nautel

NXSeries

Digital/Analog MW

HD Radio™ Pure Digital. Clear Radio.

DRM

3–2,000 kW Digital/Analog
Medium Wave Transmitters

NXSeries

The new power in medium wave.

3–2000 kW

NX300, 300 kW MW Transmitter

NAUTEL INNOVATION

- Digital precorrection, a first for high power MW
- Industry's top efficiency: 90%*
- RF and audio spectrum analyzers
- 1.8 mega-samples/second Direct Digital Modulation†
- Intuitive touch screen interface and remote web access
- The new standard in compact MW design
- Integral Digital: All DRM modes plus HD Radio transmission
- Automated audio backup
- Built-in scheduler, playlist, IP audio I/O

With power outputs of 3 kW to 2000 kW, the NX Series sets a new standard for digital performance, rugged design and operational ease in the industry's most compact enclosure. Add AM digital precorrection, 90%* efficiency plus an intuitive touch screen interface and the result is the most advanced medium wave transmitter available today.

ADVANCED CONTROL AND REMOTE ACCESS

All NX Series transmitters include Nautel's Advanced User Interface (AUI). Whether you are on-site in front of your transmitter or at home on the web, 100% of the AUI is available to help you manage your transmitter.

Hundreds of parameters are available in real time at your fingertips. Imagine knowing in advance what parts and tools you'll need at the transmitter site. Having that much control remotely can help you avoid trips, save time and save money.

CONTROL REDUNDANCY

The touch screen interface is implemented as a non-critical functional unit and may be completely removed from the system without affecting transmitter operation. A backup control interface provides control in case of front panel computer system failure. In addition to web based access the NX Series also supports traditional direct wired contact closure capability for local or remote control.

SAVE TRIPS
SAVE TIME
SAVE MONEY

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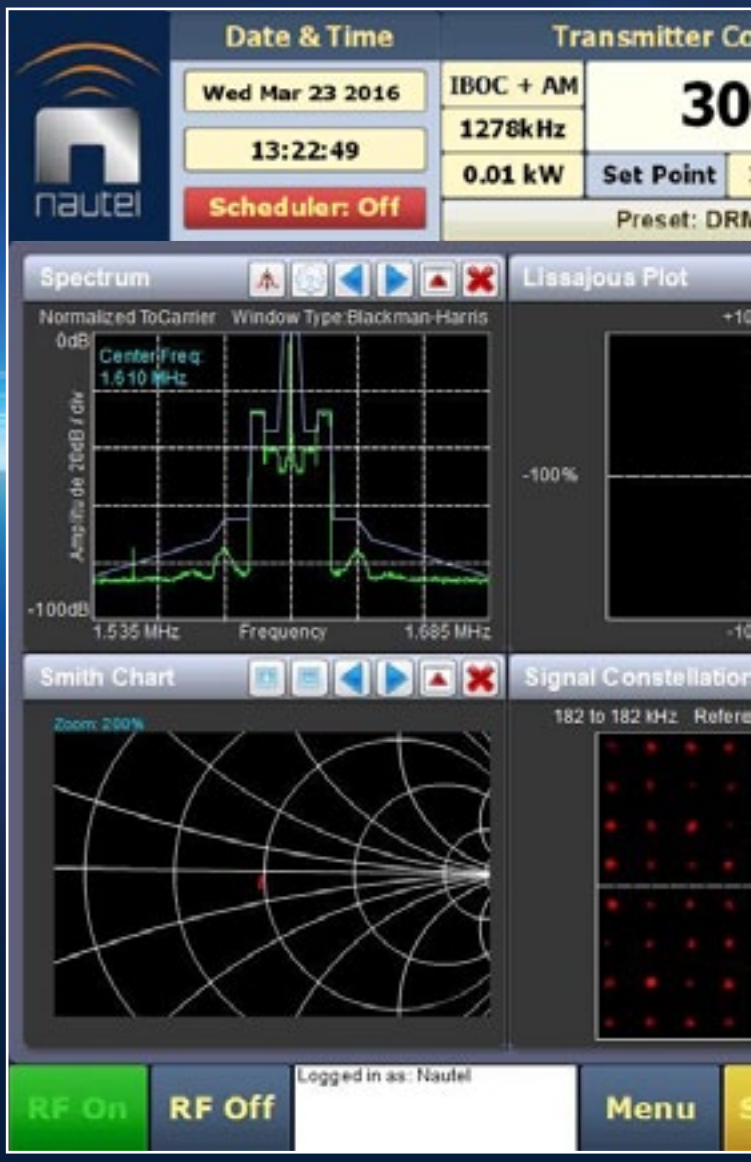
MORE CONTRO



