



XR3 / XR6

3 kW & 6 kW AM Broadcast Transmitters

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XR6 with Door Open

THE TRANSMITTERS

The XR3 and XR6 extend the XR series AM transmitters from 3 kW to 60 kW with full module compatibility. Tens of millions of hours of real world operational experience is reflected in the design and construction of the XR series. The result is unparalleled performance and reliability.

POWERFUL BUILDING BLOCK

The building block for the XR3 and XR6 transmitters is a power module integrating multiple RF amplifier units. The individual RF amplifiers and modulator units are connected to the power modules using standard plug-in industry standard "D" connectors and bolted directly to a heatsink. Servicing consists of simple exchange, using only a screwdriver. Component level repair can be performed at a workbench or near the transmitter using a convenient test cable that provides all test signals from the host transmitter.



XR Series Power Module

Making Digital Radio Work.



EXTRA POWER

The XR3 and XR6 are purposely designed for demanding AM broadcast applications that require reserve power. This extra power overcomes antenna system losses such as those encountered in complex directional arrays. It allows aggressive audio processing and high levels of asymmetrical modulation to produce more sideband energy and a louder signal. Extra power also makes it possible to maintain full power AM transmission while transmitting a digital signal or simultaneous phase-coded data.

OPERATING CONVENIENCE

The XR3 and XR6's graphic user interface and soft-keys give you simple menu control of operating modes. Six power level selections are continuously adjustable over the full range using raise/lower commands. Programmable system profiles let you define schedules for changes to power and modulation settings. An LED diagnostic status flow diagram continually monitors the system and an advanced control, alarm and 128 event time stamped logging system allows service personnel to easily identify problems.



DIGITAL PERFORMANCE ADVANTAGES

The XR3 and XR6 have been specifically designed to support the digital transmission formats now available and being developed for use on existing AM channels. Nautel employs an ultra linear extended band filter that maintains an envelope bandwidth of 40 kHz. The RF drive design optimizes IPM to ensure minimal phase error. This provides superior spectral performance when transmitting a digitally encoded signal using digital modulation techniques such as HD Radio and DRM. The XR3 and XR6 transmitters' digital performance is outstanding, even with the limited bandpass performance of real-world antenna systems. This combination of compatibility, performance and flexibility makes the XR3 and XR6 excellent choices for digital broadcasters.

AUTOMATIC STANDBY

The most critical part of a transmitter is the exciter section, which provides the coherent drive to the power modules. These low level circuits generate the RF carrier and modulation control signals. A unique feature of Nautel transmitters is the complete duplication of these circuits. Should a failure occur in the RF drive or

modulation encoder, the transmitter automatically switches over to the standby DDS exciter and modulation encoder. This dramatically enhances the already high operational reliability inherent in the modular design.

UNATTENDED OPERATION

The XR3 and XR6 transmitters are built to stay on the air without human supervision. The transmitters maintain rated power with 100% modulation even with an antenna mismatch of up to 1.5:1 VSWR. With more extreme VSWR, power is automatically reduced to a safe level. A unique circuit dynamically stabilizes power output against AC line voltage variations. After an AC power loss, overvoltage or RF overload, prior operating status is automatically restored. The XR3 and XR6 are ideally suited for unattended automatic or remote controlled operation.



XR3 AM Transmitter

MAXIMUM REDUNDANCY

In addition to the excellent feature of a fully redundant exciter section, a second complete RF power module is also available. This additional power module facilitates the requirement to have a main/standby configuration with automatic changeover at a very economical cost. Should a power module changeover occur, the module requiring servicing can be safely removed for repair without any interruption in output power.

