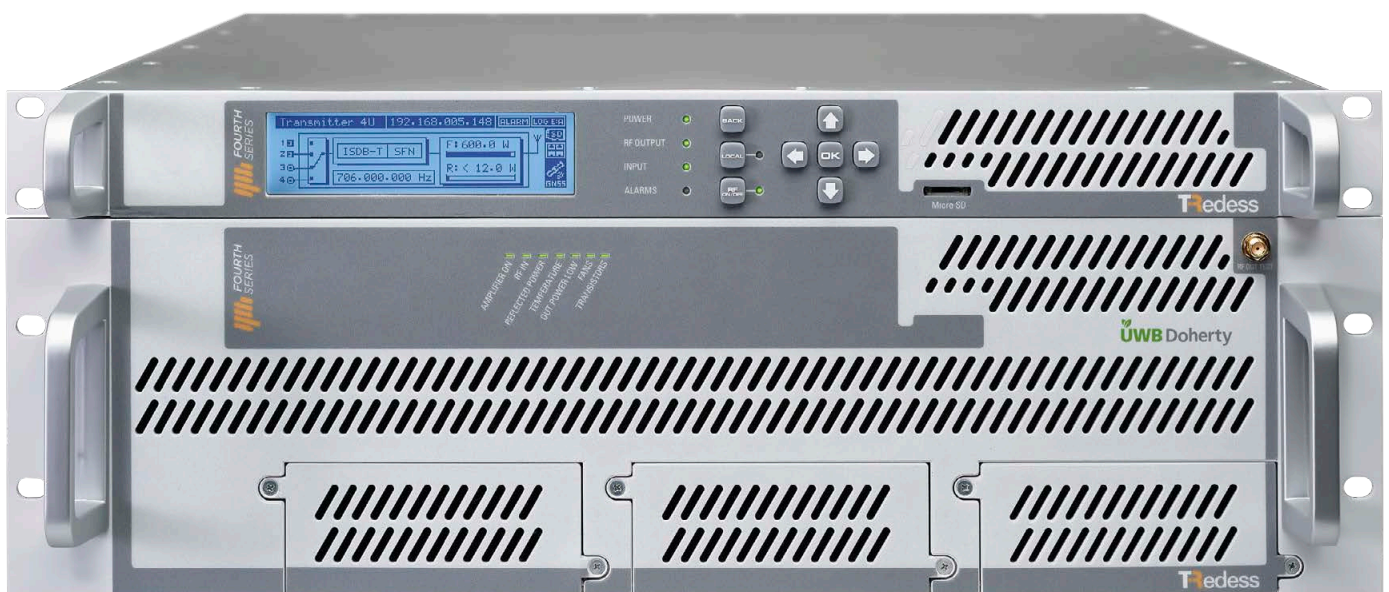
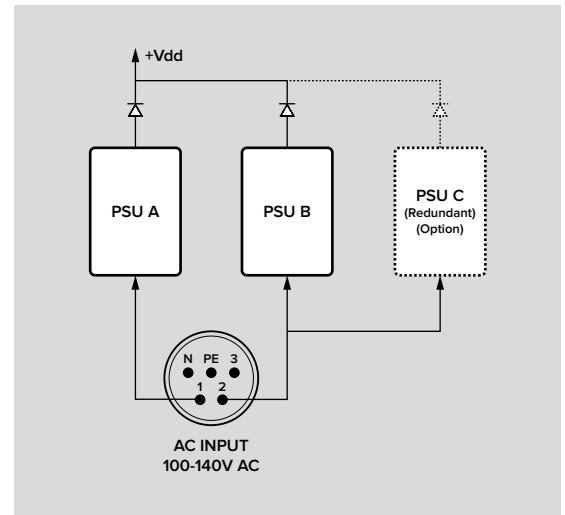
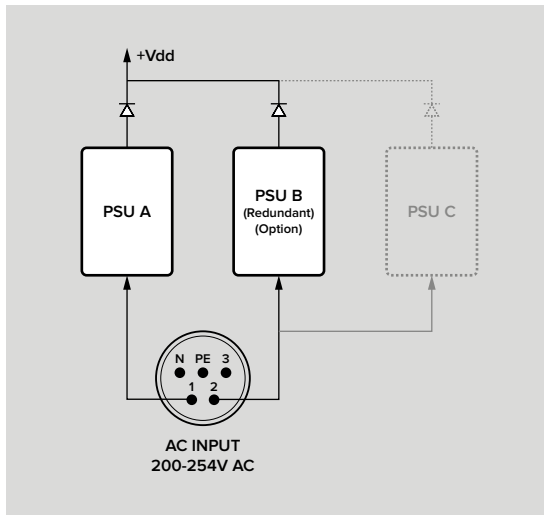
Redundant power supplies

The power supply redundancy option is available in the low power range in the 3HU models (275W and 400W) and also available for the Medium and High Power amplifiers, hence increasing the reliability of the system.