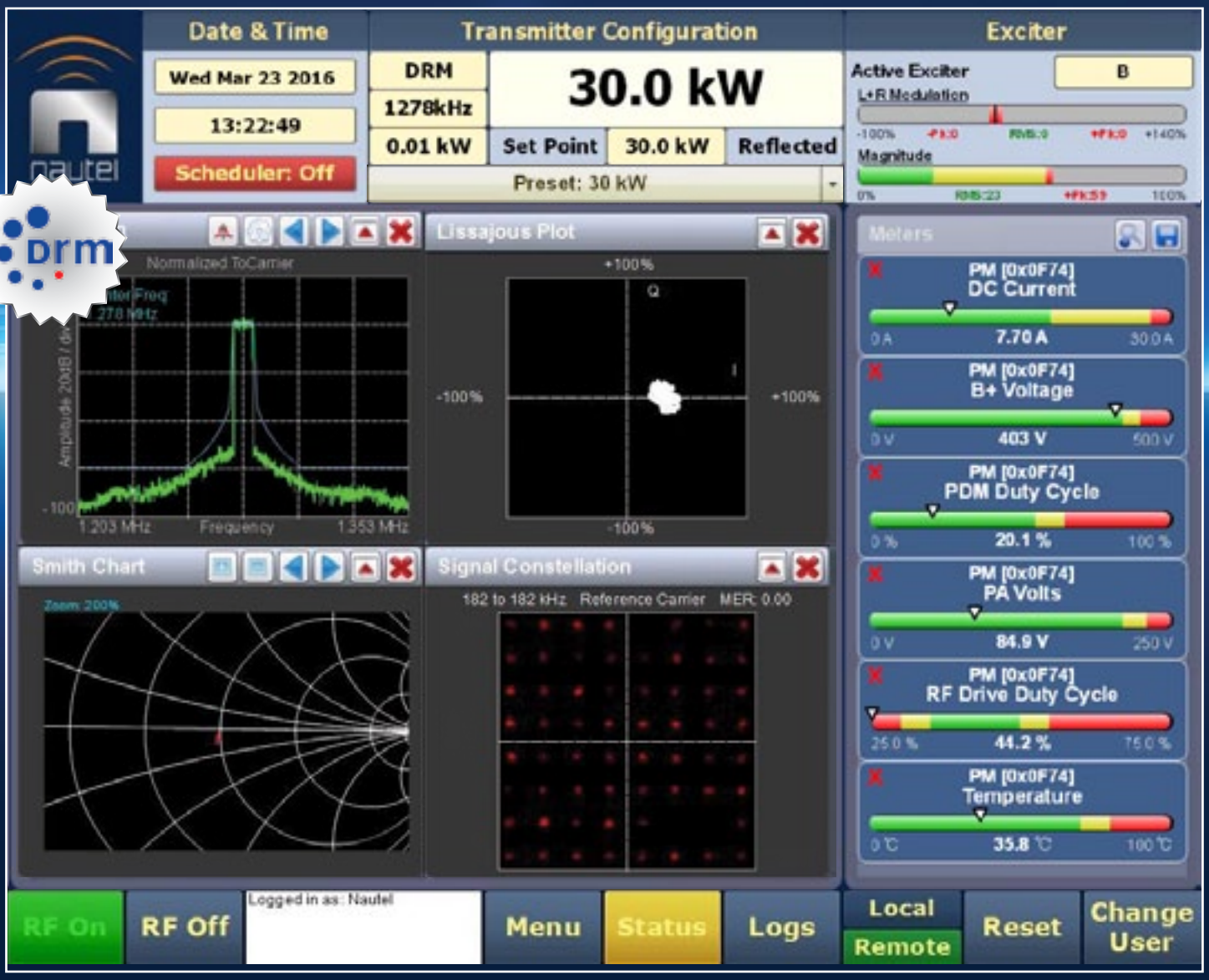
AWARD WINNING ADVANCED USER INTERFACE (AUI)

