



waveArt
HUMAN BROADCASTING



MEDIUMPOWER



FM TRANSMITTER SERIES



Technology and talent
deliver their strongest signal and
the FM Transmitter becomes intuitive.
To achieve it we could use only the head,
but then we put the heart, too.



Technology



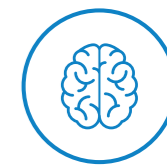
Heart



Intuition



Power



Head





WaveArt: it's coming the era of **digital** **humanism.**



WaveArt is a company specialized in the design and manufacture of **innovative FM transmitters** that provide outstanding performance for cutting-edge radio stations.

We are fascinated by **smart technology** and by solutions that improve people's life. Our focus is on people, to their business and to their radio experience.



Excellence of our product:

Reliability, efficiency, design and fair price are just a few of our inspiring principles. Decades of experience in TV Broadcasting and continuous **interactions** with other fields make our products **unique**. Just as unique are the head and the heart of who conceived them. **WaveArt is an ABE Elettronica spin-off.**



Our mission:

Innovate Radio Broadcasting.

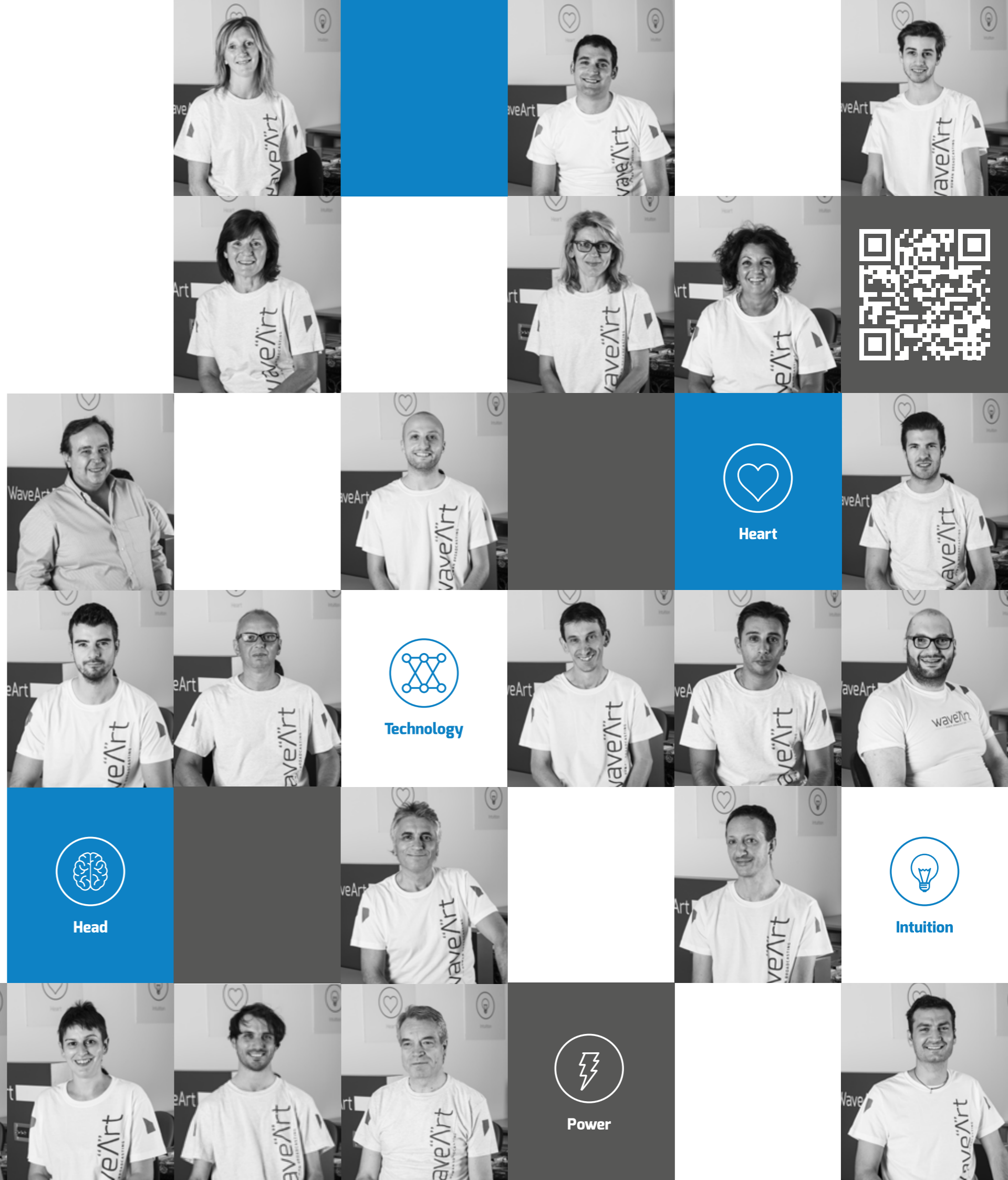


The team makes the difference. Always.

Our team has been able to express its **know-how** in a unique way, combining a proven experience in TV Broadcasting with the typical enthusiasm of the new generations. The mix of personalities, experiences and expertise that encloses WaveArt team led to design **exceptional FM transmitters**, combining **skills, technology and passion**.

Technological melting-pot: is there a greater power?

The human wealth always makes the difference: WaveArt expresses the value of a mature, inventive and lively team, looking for **new and flexible solutions**, ahead of their time. The **heterogeneous professional and cultural background** of our team has allowed us to merge into our products **solutions coming from different fields**. The result: unequalled service and performance **never seen before**.