The modularity of the Fourth Series also allows a very easy access to all the modules, including the Power supplies, so for a replacement, a very simple hot swap, slide off and slide in of the power supplies, can be made on the 3RU standalone models and on the 600W amplifiers safely and with no effort.

Power amplifier can be optionally provided with a redundant power supply unit connected in parallel operation. Figure below details the diagram of the AC connections inside the amplifier and the possible configurations depending on the input voltage range.

The design of the device allows that each power supply unit can be hot-swapped without turning off the AC source providing to the device.



06 | High performance DEEC echo cancelling

Doppler Enhanced Echo Canceller is a high-performance echo canceller that makes Fourth Series Gap-Fillers able to retransmit the RF signal under the most challenging echo conditions. It can suppress high feedback echo levels giving an outstanding MER performance.

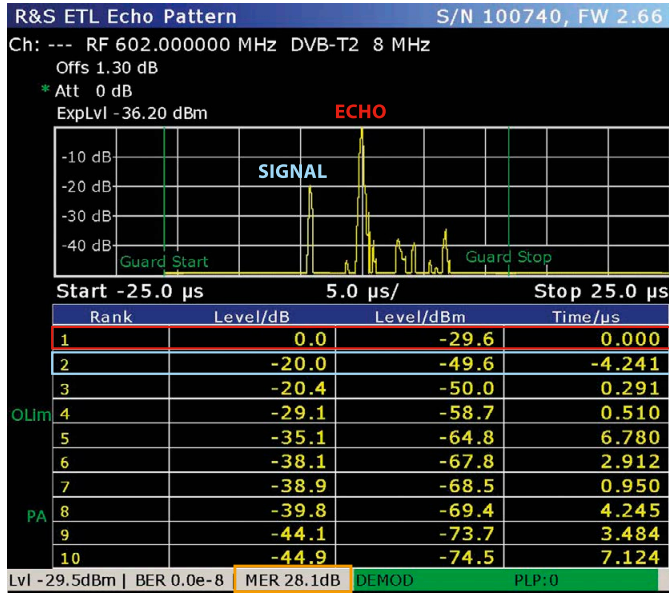
Key features of DEEC:

- **Gain margin of 35 dB** (QEF conditions) and outstanding output MER performance on complicated SFN echo conditions.
When the echo is 20 dB higher than signal, the guaranteed output MER is > 29 dB.
- **Very flexible cancellation window system**, based in 16 windows user configurable windows allowing to do an optimum configuration for each particular echo scenario at the input and consequently improving the Gap-Filler performance, and also 3 fixed windows to eliminate its own feedback.
- **Cancelling of echoes with variable amplitude or frequency: doppler, rice...** solving problems in stations close to forest, trains, sea, lakes, ...
- **Fourth Series Gap-Fillers include digital adaptive precorrector**, delivering shoulder and Output MER optimization and leading to Outstanding MER performance (with and without feedback echo).
- **Smart web graphical interface**, with two graphs showing the echo pattern before and after the echo canceller (echo pattern view & cancellation result) simplifying the installation and facilitating the local and remote optimum configuration of the echo canceller, optimizing the performance of the Gap-Filler.
- **Very short processing time:** a very low latency makes possible that the Gap-Filler can be installed in a site much closer to the Guard Interval limit, this is, further away from main Transmitter.

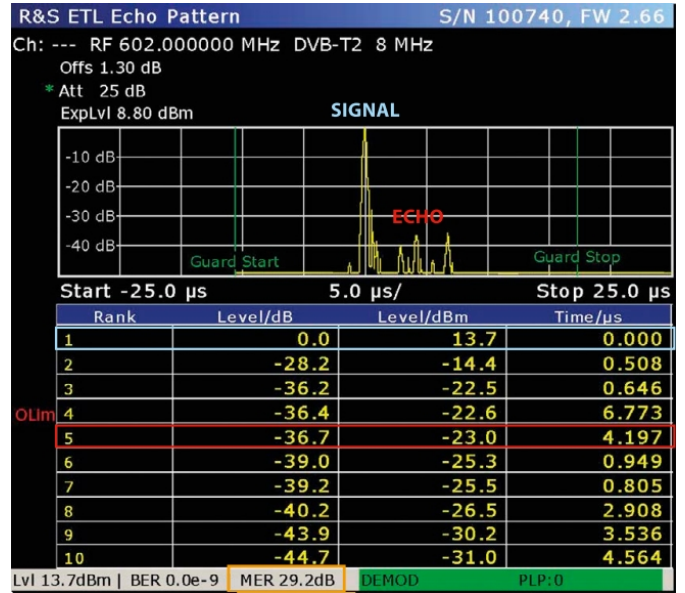
Consequences of having the best echo canceller in your network:

- **Being able to install Gap-Fillers in the same sites where other competitors will need to install a Transmitter:** with all the extra cost this would imply in terms of additional devices as GPS, sat receiver/microwave link, etc., and also implying a much simpler maintenance of a Gap-Filler at a Transmitter site.
- **Being able to use a higher output power than any other competitor on the same Gap-Filler site,** hence reaching a bigger coverage from the same site.
- **And also the much better echo cancelling performance leads to a much more stable operation at the site,** implying that the long term performance of the Gap-Filler is not affected by the fluctuations of the input signal, and leading to less need of site visits (cost savings) and also very importantly leading to a much better customer satisfaction.

Example: cancellation of an echo 20dB higher than the signal with DEEC echo canceller, with output MER > 29dB:

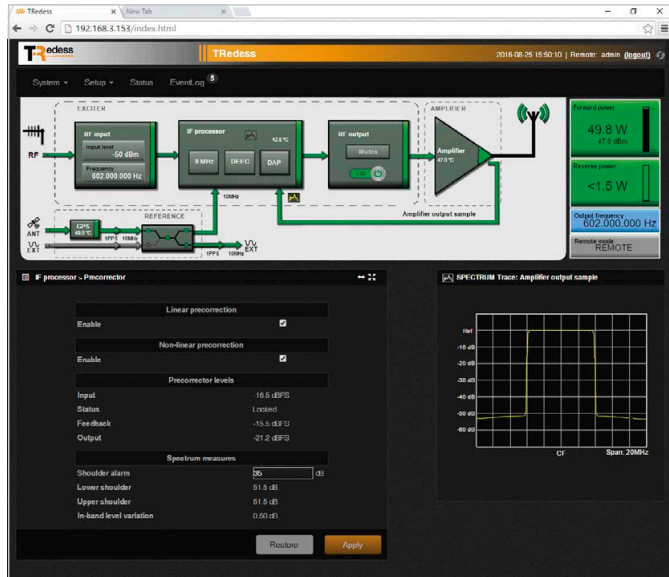


Input signal

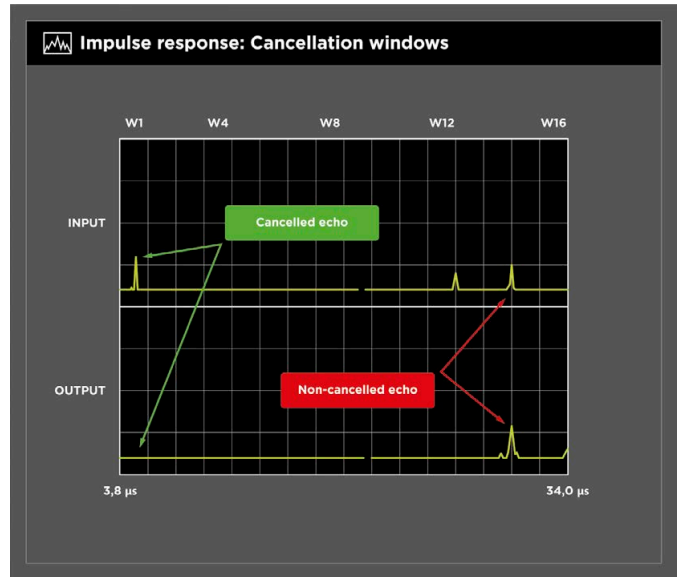


Output signal

Smart Web Interface



Cancellation Window System



07 | REMUX (ISDB-Tb)

TRedess is offering as an option the **REMUX Software functionality for their ISDB-T/Tb range of modulators.**

- ISDB-Tb REMUX software functionality for TV Stations with satellite reception.
- Cost effective feature due to avoidance of additional equipment for BTS generation.

When the satellite signal (DVB-S/S2) is received by the system, it is received as TS (188 bytes). TRedess ISDB-T/Tb modulator will accept the TS signal or BTS signal over ASI or IP (Without TS to BTS decompression). This will avoid the necessity of additional equipment for conversion.