The NX Series features an Advanced User Interface with a wide range of configurable displays. The GUI can be controlled by touch screen, or via a mouse and keyboard. Some of the key features of the GUI include:

- Real time network analyzer for antenna cusp analysis.
- Real time spectrum analyzer for spectral mask compliance.
- Complete monitor and control of all functions to the module level.
- Logging of all functions
- 17 inch color LCD screen on NX Series Transmitters 15 kW and above

Screens are easy to set up and read, and clearly display the parameters you need to see.

MORE CONTROL



REAL TIME BUILT-IN INSTRUMENTATION

NX Series transmitters are provided complete with built-in instrumentation that would cost tens of thousands of dollars if purchased separately.

Nautel's patented, real-time impedance measurement technology allows the antenna system load impedance to be optimized and monitored while the transmitter is operating normally. The transmitted voltage and current waveforms are compared to measure the load impedance over the operational frequency range.

Because this system can measure impedance without requiring artificial swept tones, the antenna system impedance locus can be measured without taking the station off-air. Impedance is measured at the combiner so no correction for harmonic filter phase is required.

NX transmitters also utilize a built-in directional coupler for spectrum measurement instead of a traditional voltage or current sensor. The directional coupler increases the accuracy of spectrum measurement into a real antenna load which is quite important when measuring adjacent channel emissions.

100% REMOTE ACCESS

No matter where you are, you're only moments away from ensuring your NX Series transmitter is operating optimally. Open a web browser, enter your transmitter's IP address, and you're connected. 100% of the local NX Series display functionality is available on any web-interfaced PC or handheld device via the internal NX Series web server. Users can access status, controls, alarms, logs and reports via the internet.

SNMP SUPPORT

NX Series transmitters also support Simple Network Management Protocol (SNMP), a network protocol that allows network management systems or a network operations center (NOC) to monitor network attached NX Series transmitters.

ROBUST, RELIABLE

POWERFUL BUILDING BLOCKS

The building block of the NX Series is an integrated RF amplifier/modulator with a carrier power capability of 2,500 W. These power modules are hot pluggable from the front of the transmitter making service easy. The Class-D RF amplifier uses four

transistors that can be replaced using only a screwdriver. Due to advances in amplifier technology, this amplifier is so efficient (98%) that it is capable of operating at over 10 kW continuously. This power capability results in very low transistor junction temperatures assuring robust operation even in the highest ambient temperatures.

REDUNDANT ARCHITECTURE

Redundancy features and protection systems help you maintain operation without a site engineer, reducing your operating costs even further. The NX Series offers:

- Redundant Exciters[1]
- Redundant Modulators
- 15 parallel/redundant fans per 100 kW cabinet[2]
- Redundant low voltage power supplies
- Redundant Amplifier control power supplies[3]
- Failsafe manual and remote control

ROBUST PROVEN DESIGN

Nautel MW transmitters are field proven with installations in harsh environments all over the world. Tens of millions of hours of real-world operational experience have gone into the design and construction of the NX Series. The result is unparalleled performance and reliability.