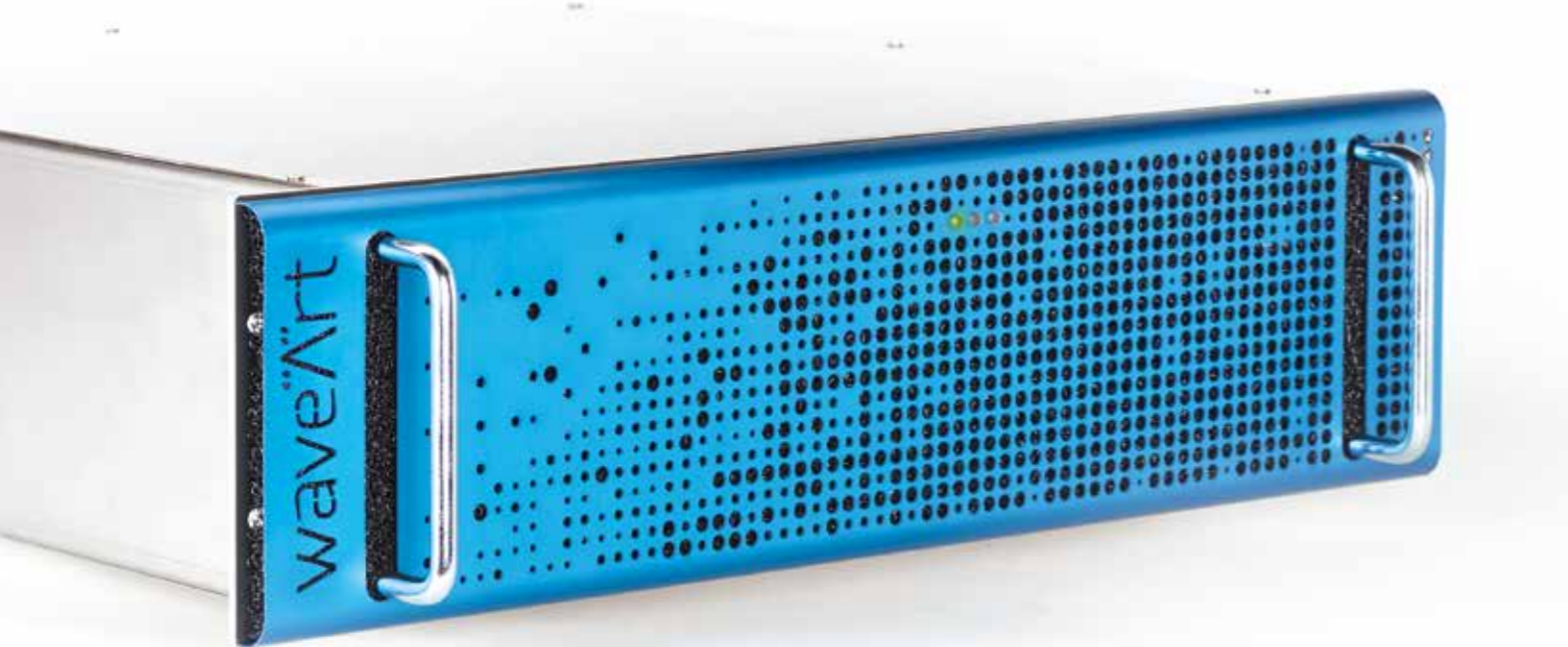
The reinvention of FM Transmitters

Listening to the needs and requests of broadcasters, we managed to incorporate in our transmitters features that make them unique in terms of **reliability, ease of management and reaction to critical scenarios.**

Our goal is to simplify network management and complexity, in order to **prevent you to waste money and time.**

Thanks to this approach, in a few years **the concept of FM transmitter will be revolutionized...**

Have you ever seen a SAT receiver inside an FM transmitter?



ProDigy

Digital Processing with DDS Modulator

Digital Processing is a technique that involves **the conversion of the input signal from analog to digital**; the sampling result is then processed and modulated at the frequency required. This method introduces **less distortion**, requires no calibration and allows more flexibility on input and output signal handling. A further benefit is the hardware scalability, allowing a simple transition to Digital Broadcasting and **additional tailor made features.**



EffiSense

Prognostics

Analysis for predictive maintenance

WaveArt transmitters are able to **collect and process several parameters** to evaluate the operating conditions at the site. This feature is crucial for maintenance and for **predictive analysis** of potential future failures.

WorryFree

Free warranty up to 5 years

Based on the collected data, the unit recommends the proper operations to extend its life span, rewarding more careful customers with an **unmatched warranty.**

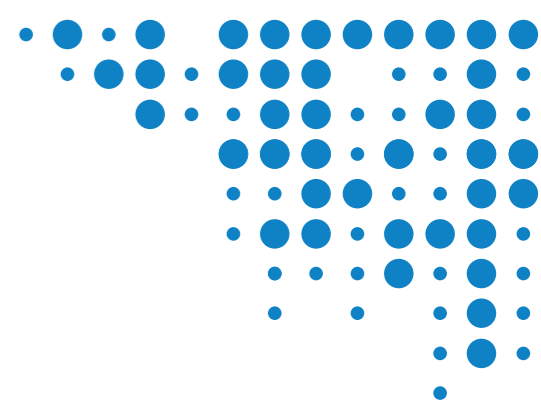


All-in

It receives, sharpen and deliver your audio

Our transmitters integrate a **comprehensive set of input interfaces**, as well as **MPX/RDS Encoder** and **Audio Processor.**

Say goodbye to headaches, you won't need to use external units anymore!





Designed to be intuitive

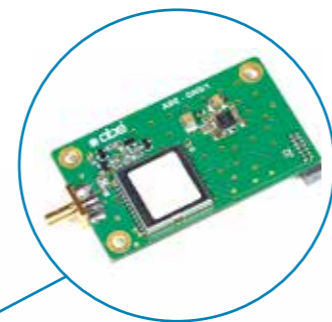
WaveArt transmitters are a synthesis of a **forefront hardware design**, combining state-of-the-art technology with great ease of management.