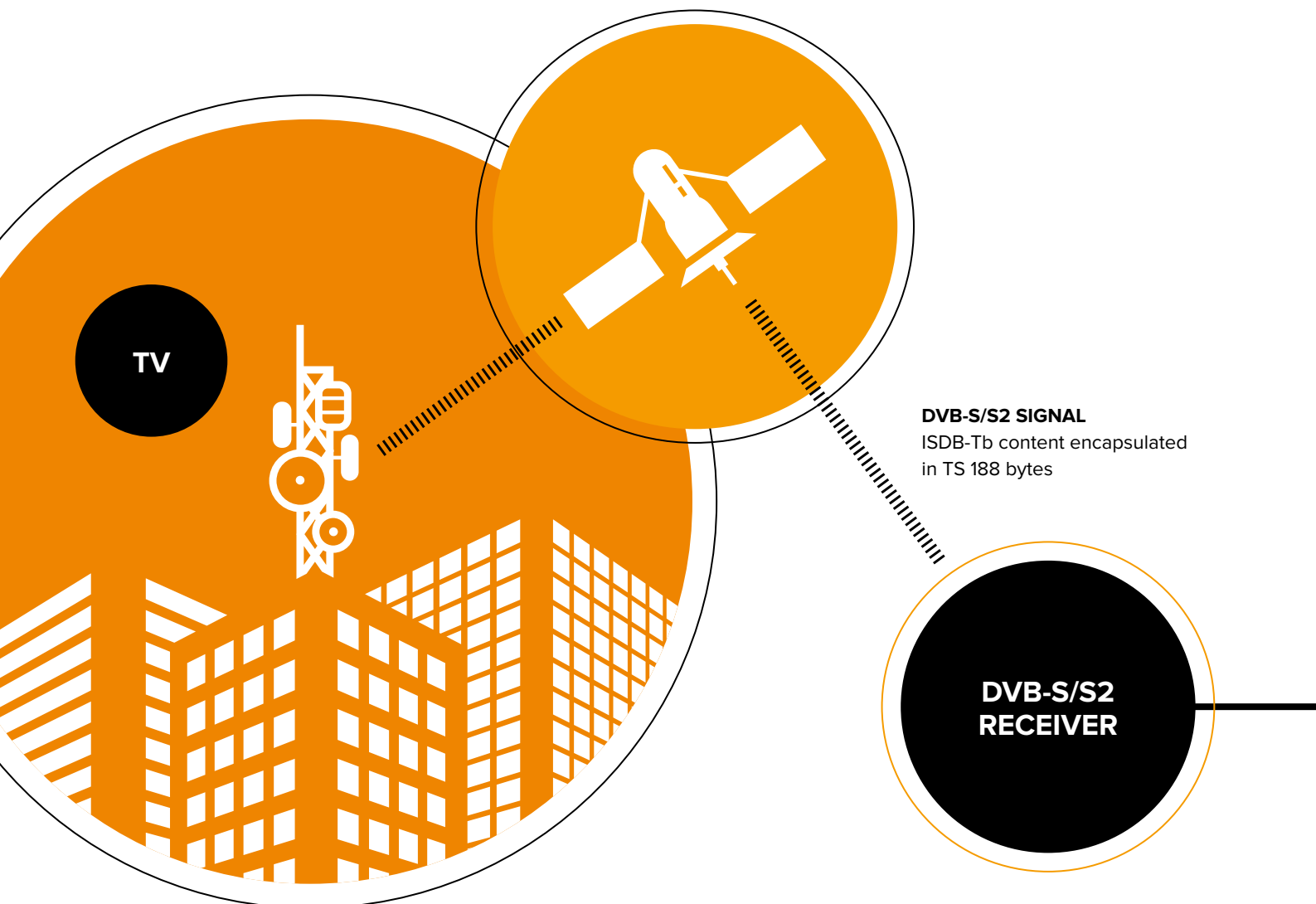
ISDB-T Remux functionality provides the Transmitter ISDB-T/Tb with services filtering capabilities. Three performance modes are available:

1. PID filtering mode

- Requires knowledge in advance the incoming PIDs.
- Assumes just one service per layer.
- Generates NIT, BIT and TOT from scratch.
- Updates the rest of PSI/SI tables according to the entered parameters.

2. Program filtering mode

- Does not require knowledge in advance the incoming PIDs.
- Programs can be checked under PSI/SI submenu.
- Allows several services per layer.
- Updates the rest of PSI/SI tables according to the entered parameters.