HIGH POWER COMBINING

Nautel NX 100, 200, 300 and 400 kW systems form the building blocks for higher power systems. Using Nautel's NXC two to five way combiners, configurations with outputs of up to 2 MW can be configured.

The NXC combiners integrate with NX Series control and provide top level advanced user interface functionality for system control. Built in automatic switching allows the selection of combined or individual transmitter outputs to the antenna or the test load. NXC combiners are provisioned with built-in reject load modules.

"Over twenty Megawatts of NX Series transmitters deployed in just a few short years."

	NX3	NX5	NX10	NX15	NX25	NX50	NX100	NX200	NX300	NX400	Combined Systems
ANALOG	3 kW	5 kW	10 kW	15 kW	25 kW	50 kW	100 kW	200 kW	300 kW	400 kW	up to 2 MW
Modules	2	2	4	10	10	20	40	80	120	160	
Efficiency	82%	86%		84%	88%		90%				
AM Frequency	532 kHz – 1700 kHz			531 kHz – 1,620 kHz							
LW Frequency	Contact your Sales Rep.			120 kHz – 370 kHz							

1. Available option for NX3/5/10
2. Applies to systems 100 kW or larger
3. Does not apply to NX3/5/10

LEADING SPACE AND POWER EFFICIENCY

OUTSTANDING EFFICIENCY LOWERS OWNERSHIP COST

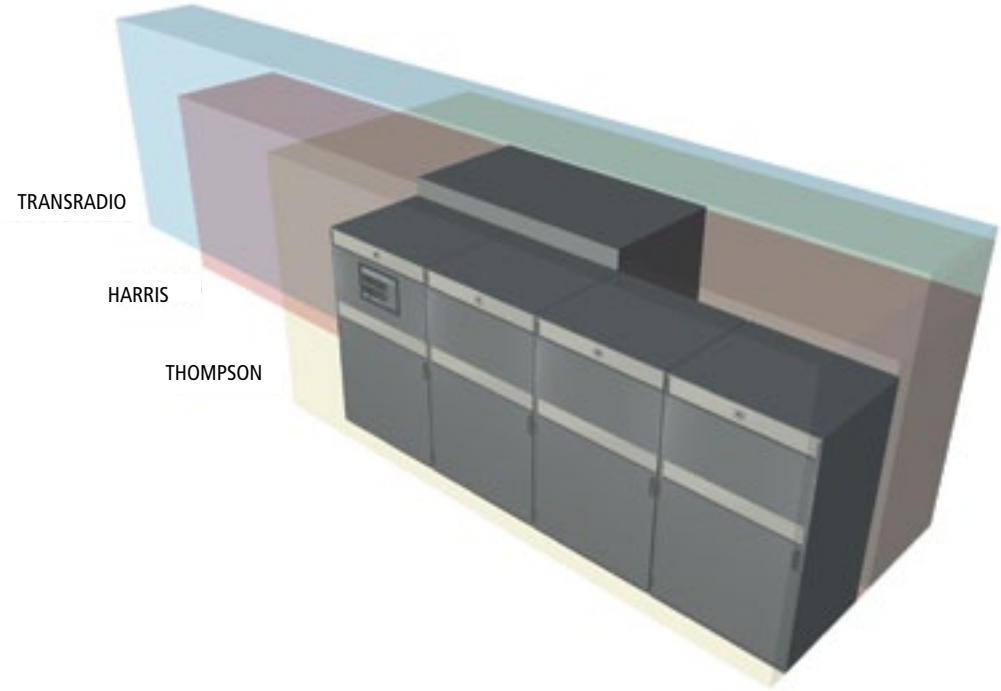
Exceptional efficiency and low maintenance overhead make this transmitter extremely cost effective to own and operate. Overall efficiency is typically up to 90%* or better. The high efficiency means less energy is wasted as heat, which reduces cooling and ventilation costs. The resulting savings could amount to thousands of dollars per year.