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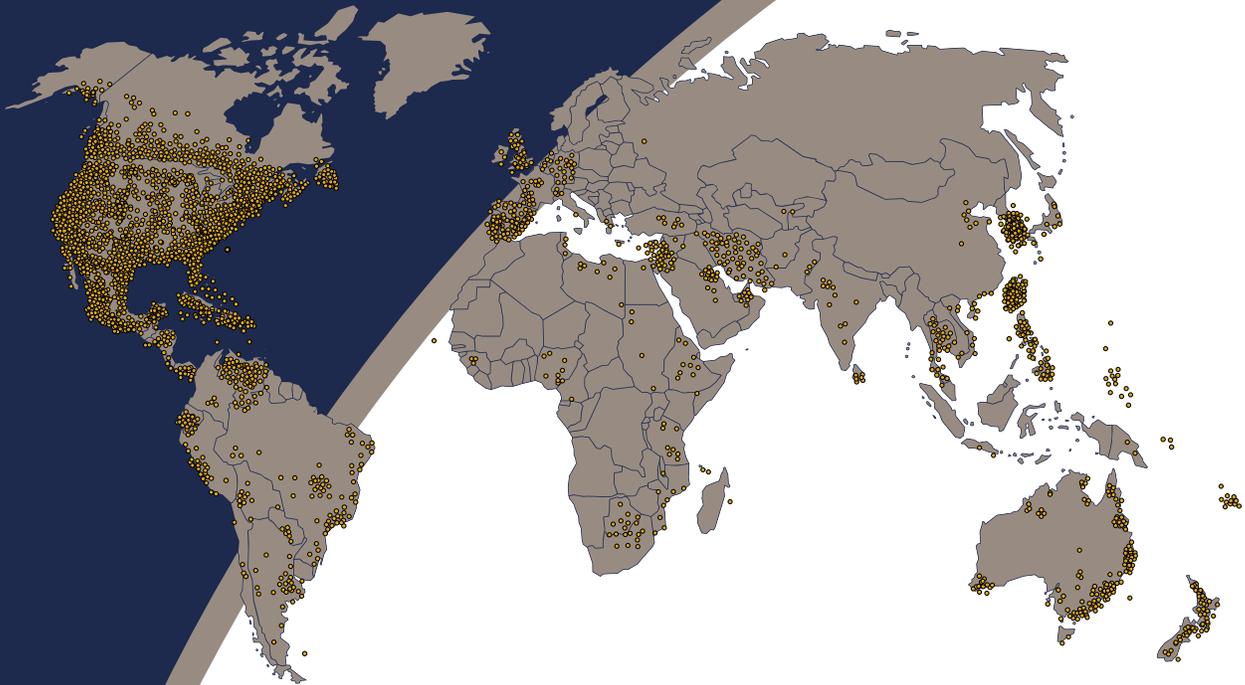
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• **Nautel installed transmitters**



QUICK SPECS

- XR3 RF Output Power – 3 kW (rated)
3.75 kW (capable)
- XR6 RF Output Power – 6 kW (rated)
7.5 kW (capable)
- 145% positive peak modulation
at rated power
- Dual DDS exciters with automatic
changeover
- 1.5:1 VSWR at rated power,
100% modulation

- Plug and play integration with Nautel's
NE IBOC AM HD Radio signal generator
- Built-in preset scheduler allows for six
preset power levels
- Programmable user interface facilitates
custom profiles for each preset
- Second spare power module provides
full main/standby feature
- XR3/XR6 dimensions 58.4 cm W x
184 cm H x 80.5 cm D

Making Digital Radio **Work.**

Issue 1.0
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XR3/XR6

TECHNICAL SUMMARY ISSUE 1.0
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GENERAL

Transmitter Type

Medium wave, 100% solid state

Configuration

Eight broadband RF amplifiers and four modulators mounted in a plug-in RF Module

Dual DDS exciters and modulation encoders.