3. Advanced filtering mode

- Requires knowing in advance the incoming PIDs and typology.
- Allows PID remapping.
- Allows several services per layer.
- Allows changing program names.
- Generates PAT, PMT, SDT, NIT, BIT and TOT from scratch.
- Updates the rest of PSI/SI tables according to the entered parameters. Parameters that can be changed on the interface Table:

Table	Description
NIT	Network ID, Network name, Transport Stream ID, Transport Stream name, Area code, Frequency, Virtual channel
BIT	Affiliation ID
TOT	Country code, Region ID

Using that information as well as the incoming PSI/SI information all the following tables are updated, service ID recalculated: PAT, PMT, SDT, EIT.

Advanced Features

- External reference inputs: 10 MHz & 1PPS.
- Spectrum configuration: One, two or three layers, with or without partial reception.
- IFFT Size Mode: One (2048), Two (4096) or Three (8192).
- Modulation: QPSK, 16-QAM and 64-QAM.
- Time Guard Interval: 1/32, 1/16, 1/8 and 1/4.
- Time interleave: 0, ≈100ms, ≈200ms and ≈400ms EWBS.
- PCR adaptation.

ISDB-T/Tb

AVAILABLE INPUTS
(2x) ASI / (2x) TSoIP Gb



TS 188 bytes · ASI/TSoIP Gb



Fourth Series Medium & High Power

600 to 5000W / 750 to 6000W for ATSC 1.0

Architecture and system key features

Fourth Series Medium & High Power Air-Cooled UHF Transmitters cover the power range from 600W to 5000W / 750W to 6000W for ATSC 1.0, bringing together maximum flexibility, high efficiency based on the use of the latest Ultra-Wide Band Doherty technology, very smart installation and operation, high reliability and a compact design.

They are based on a modular architecture, with a separated 1HU exciter and the multiple number of necessary 3HU amplifiers. Note that TRedess

counts with two different models of 3HU amplifiers (600W amplifier in Symmetrical Doherty and Asymmetrical Doherty). Both, Single Drive and Dual Drive configurations are available.

The design is fully oriented to minimize the rack space and the total cost of ownership: Single Drive Transmitters are composed by one Exciter module and the needed number of Power Amplifier modules, with an output power of 600W / 750W rms each.



TRedess DTT TRANSMITTERS up to 5000W (6000W for ATSC 1.0)

Fourth Series **Medium & High Power** | Technical specifications

Output power (Before filter) COFDM modulations	600 W	1200 W	1800 W	2400 W	3000 W	3600 W	4800 W
Output power (Before filter) ATSC 1.0	750 W	1500 W	2500 W	3000 W	3750 W	4500 W	6000 W
N° of Amplifiers	1	2	3	4	5	6	8
Final amplifier type	UWB Symmetrical Doherty / UWB Asymmetrical Doherty						
Efficiency (Typical)	37% (COFDM Modulation) / 41% (COFDM Modulation)						
Frequency range	BIII (174-254 MHz) or UHF (470-790 Mhz) / UHF (470-700 Mhz)						
Standards	DVB-T/H ETSI EN 300744, ETSI EN 302304, TR 101191, EN 50083-9 DVB-T2 ETSI EN 302755 V1.3.1, TS 102 831, TS 102 773 ISDB-T ARIB_STD-B31 v1.6, ABNT NBR15601:2007 ATSC A/53, A/153, A/110; ATSC 3.0 Upgradeable						
Inputs	DVB-T/H/T2: 2x ASI/T2-MI BNC-female - 2x TSolP 10/100/1000 (UDP, RTP, RTP-FEC) RJ-45 Optional: RF input 1xN-female (VHF and UHF); DVB-S2 input 1xF-female with CAM and BISS 1/E ISDB-T/Tb: 2x ASI/BTS BNC-female - 2x TSolP 10/100/1000 (UDP, RTP, RTP-FEC) RJ-45 Optional: DVB-S2 input 1xF-female with CAM and BISS 1/E ATSC: 2 xASI/SMPTE BNC-female - 2x TSolP 10/100/1000 (UDP, RTP, RTP-FEC) RJ-45 Programmable seamless switching between all inputs						
MER	> 35 dB						
IMD (Shoulder)	> 38 dB						
Precorrection	Digital adaptative, linear and non-linear						
Crest factor	≤ 13 dB						
RF output connector	DIN 7/16	EIA 7/8" *	EIA 1 5/8" *				
10 MHz reference input	BNC female 50 Ω (-15 to +10 dBm)						
10 MHz reference output	BNC female 50 Ω						
1 pps reference input	BNC female 50 Ω (TTL)						
GPS/GNSS (Option)	SMA female 50 Ω Connector Stability < ±1x10exp-9 (0°C to 60°C) Holdover: <0.8µs after 4 hours; <12 µs after 24 hours						
OCXO (Option)	Stability < ±5x10exp-9 (0°C to 60°C) Aging: < ±5x10exp-10/day < ±5x10exp-8/year						
Local control	Front LCD display with keyboard and LED indications. Micro-SD card to save and restore configurations settings.						
Remote control	Ethernet (web application and SNMP); I/O contacts						
Operating temperature range	-5°C to 45°C						
Relative humidity (max.)	95% · Non condensing						
Altitude of operation	≤ 2500 m above sea level (> 2500m on request)						
Cooling	Force air (with air dust filters for dusty air atmospheric conditions)						
Supply Voltage	110/240 VAC (single phase) 47 to 63 Hz	110/240 VAC (single phase) 208/400 V (three phase 4 wires) 47 to 63 Hz					
Safety	EN 60950-1:2006+A1:2010+A11:2009 +A12:2011 · EN 60215:1989+A1:92+A2:94						
EMC	ETSI EN 301 489-1 V1.9.2 (2011-09); ETSI EN 301 489-14 V1.2.1 (2003-05); EN 61000-4-5, heavy Industry level						
Spectrum efficiency	ETSI EN 302 296-2 V1.2.1 (2011-05)						