CLASS LEADING SPACE EFFICIENCY

NX Series transmitters are typically one half to one third the size of comparable high power medium wave transmitters. That makes planning your NX transmitter deployment that much easier and gives you flexibility too.

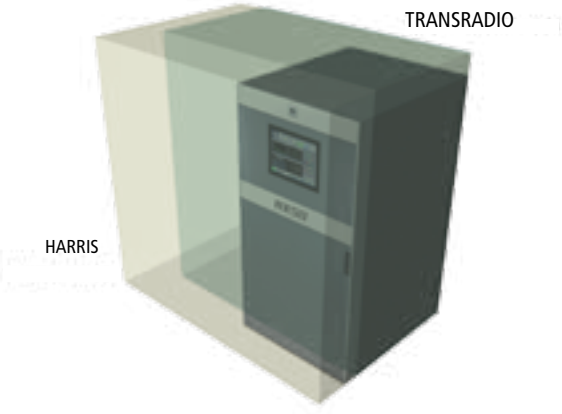
As an example, you may be able to avoid expanding existing facilities or building new ones. Or possibly a portable shipping container enclosed NX could be used as an emergency back up to existing facilities or to provide backup transmission during periods of major facility maintenance.

While NX Series transmitters may be compact they still offer easy and spacious access to all major serviceable components and modules ensuring easy maintenance.



POWER SAVING TECHNOLOGY

Nautel NX Series transmitters come standard with power saving technology commonly referred to as Carrier Control Algorithms or Modulation Dependent Carrier Level (MDCL). Power savings of up to 30% or more may be realized with minimal impact on the received signal quality and the coverage area.



* Efficiency of NX25 and NX50 is 88%, NX5 and NX10 is 86%, NX15 is 84%, NX3 is 82%

OPERATIONAL EASE

PROVEN RELIABILITY AND EASE OF OWNERSHIP

Like every Nautel transmitter ever built, the NX Series incorporates solid state components in a rugged, highly redundant, hot swap architecture. Compact footprints, published parts lists and screw driver replaceable power FETS make living with your NX transmitter easy for years to come.

AUTOMATIC STANDBY

The most critical part of a transmitter is the exciter section, which provides 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.[1] Should a failure occur in the RF drive or modulator drive, the transmitter automatically switches over to the built-in standby exciter. This dramatically enhances the already high operational reliability inherent in the modular solid state design.

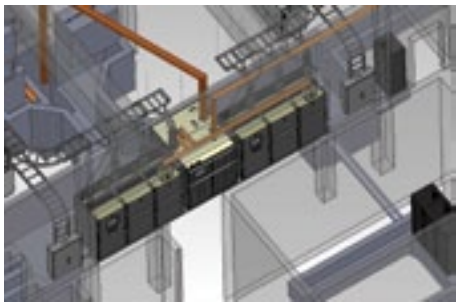
FAST FREQUENCY CHANGE

All NX Series transmitters are designed for fast simple frequency changes. Typically a 50 kW or 100 kW transmitter can be changed by a trained engineer within a few hours.

INTEGRATION SERVICES

As one of the world's largest radio transmitter manufacturers, Nautel applies its broad design capabilities and extensive experience to tackle even the largest medium wave deployments and integrations. Seasoned professionals and dedicated project managers help to ensure all details of your installation are addressed.

Nautel offers site survey, commissioning and the coordination of third party specialists to provide comprehensive integration services for your project. Nautel maintains two North American production locations and high power test facilities. Even international financing can be offered as part of your total Nautel solution.



ON-AIR SERVICEABILITY

NX Series transmitters are ruggedly engineered to provide easy on-air service and maintenance. In the NX100 and in each 100 kW power cabinet, 40 amplifiers combine to deliver up to 150 kW of average power (carrier plus modulation). At all power and modulation levels, all modules contribute equally to the final output. If an amplifier fails, no stress is imposed on the remaining modules and spectral integrity is not compromised. Repair or replacement can be performed whenever it is convenient. Ventilation is provided by redundant brushless DC-powered ball bearing fans mounted in hot pluggable trays below the power modules. Airflow is unaffected by AC supply variations, further ensuring cool operation and long term reliability.