Be part of the innovation

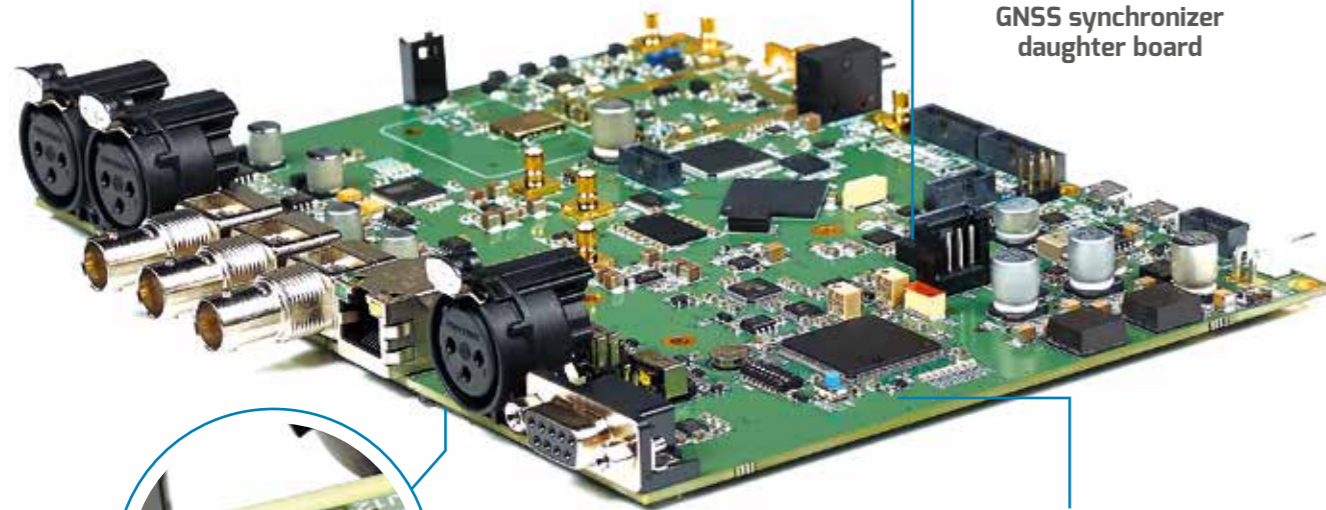
We'll release **FREE software upgrades**, adding new features and **constantly increasing the equipment performance**. Simply get the latest software version from our website and upload it in your transmitter via LAN or USB interface.

Always on-air

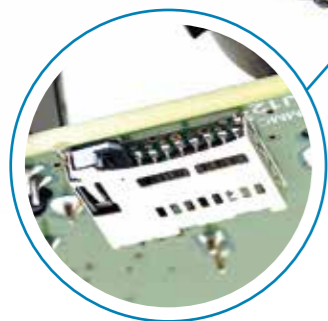
Loosing input signal is one of the worst conditions you can face. Our **built-in automatic input switch** will immediately get an alternative in case of failure of the main source. No matter what happens, WaveArt transmitter will always find a Plan B.