* Other RF output connectors under request

Fourth Series Low Power

10 to 400W / 500W for ATSC 1.0

Architecture and system key features

Fourth Series Low Power Air-Cooled Family covers the power range from 10W to 400W / 500W for ATSC 1.0, bringing together maximum flexibility, high efficiency, very smart installation and operation, high reliability and a compact design.

They are based on a all-in-a-box standalone architecture, fully oriented to minimize rack space and the total cost of ownership: Power supply, Exciter and Amplifier in the same chassis.

Fourth Series Low Power ultra-compact units are ideal for scenarios with space limitation at the site.

Several models are available, with rms output powers of 10, 40 and 75W in 1RU, 120W (UWB Doherty) and 150W (AB class) in 2RU, and 275W (AB Class) or 400W (UWB Doherty amplifier) in 3RU, so the hardware is always well sized and optimized for each DTT network infrastructure.

Two types of units are available: Transmitters and Gap-Fillers: Transmitters can also work as Re-Transmitters. Gap-Filler units can work as MFN Translators/Transposers, or in SFN On-channel Repeater mode, using TRedess' DEEC, the best echo canceller in the World.



TRedess DTT TRANSMITTERS up to 400W (500W for ATSC 1.0)

Fourth Series **Low Power** | Technical specifications

Output power (Before filter) COFDM modulations	120 W	400 W	25 W	75 W	150 W	275 W
Output power (Before filter) ATSC 1.0	160 W	500 W	30 W	100 W	200 W	340 W
Final amplifier type	UWB Symmetrical Doherty		LDMOS AB class			
Frequency range	470-790 Mhz		470-862 MHz			
Dimensions	2RUx19"x480mm	3RUx19"x480mm	1RUx19"x465mm	1RUx19"x465 mm	2RUx19"x480mm	3RUx19"x480mm
Standards	DVB-T/H ETSI EN 300744, ETSI EN 302304, TR 101191, EN 50083-9 DVB-T2 ETSI EN 302755 V1.3.1, TS 102 831, TS 102 773 ISDB-T ARIB_STD-B31 v1.6, ABNT NBR15601:2007 ATSC A/53, A/153, A/110; ATSC 3.0 Upgreadeable					
Inputs	DVB-T/H/T2: 2x ASI/T2-MI BNC-female - 2x TSolP 10/100/1000 (UDP, RTP, RTP-FEC) RJ-45 Optional: RF input 1xN-female (VHF and UHF); DVB-S2 input 1xF-female with CAM and BISS 1/E ISDB-T/Tb: 2x ASI/BTS BNC-female - 2x TSolP 10/100/1000 (UDP, RTP, RTP-FEC) RJ-45 Optional DVB-S2 input 1xF-female with CAM and BISS 1/E ATSC: 2 xASI/SMPTE BNC-female - 2x TSolP 10/100/1000 (UDP, RTP, RTP-FEC) RJ-45 Programmable seamless switching between all inputs					
MER	> 35 dB					
IMD (Shoulder)	> 38 dB					
Precorrection	Digital adaptative, linear and non-linear					
Crest Factor	≤ 13 dB					
RF output connector	N- female	DIN 7/16 female	N- female	N- female	N- female	DIN 7/16 female
10 MHz reference input	BNC female 50 Ω (-15 to +10 dBm)					
10 MHz reference output	BNC female 50 Ω					
1 pps reference input	BNC female 50 Ω (TTL)					
GPS/GNSS (Option)	SMA female 50 Ω Connector Stability < ±1x10exp-9 (0°C to 60°C) Holdover: <0.8µs after 4 hours; <12 µs after 24 hours					
OCXO (Option)	Stability < ±5x10exp-9 (0°C to 60°C) Aging: < ±5x10exp-10/day < ±5x10exp-8/year					
Local control	Front LCD display with keyboard and LED indications. Micro-SD card to save and restore configurations settings.					
Remote control	Ethernet (web application and SNMP); I/O contacts					
Operating temperature range	-5°C to 45°C					
Relative humidity (max.)	95% , non condensing					
Altitude of operation	≤ 2500 m above sea level (> 2500m on request)					
Cooling	Force air (with air dust filters for dusty air atmospheric conditions)					
Supply Voltage	110/240 VAC (single phase) - 47 to 63 Hz					
Safety	EN 60950-1:2006+A1:2010+A11:2009 +A12:2011 · EN 60215:1989+A1:92+A2:94					
EMC	ETSI EN 301 489-1 V1.9.2 (2011-09); ETSI EN 301 489-14 V1.2.1 (2003-05); EN 61000-4-5, heavy Industry level					
Spectrum efficiency	ETSI EN 302 296-2 V1.2.1 (2011-05)					