UNATTENDED OPERATION

NX Series transmitters are built to stay on the air without human supervision. The NX Series is designed with a high VSWR threshold of 1.5:1 peak reflected watts at rated power with 100% modulation. With more extreme VSWR values, power is automatically reduced to a safe level. A unique circuit also dynamically stabilizes power against AC line voltage variations. After an AC power loss, over voltage or RF overload, prior operating status is automatically and quickly restored. The NX Series is ideally suited for unattended automatic or remote controlled operation.

SAFETY WITHOUT COMPROMISE[3]

The NX Series transmitters cabinets are fitted with locked front and rear doors that require a key to open ensuring only authorized access to critical or dangerous circuitry. These standard features allow the transmitter to meet safety standard EN60215.

Further, an optional mechanical key controlled access system is available that ensures power is removed from the transmitter cabinets and the antenna is grounded before allowing access. In addition, an optional emergency shut down system is available, allowing an unlimited number of series connected safety shut off switches to be added.

Any loss of electrical continuity in this loop will automatically cause the main AC circuit breaker to open, removing all power from the transmitter cabinet(s).

Making Digital Radio Work.

INTEGRAL DIGITAL

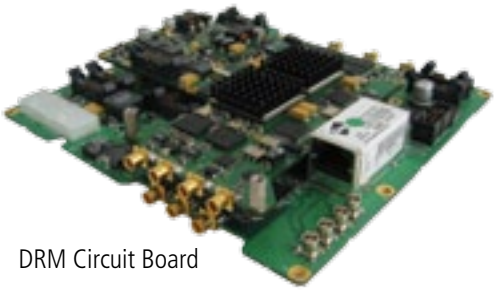
The NX Series transmitters are the first high power MW transmitters that assume digital transmission as a default requirement. That means digital is Integral to the overall NX Series design and isn't an add-on or an afterthought. Whether you initiate digital broadcasting immediately or start with analog transmission and move to digital at a later date, the NX Series will address all of your analog and digital transmission needs. In fact the NX Series transmitters support all current forms of AM broadcasting without the need for external exciters.

DESIGNING THE INDUSTRY'S BEST DIGITAL TRANSMITTER

Nautel invented the modern solid state broadcast transmitter more than 40 years ago. Everything our engineers have learned over those years and 5 generations of transmitter design has been applied to the NX Series. To design the industry's best digital transmitter our engineers applied two guiding principles. First they designed a transmitter so linear that no precorrection would be needed. Then they pushed the limits of transmitter design by adding the best precorrection available. The result is an ultra linear digital broadcast transmitter that is scalable from 5 kW to 2 MW.

NX Series transmitters configured for HD Radio transmission include an integral IBOC Exgine card and Nautel's Exporter Plus which provide an HD Radio signal to the transmitter's exciter. This solution is easy to configure, includes GPS synchronization and is compatible with Nautel's award winning Reliable HD Transport Suite for reliable studio to transmitter communications.

NX Series transmitters configured with Digital DRM support all current DRM modes and provides excellent program flexibility allowing broadcasters to offer both AM and DRM services on a time of day basis.