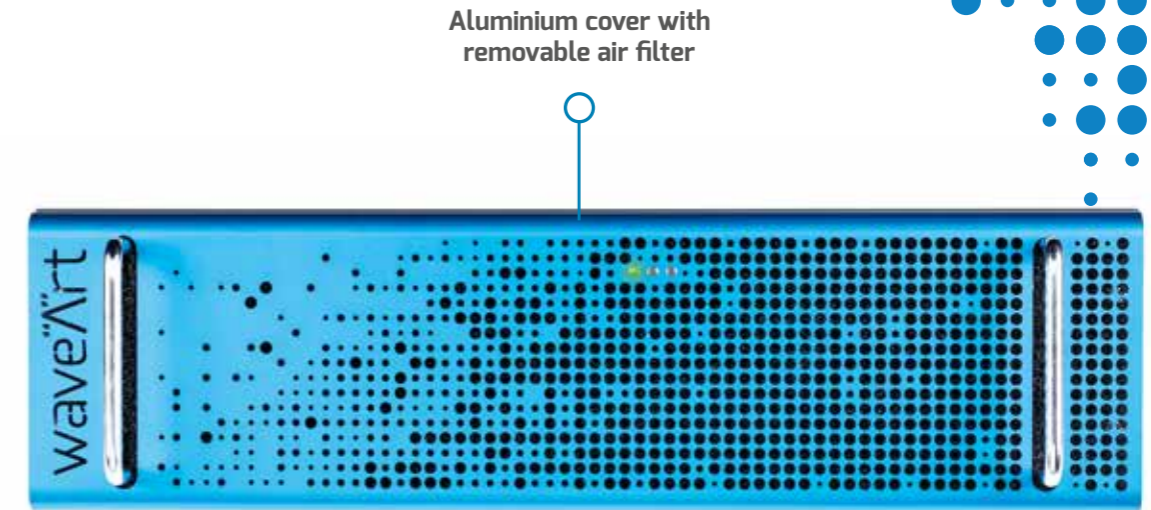
GNSS synchronizer daughter board



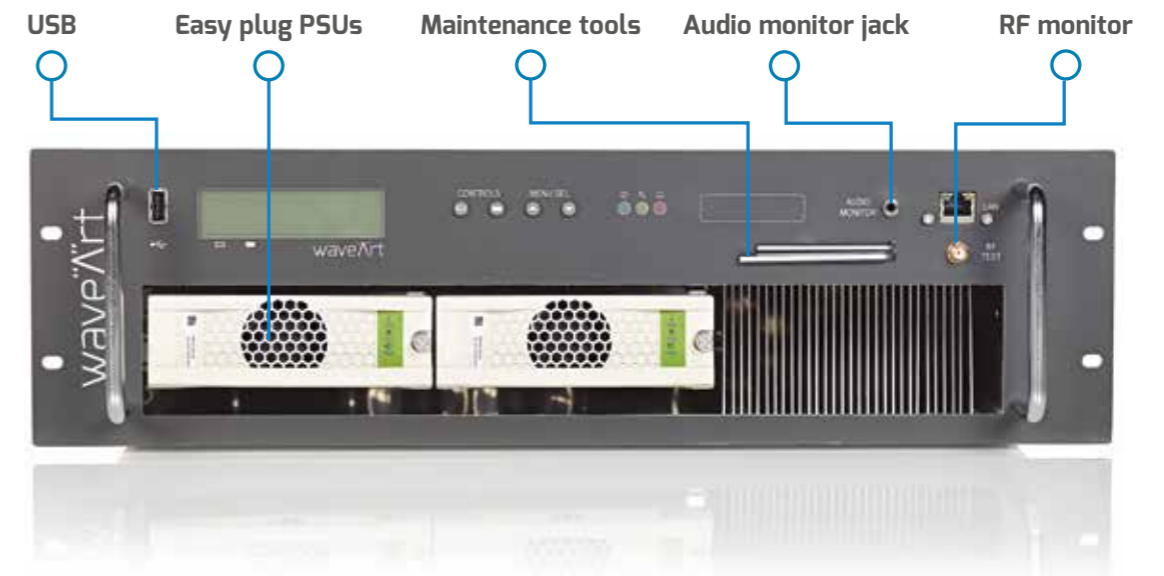
Modulator board with Input interfaces



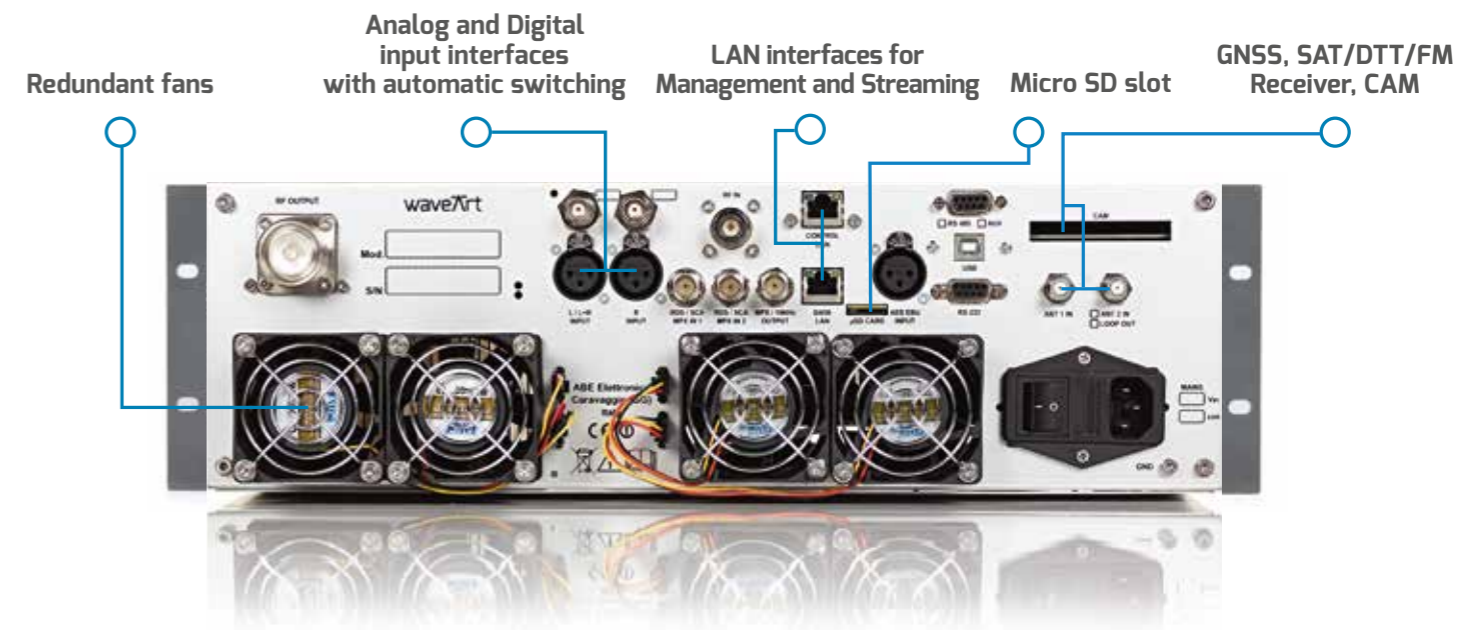
Micro SD slot



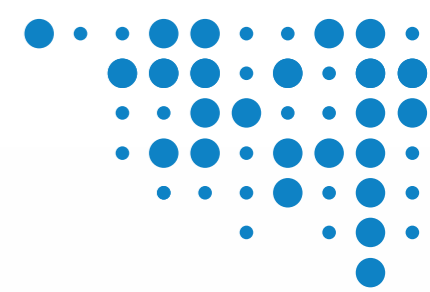
Aluminium cover with removable air filter



USB Easy plug PSUs Maintenance tools Audio monitor jack RF monitor



Redundant fans Analog and Digital input interfaces with automatic switching LAN interfaces for Management and Streaming Micro SD slot GNSS, SAT/DTT/FM Receiver, CAM



It's easy to be smart

We know that power surges and dust constantly threaten your transmitters and so we implemented the **best technology** to **make maintenance easier**.

In case of a power supply failure, you don't need to waste your time disassembling the unit. You can pull out the damaged PSU from the front panel in **just few seconds**, with **no need to turn off the transmitter**.

Have you forgotten your tools? No problem, WaveArt transmitter holds the necessary set of tools behind the cover!

Easy plug power supplies



Maintenance tools





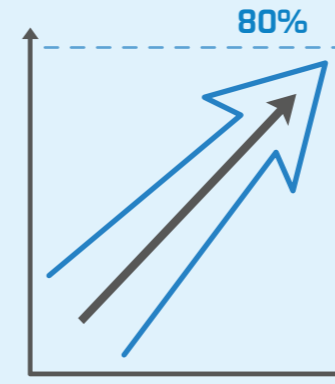
A penny saved is a penny earned

Developing strategies to increase sales to drive up profit and grow up the organization is the target of every CEO.

But you know that increasing sales is much more difficult and inconstant than reducing costs.

WaveArt transmitters, thanks to their typical **75% efficiency** and **exclusive features**, work right by your side to minimize your running costs, thus freeing up resources.

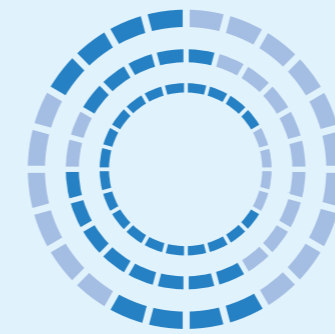
So, just switch on and start monetizing!