TRedess GAP-FILLERS up to 400W

Fourth Series **Low Power** | Technical specifications

Output power (Before filter) COFDM modulations	120 W	400 W	25 W	75 W	150 W	275 W
Final amplifier type	UWB Symmetrical Doherty		LDMOS AB class			
Frequency range	470-790 Mhz		470-862 MHz			
Dimensions	2RUx19"x480mm	3RUx19"x480mm	1RUx19"x465mm	1RUx19"x465mm	2RUx19"x480mm	3RUx19"x480mm
Standards	DVB-T/H ETSI EN 300744, ETSI EN 302304, TR 101191, EN 50083-9 DVB-T2 ETSI EN 302755 V1.3.1, TS 102 831, TS 102 773 ISDB-T ARIB_STD-B31 v1.6, ABNT NBR15601:2007					
RF input signal level	-70 to -20 dBm					
RF input signal frequency range	470-862 MHz					
RF input connector	N-female					
Echo canceller	Gain Margin (signal-echo): -35 dB (QEF conditions) Flexible cancellation: 3 fixed windows and up to 16 user configurable windows. Echo suppression: more than 40 dB Doppler cancellation Amplitude equalization					
MER with Echo Canceller -20dB margin	> 29 dB (input MER >35 dB)					
IMD (Shoulder)	> 38 dB					
Precorrection	Digital adaptative non-linear and amplitude equalization					
Crest Factor	≤ 13 dB					
RF output connector	N- female	DIN 7/16 female	N- female	N- female	N- female	DIN 7/16 female
10 MHz reference input	BNC female 50 Ω (-15 to +10 dBm)					
10 MHz reference output	BNC female 50 Ω					
1 pps reference input	BNC female 50 Ω (TTL)					
OCXO (Option)	Stability < ±5x10exp-9 (0°C to 60°C) Aging: < ±5x10exp-10/day < ±5x10exp-8/year					
Local control	Front LCD display with keyboard and LED indications. Micro-SD card to save and restore configurations settings.					
Remote control	Ethernet (web application and SNMP); I/O contacts					
Operating temperature range	-5°C to 45°C					
Relative humidity (max.)	95% · Non condensing					
Altitude of operation	≤ 2500 m above sea level (> 2500m on request)					
Cooling	Force air (with air dust filters for dusty air atmospheric conditions)					
Supply Voltage	110/240 VAC (single phase) - 47 to 63 Hz					
Safety	EN 60950-1:2006+A1:2010+A11:2009 +A12:2011 · EN 60215:1989+A1:92+A2:94					
EMC	ETSI EN 301 489-1 V1.9.2 (2011-09); ETSI EN 301 489-14 V1.2.1 (2003-05); EN 61000-4-5, heavy Industry level					
Spectrum efficiency	ETSI EN 302 296-2 V1.2.1 (2011-05)					

Integrated solutions

TRedess offers more than TV broadcast equipment. Our aim is to deliver complete solutions to give response to our customer needs in DTT transmission. We are able to provide turnkey solutions for your projects, being a flexible company, listening to your needs and adapting the proposal.