Full automatic changeover

Second redundant spare module with full automatic changeover (optional)

RF Output Power

Maximum: XR3 - 3.75 kW

XR6 - 7.5 kW

Range: XR3 - 50 W to 3.75 kW

XR6 - 50 W to 7.5 kW

Six programmable preset power level profiles, selectable locally or remotely

RF Output Connection

7/8" or 1 5/8" standard

RF Output Impedance

50 ohms, unbalanced

Efficiency

83% typical

RF Load VSWR

XR3 - 500 peak reflected watts 1.5:1 VSWR at 3 kW, 100% modulation

XR6 - 1,000 peak reflected watts 1.5:1 VSWR at 6 kW, 100% modulation

Frequency Range

531 kHz to 1,710 kHz. Supplied, tuned and tested to one frequency as specified

Frequency Stability

±2 ppm over temperature range.

External GPS for increased stability

Modulation Type

Nautel Wideband Interphase Pulse

Duration Modulator

Modulation Capability

XR3

155% positive peak modulation at 2.5 kW

145% positive peak modulation at 3 kW

120% positive peak modulation at 3.75 kW

XR6

155% positive peak modulation at 5 kW

145% positive peak modulation at 6 kW

120% positive peak modulation at 7.5 kW

Spurious and Harmonic

Exceeds FCC, IC and ITU requirements

80 dB relative to carrier

AC INPUT

Voltage

197 to 437 V ac, 3 phase

200 to 260 V ac, 1 phase

50 Hz or 60 Hz to customer specifications

Power Supply Variation

±10% voltage, 47 Hz to 63 Hz

Power Consumption

XR3

3.0 kW typical at 2.5 kW, 0% modulation

4.5 kW typical at 2.5 kW, 100% modulation

3.6 kW typical at 3 kW, 0% modulation

5.4 kW typical at 3 kW, 100% modulation

XR6

6 kW typical at 5 kW, 0% modulation

9 kW typical at 5 kW, 100% modulation

7.2 kW typical at 6 kW, 0% modulation

10.8 kW typical at 6 kW, 100% modulation

Power Factor

0.95 typical, 3 phase

0.85 typical, 1 phase

ENVIRONMENTAL

Temperature Range

0°C to +50°C

Derate 3°C per 500 m above sea level (2°C per 1,000 ft)

Humidity Range

0% to 95% non-condensing

Altitude

0 m to 3,000 m (0 ft to 10,000 ft)

Cooling Air Requirements

340 m³/hr (200 CFM)

PHYSICAL

Dimensions

184 cm H x 58.4 cm W x 80.5 cm D (72.5" H x 23" W x 31.7" D)

Weight

329 kg (725 lbs)



AUDIO PERFORMANCE

Audio Input

600 ohms balanced

+10 dBm nominal (adjustable from 0 dBm to +12 dBm)

Frequency Response

+0.2 dB/-0.8 dB, 30 Hz to 10,000 Hz.

Referenced at 1 kHz, 95% modulation

Total Harmonic Distortion

Better than 0.8% (THD), 30 Hz to 10,000 Hz.

Referenced at 1 kHz, 95% modulation

XR3

1.25% @ 1,250 W

1.5% @ 500 W (typical)

XR6

1.25% @ 2,500 W

1.5% @ 500 W (typical)

Intermodulation Distortion

1.0% or less, 60/7000 Hz, 1:1 ratio

SMPTE standards at 95% modulation.

Transient Intermodulation Distortion

0.5% at 80% modulation, 2.96 kHz/8 kHz,

30 kHz BW

Square Wave Overshoot

1.0% or less at 400 Hz (100 μ S risetime)

Square Wave Tilt

0.5% or less at 40 Hz

Carrier Shift

0.5% or less

Hum and Noise

-65 dB or better below 6 kW, 100% modulation, 3 phase

-60 dB or better below 6 kW, 100% modulation, 1 phase

DIGITAL COMPATIBILITY

HD Radio™

Compatible with NE IBOC - HD Radio signal generator

Exceeds all regulatory requirements for AM HD Radio operation

DRM

Compatible - Consult factory



Notes:

Specifications defined in a laboratory environment with high grade source and demodulation equipment. Standard factory measurement does not include all items.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.