AEB

Adaptive Efficiency Boost

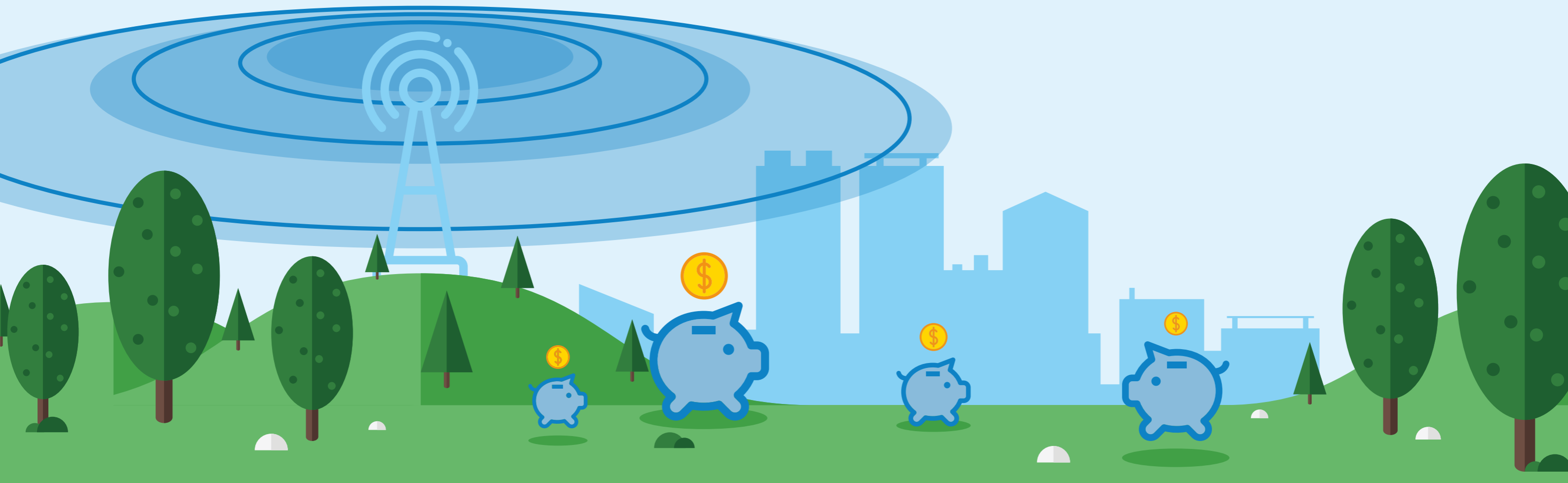
Using a proprietary algorithm that directly acts on the RF stages, WaveArt transmitters are able to **self optimize the key parameters** to **achieve the maximum efficiency** without any retuning.



Wave Plan

Power scheduler

Using WavePlan you are able to **fit your power consumption** according to your audience. You can create **daily and weekly plans**, setting up start and stop time and output power level. You can even save and recall plans on different transmitters.





Always connected providing concrete answers

Telemetry: which advantages?

Having **total control** and knowing how the equipment works is priceless: that's why in our transmitters **telemetry will never be an option**. The embedded **web server** and **SNMP agent** provide a quick connection to the equipment, allowing you to check and manage all the parameters **from any device**, wherever you are.

WaveArt transmitters are able to **send e-mails** in case of specified events. The transmitter shows you its past behavior through the advanced event log and it **foresees the future** thanks to the **EffiSense prognostics** feature.

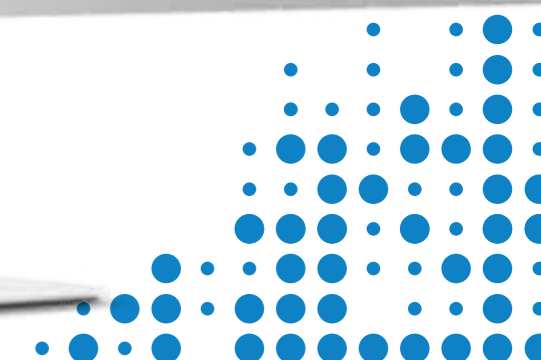
Our experience at your service

We offer **professional technical training courses** to enable operators to become familiar with theoretical and practical aspects of radio broadcasting.

Detailed content of each course will be customized to suit the particular needs of those attending.

Our team assists you in every step of your **network planning**, as well as in every kind of **troubleshooting**.

We care for **human relationships** first and we'll always do our best to **put you and your station on top**.





Medium Power FM Transmitters

Wave Series

RF OUTPUT

Output frequency range:	87.5 to 108 MHz (Output frequency adjustable in 1 Hz steps)
Class of emission and Frequency deviation:	F3E – Standard: ± 75 kHz peak deviation – Max: ± 200 kHz peak deviation
Frequency stability:	In the temperature range -5 to $+45^{\circ}\text{C}$: $\geq \pm 1$ ppm In one year (aging): $\geq \pm 1$ ppm Option: GNSS synchronizer (GPS + GLONASS) for better than 1Hz precision and stability
Model/Nominal output power:	Wave 600: 600W – Wave 1000: 1 KW – Wave 2000: 2 KW – Wave 3000: 3.5 KW tol.: ± 0.5 dB
Output power range:	Output power is adjustable from nominal value up to -10 dB
Output power stability:	± 0.2 dB (with ALC inserted – Automatic Level Control)
Output connector and impedance:	DIN 7-16 female - 50Ω
Load (Antenna) VSWR:	Normal operation up to 1.5:1 (4% reflected power – 14 dB return loss). Fold-back and Fast Protection functions operate (see description under “Embedded Features”)
Spurious emissions (including harmonics):	Compliant with ETSI and FCC specification
RF Monitor output:	SMA Female on the front panel (coupled to the RF output @ -50 dB typ.)