Plug & Play Solutions

TRedess systems are built, configured and adjusted in our factory according to the specific requirements of our customers, so the delivered solution is ready to be easily installed and put into operation with a minimum effort, fast and easily.

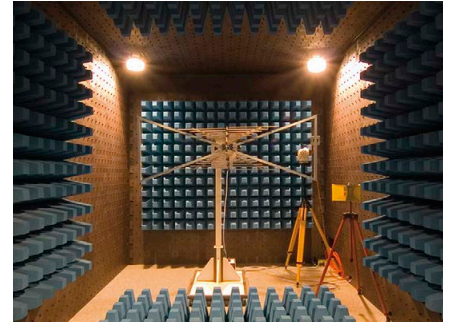
Complete Solutions

TRedess has wide experience with projects in more than 35 countries in supplying fully integrated racks, including all the necessary 3rd party equipment required such as combiner systems or satellite reception systems, as well as auxiliary elements for the transmitting sites: reception and transmission antenna systems, cabling, etc., integrated at our factory with TRedess transmission systems.

Technical Advice and Support

We work closely with customers to ensure they get the maximum benefit of our systems, so we provide advice in system configuration, training and a close and professional technical support.

About TRedess



Our Company

TRedess is highly specialized in the design, development and manufacturing of competitive, reliable and innovative solutions for digital TV broadcasting networks.

Our main products are AIR COOLED (Low, Medium and High) power Transmitters and Gap-Fillers for DVB-T/T2, ISDB-T, ATSC 1.0 and ATSC 3, counting with a huge technical experience in this market sector.

With a very strong effort in R&D, TRedess products are fully designed by our R&D engineers and manufactured at our own factories in Spain, leading to a full control of the product.

High Manufacturing Capabilities

TRedess belongs to the Televes Corporation, and our products are manufactured in the Televes Corporation State-of-the-Art manufacturing facilities in Santiago de Compostela (Spain), and tested with the most advanced quality control techniques.

We have full control on our production, and this leads to having very reliable products, the flexibility to adapt to customer requirements, and the capacity to respond to demanding delivery times and volumes.

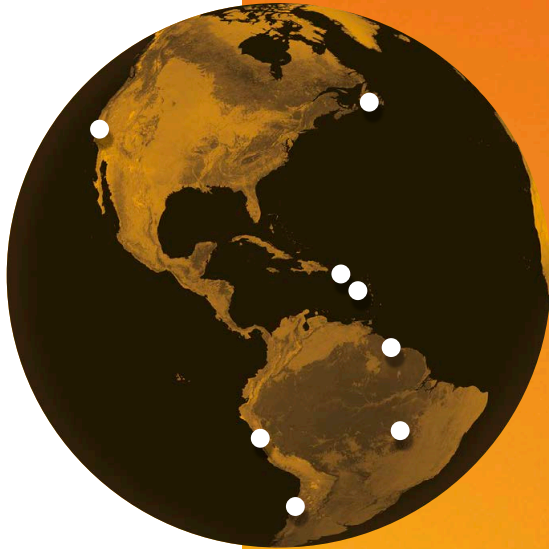
To get a competitive manufacturing facility is only possible by constant investments and a solid financial stability, so, Televes Corporation has initiated an investment project of 23 million euro for a 4.0 update of the factory.

Financial stability

The continuous financial positive results obtained during the last 10 years plus the big economical solvency and financial stability of TRedess and Televes Corporation, make of TRedess a very reliable long term partner selection for any network operator worldwide.

Worldwide Experience

TRedess supplies reliable and efficient digital TV transmission equipment to main DTT operators worldwide. We have a consolidated experience having participated in major DTT rollout projects, and counting nowadays with **more than 17,000 Transmitter and Gap-Filler devices running worldwide**. TRedess solutions are **present in more than 35 countries**.



SPAIN

FRANCE

HUNGARY

POLAND

ITALY

PORTUGAL

SWEDEN

NORWAY

MALTA

FAEROE

IRELAND

GEORGIA

PERU

CHILE

BRASIL

VIETNAM

HONG KONG

THAILAND

MOROCCO

MALI

SOUTH AFRICA

GREECE

CROATIA

USA

...





TRedess 2010, S.L.
Volta do Castro, s/n
15706 Santiago de Compostela
SPAIN

GPS N: 42° 51' 52.93", W: 8° 34' 5.19"
T +34 981 534 203
F +34 981 522 052
international@tredess.com
www.tredess.com

TRedess is certified by
UNE - EN ISO 9001:2015



06010113 v0319

Specifications are subject to change
without notice.