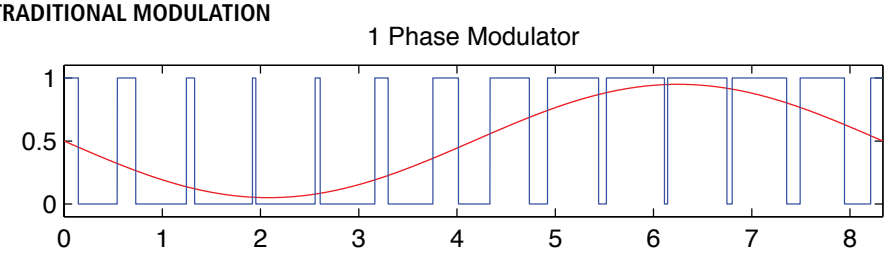


DRM Circuit Board

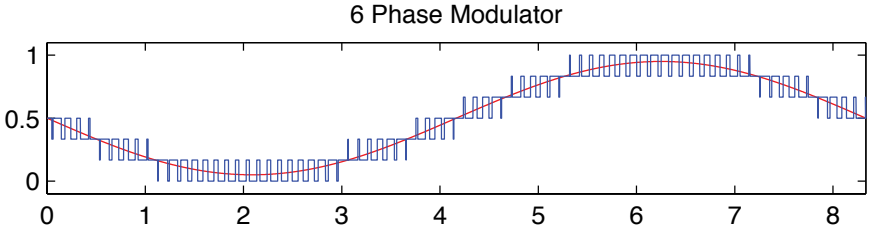
LINEAR-OPTIMIZED

The NX Series transmitters achieve their outstanding linearity by employing a unique six phase Direct Digital Modulation that is encoded at an unprecedented 1.8 mega-samples/second.

TRADITIONAL MODULATION



1.8 MEGA-SAMPLES/SECOND SIX PHASE DIRECT DIGITAL MODULATION



NOTE: 2.7 mega-samples/second nine phase direct digital modulation in NX300

INDUSTRY FIRST DIGITAL PRE-CORRECTION

The NX Series of AM transmitters are the first high power AM transmitters to be offered with digital pre-correction that corrects for all primary forms of distortion which typically affect both analog and digital AM broadcasting. The result is dramatically increased linearity and an extremely clean spectrum. Specific precorrection techniques include:

- Envelope equalization
- AM-AM correction
- AM-PM correction

All precorrection filters can be monitored from the front panel display.

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Making Digital Radio Work.

Nautel has emerged as one of the world's largest manufacturers of radio broadcast transmitters with more than 14,000 deployments in 177 countries.

NX100, 100 kW MW Transmitter

NX SERIES QUICK SPECS 100 kW cabinet*

110 kW RF maximum output power

90% efficiency at 100 kW typical

Field tunable to any MW frequency

140% positive peak modulation at 100 kW

1.5:1 VSWR threshold at 100 kW, 100% modulation

40 RF power modules each with:

- Digital optimized linear design
- Integrated RF amplifier/modulator
- Microcontroller for protection and monitoring
- Short circuit protection
- Hot pluggable

Dual exciters and modulation encoders:

- Digital precorrection
- 1.8 mega-samples/second Direct Digital Modulation†
- MDCL/Dynamic carrier control algorithms included
- Integrated AM stereo
- Audio filtering with pre-emphasis and low pass
- Automatic changeover

Integral Digital Broadcast Support options

- DRM 4.5/5/9/10/18/20 kHz and simulcast modes
- HD Radio
- Two AES-EBU inputs supporting analog or digital I,Q inputs

Control and Monitoring

- 17"/436mm LCD touch screen[3]
- Web based remote access/control
- Contact closure remote interface
- SNMP
- Redundant back-up control interface
- Module level monitoring
- Power, current, voltage, RF spectrum, RF impedance, modulation, heat sink, fan RPM

Voltage: 380/400 Vac 3 phase or to customer specifications

NX Series dimensions per 100kW cabinet

1.84 m H x 0.96 m W x 1.12 m D

72.5" H x 37.75" W x 44" D

External Transformer Dimensions (100 kW Transmitter)**

1.16m H x 1.11m W x 0.58m D

46" H x 44" W x 23" D

Cabinet and transformer dimensions may vary depending on power level and specific customer specifications.

* please refer to the specifications for full details of individual NX Series transmitters

** please note that the NX50, NX25, NX15, and NX 3/5/10 transformers reside within the NX cabinet

† 2.7 MSPS in NX300

3. Not available on NX3/5/10

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