INPUT INTERFACES

Analog Audio:	L; R or Stereo: N*2 XLR female (Balanced; impedance $600\Omega/10K\Omega$ jumper selectable) Nominal input level: $+15$ dBu to -15 dbu (software adjustable) MPX / SCA / RDS: N*2 BNC female (Unbalanced; impedance $50\Omega/10K\Omega$ jumper selectable) Nominal input level: $+12.5$ dBu to -12.5 dbu (software adjustable)
Digital Audio:	AES/EBU: XLR female (Balanced; impedance 110Ω) Nominal input level: -24 dBFS to 0 dBFS (software adjustable); automatic sample rate selection Ethernet 10/100 base T (for Web Radio streaming and IP link): RJ45 ASI: BNC (female) 75Ω
Micro SD Card slot:	Cards up to 32 GB; Supported format: MP3; AAC-LC; AAC-HE; MPEG1 L2; WMA; FLAC; Ogg Vorbis Card reader for emergency content transmission (in case other input sources are not available)

Analog receiving interfaces:

FM receiver (for regenerative transposer application or for audio monitoring)
Input connector (for transposer application): N female 50Ω
Note: for regenerative transposer application it is also required an input filter

Digital receiving interfaces:

DVB-S/S2 receiver: input “L” band, “F” female connector 75Ω ; LNB power supply and control
DVB-T/T2 (Base and Lite) and ISDB-T/Tb receiver: input 42 to 1002 MHz, “F” female connector 75Ω
Digital receivers have the possibility to select and decode the wanted audio service (PID). Formats supported: MP3; AAC-LC; AAC-HE; MPEG1 L2; WMA; FLAC; Ogg Vorbis
Additional option: CAM slot for encrypted services

Input Interface selection:

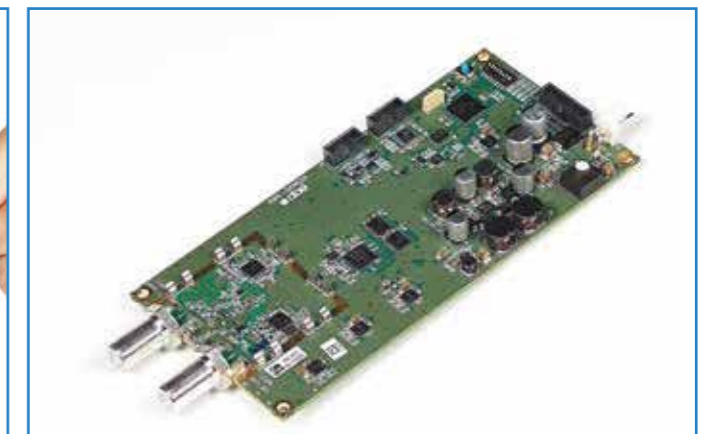
Manual or Automatic with three priority levels user selectable

AUDIO PERFORMANCES

Pre-emphasis:	0, 50 or 75 μs selectable
Mono / Stereo Audio bandwidth:	20 Hz to 15 kHz
Audio amplitude/frequency response flatness:	$\geq \pm 0.15$ dB (30 Hz to 15 kHz - including pre-emphasis)
MPX bandwidth:	Up to 100 kHz (according to the filter selected)
FM S/N ratio:	80 dB (typ. below 100% deviation at 400 Hz)
Distortion (THD):	$\leq 0.05\%$ (typ. 0.012%)
Stereo crosstalk attenuation (30Hz to 15 kHz):	≥ 50 dB (typ. 70 dB)
Asynchronous AM S/N ratio:	≥ 55 dB below equivalent 100% AM @ 400Hz measured with 75 μs de-emphasis (no FM modulation)
Synchronous AM S/N ratio:	≥ 50 dB below equivalent 100% AM @ 400Hz measured with 75 μs de-emphasis (FM ± 75 kHz peak deviation with 1 kHz tone)



CAM slot for encrypted services



DVB-T/T2 (Base and Lite), ISDB-T/Tb and DVB-S/S2 receiver board

EMBEDDED FEATURES & FUNCTIONS

Encoders:	Stereo MPX (ITU-R Recommendation 450) RDS/RBDS (static and dynamic) Dynamic data through RS232 port (other options for dynamic data on custom basis)
Digital Audio processing:	Soft Clipper with band limitation. This function allows modulation peaks limitation (within certain limits) without perceiving the annoying distortion effect, without affecting the mono or stereo transmission bandwidth, without overmodulating but maintaining a high emission volume). This function is made inside a FPGA (Field Programmable Gate Array) with a high oversampling real time processing. Equalizer
Audio test mono/ stereo generator	From 20 Hz to 15 KHz
19 kHz (external RDS) / MPX output connector:	BNC female 50Ω
Fold-back function:	In case of high value of VSWR (exceeding the specified tolerance) or power amplifier high heatsink temperature, the Fold-back function operates to reduce the RF output power before tripping off.
Fast Protection function:	In case of instantaneous very high VSWR (e.g.: RF output disconnection or short circuit), the Fast Protection function operates to cut-off output power in few microseconds.
Environmental sensors:	Temperature, Humidity, Dust, Corrosion (for alarms, protections and predictive analysis)
Audio monitoring:	Stereo jack 3.5 mm for headphones on the front panel to monitor input signals and the RF output signal.
“Wave Plan” Output Power Scheduler:	Reduce the output power at specific times and days

LOCAL & REMOTE CONTROLS

Controlled parameters:	All main parameters of the transmitter are constantly controlled by the embedded MCU and available on the local display as well as through the remote control (Web Server, SNMP, etc.) Parameters include: transmitter and interfaces settings, output frequency and power (forward and reflected), voltages and currents, temperatures, input levels, optional devices (e.g.: GPS/GLONASS synchronizer, DVB-S/S2 receiver, etc.)
Web Server:	Manage all the main equipment parameters. Access is protected by username/password
SNMP Agent:	Version 2 Send alarms, read and set parameters. MIB file is downloadable from the web server
E-mail Client:	Send automated notification in case of specified conditions to programmed email addresses
Event Logger:	Stores over 5.000 events (with time, date and description) The event Log can be downloaded through the web server
Remote control interface:	RJ45 connector - Ethernet 10/100 Base-T (SNMP - web server - e-mail client) Other options on custom basis
Remote firmware upgrade:	Supported

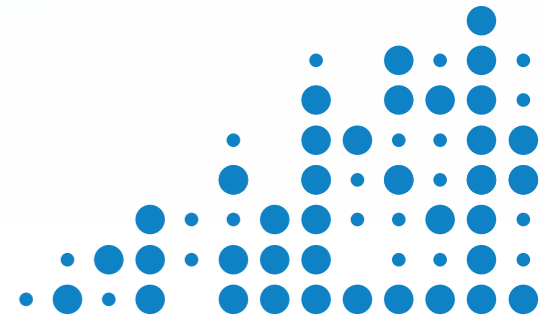
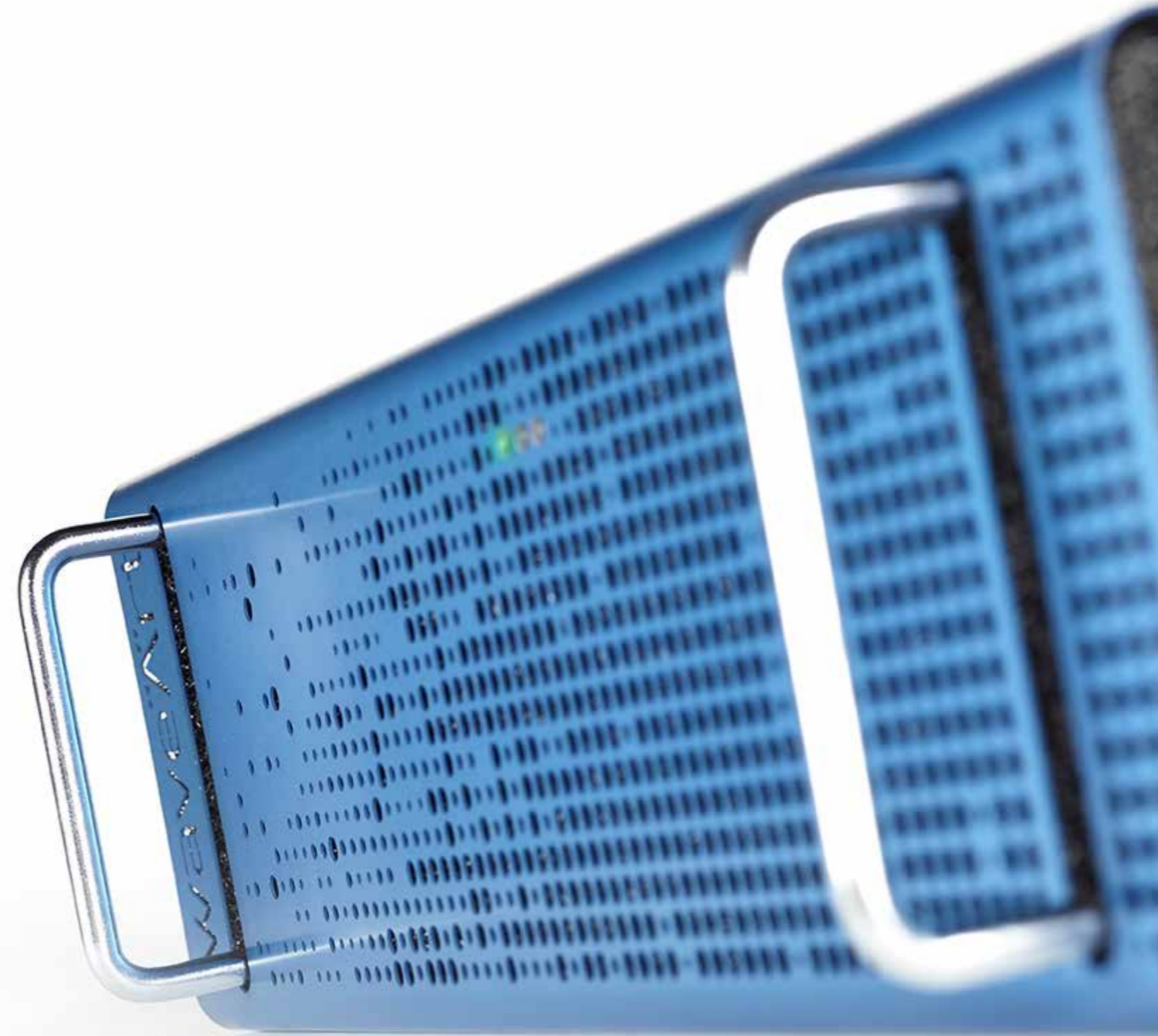
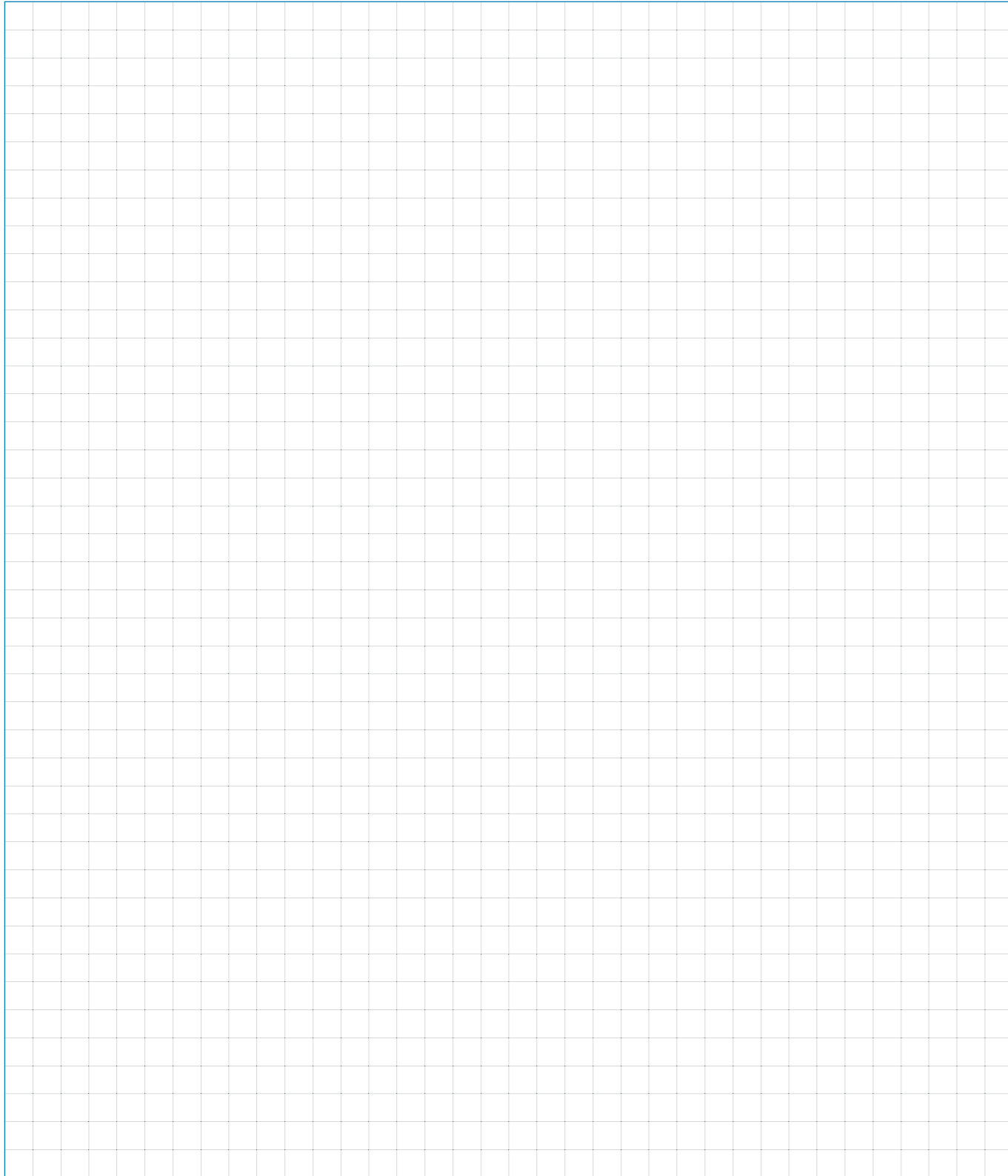
Control Contacts: One free contact available as general alarm; one contact (to be shorted) for transmission enabling

GENERAL SPECIFICATIONS

AC Input voltage and frequency:	185 to 264 Vac; 47 to 63 Hz single phase
AC/DC Power Supplies	Wave 600 and Wave 1000: single power supply hot pluggable from the front panel Option for double, full redundant, power supply Wave 2000 and Wave 3000: two or three power supplies hot pluggable from the front panel in semi-redundant configuration
Power factor:	≥ 0,96 (typ. 0,99 - @ nominal output power) Main power supplies have High Efficiency (typ. 95%) and are equipped with PFC (Power Factor Corrector)
AC to RF Efficiency:	≥ 70% (typ. 75% with AEB inserted - Adaptive Efficiency Boost) Conditions: standard product @ nominal output power, 230 Vac supply voltage, 25°C ambient temperature
Operating temperature range and max. altitude:	-5 to +45°C @ MSL Maximum operating temperature decreases by 6,5°C / 1.000 m altitude (as per the international ICAO Standard Atmosphere) up to the maximum allowed operating altitude of 3.000 m AMSL. Fold-back function operates (see description under “Embedded Features”)
Maximum operative humidity:	95% non condensing
Fans:	Wave600 and Wave1000: 1 fan for power supply and 1 fan for power amplifier option for double, full redundant, fans Wave2000 and Wave3000: 2 or 3 fans for power amplifier and 2 or 3 fans for power supply in semi-redundant configuration Fans are high quality, long life, ball bearings units, easily replaceable from the rear panel with automatic variable speed (according to the internal temperatures) to reduce dust and power consumption. Fold-back function operates (see description under “Embedded Features”)
Housing:	19” 3U Rack drawer Wave 600 / 1000 / 2000: depth 45 cm Wave 3000: depth 70 cm Note: measures taken from the front panel to the rear panel. Handles, fans, connectors, etc. excluded.
Weight:	Wave 600 / 1000 / 2000: approx. 18 Kg (according to the options installed) Wave 3000: approx. 28 Kg (according to the options installed)



Notes



Medium Power FM Transmitters

Wave Series

Main Features & Specs

Model/Nominal output power:	Wave 600: 600 W – Wave 1000: 1 KW – Wave 2000: 2 KW – Wave 3000: 3.5 KW
Employed technologies:	Full digital processing with DDS modulator; High Efficiency RF Power Amplifier with AEB (Adaptive Efficiency Boost); High Efficiency Power Supply with PFC (Power Factor Corrector)
Input interfaces	Analog: L; R or L+R; N°2 MPX or SCA or RDS Digital: AES/EBU; Ethernet (for Web Radio streaming and IP link) Micro SD card reader (with decoders) Analog receiving interface (with demodulator): FM receiver (for regenerative transposer) Digital receiving interface (with CAM and decoders): DVB-S/S2; DVB-T/T2; ISDB-T Automatic switching between input interfaces
Embedded Decoders	MP3; AAC-LC; AAC-HE; MPEG1 L2; WMA; FLAC; Ogg Vorbis
Embedded Encoders	Stereo Encoder (MPX); RDS Encoder (static and dynamic)
Digital Audio Processing	Soft Clipper with band limitation; Equalizer
Environmental sensors:	Temperature, Humidity, Dust, Corrosion (for alarms, protections and predictive analysis)
Remote control	Ethernet 10/100 Base-T (SNMP - Web Server - e-mail Client) Other options on custom basis
Remote firmware upgrade:	Supported
AC to RF efficiency:	75% typ. (with AEB inserted - Adaptive Efficiency Boost)
Housing:	19" 3U Rack drawer
Other features & options:	GPS-GLONASS receiver/synchronizer (for Frequency precision/stability - Isofrequency Synchronization - Location Locked Antitheft) "Wave Plan" Output Power Scheduler to reduce operational costs (OPEX)

For more detailed features specification and for custom solutions (e.g.: remote controls, backhauling, isofrequency, customizations, etc.), the information is subject to an NDA (Non-Disclosure Agreement).

Some of the described features are included in the standard product; other features are available as hardware and/or software options. Please consult WaveArt technical/commercial office for more details and for availability.

All specifications contained in this document may be changed without prior notice.

