

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

Anritsu envision : ensure

Azimuth

Product Brochure

ACE RNX Channel Emulator

ACE-RNX



ACE RNX Channel Emulator Features

Purpose-Built RF Environment Emulator for LTE-A, HetNet, and Beyond

Consumers increasingly demand ubiquitous high-speed access to feed their bandwidth and data-hungry applications. The industry is addressing this through LTE Advanced (LTE-A), which takes the following new approaches to meet this demand:

- HetNet to improve capacity
- Small cells to expand coverage
- Carrier aggregation to boost data rates

Channel emulation is fine for testing single-link, planned environments with controlled interference, but it's inadequate for testing HetNet—a dynamic, multilink, interference-dominated, and increasingly dense network. For that, you need HetNet environment emulation. Only Azimuth's ACE RNX, with its unique built-in Virtual Network Environment™ (VNE™), fully addresses the technical and logistical challenges of LTE-A testing:

- Testing ICIC, eICIC, FeICIC, NAICS, and advanced interference cancellation receivers
- Prelaunch testing of small cells
- Recreating field environments for debugging
- Regression testing
- Testing builds/configurations before going to the field

ACE RNX: Optimized for LTE-A, HetNet, and Beyond

- Multilink support for CA, HetNet, and MU-MIMO
- Addresses technical and logistical challenges of LTE-A testing

Industry's Best RF Emulation

- 1ms playback rate
- Lowest insertion delay
- Highest output power
- Widest dynamic range
- Dynamic uplink noise
- Internal splitting and combining

Most Powerful Test Executive

- Optimized for multilink testing
- Intuitive GUI to develop complex test scenarios and scenarios
- Cloud architecture to maximize testbed utilization

VNE™

- Industry's first advanced environment emulation
- Fully configurable downlink interferers
- Synchronized with serving cell
- Configurable fading and AWGN



ACE RNX Channel Emulator Functions

Virtual Network Environment (VNE™)

The Industry's First—and Only —HetNet Environment Emulation Capability

Consumers demand ubiquitous high-speed access to feed their bandwidth and data-hungry applications. LTE-A uses network densification/HetNet (a network of cells of different sizes) to meet this demand. One consequence of network densification is increased interference. LTE-A offers many complex and advanced mechanisms (e.g., ICIC, eICIC, FeICIC, NAICS, and advanced receivers) to handle this interference. While these mechanisms and techniques help, they also increase the overall complexity of the system. HetNet fundamentally changes how networks must be tested.

Testing HetNet in the lab requires (1) creating a HetNet environment, and (2) controlling the HetNet environment to run specific test cases. Doing this through traditional means—for example, by using real eNBs or signal generators as interferers—is rarely practical due to costs and the complexity of the test-bed.

Virtual Network Environment™ (VNE™), available within the RNX platform, is the first and only solution capable of creating and controlling a complete HetNet radio environment in the lab. VNE™ provides a configurable, synchronized* LTE downlink (i.e., eNB) interferer within the RNX. Designed to include a fading channel, each interferer can be configured to be independent of the others.

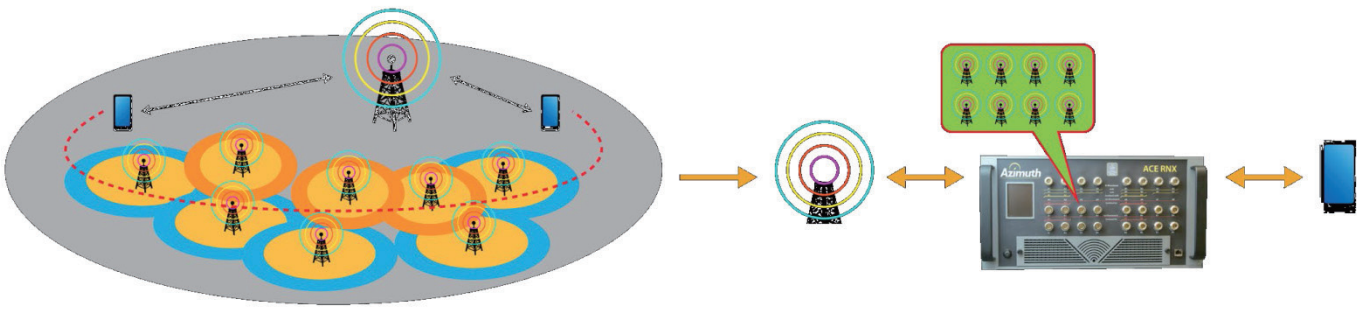
*: Synchronization is critical since testing time-based mitigation schemes such as ABS (almost blank subframes) requires subframe-level synchronization.

VNE™

- Industry's first advanced environment emulation
- Fully configurable downlink interferers
- Synchronized with serving cell
- Includes a controllable fading environment and AWGN
- Logistically and technically feasible

Use Cases

- Testing ICIC, eICIC, FeICIC, NAICS, and advanced interference cancellation receivers
- Pre-launch testing of small cells
- Device qualification, interoperability testing (with device, macro)
- Recreating field environments for debugging
- Regression testing
- Testing builds/configurations before going to the field



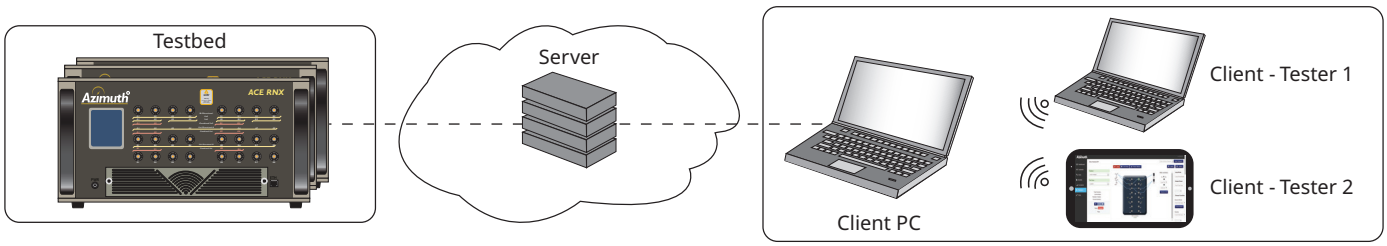
ACE RNX Channel Emulator Functions

Director 3 Test Executive (D3)

Cloud based Test Executive for ease of use

D3 provides a cloud-ready, server-client architecture that facilitates a single server, and multi-client setup. D3 doesn't require desktop software on dedicated PCs, and it's possible to access from any web browser. It means it's possible to access the test bed from anywhere and anytime globally, and it should be better to build test bed and lab space utilization.
The server consists of the following:

- **Server Component** — hosts a responsive and easy to use HTML5 single page application that enables you to create, run and analyze test cases with the ACE-RNX. It also serves as the endpoint for all of the Azimuth SOAP API.
- **Node (Slave) Component** — hosts a dedicated set of engines that stream real-time information to multiple ACE-RNXs.
- **Database Component** — all test cases created are stored in a database that pushes updates to clients and nodes in real time.



The GUI is comprised of user selectable tabs that indicate the states of the test equipment, allow for setup of testbeds, allow for creation of testcases, and let the user run tests with their hardware. Simple operation based GUI should bring efficiency as easy-to-follow and easy-to-use to setup of testbeds, to make scenarios, and to playback testcases. Especially, Scenario Builder is a powerful wizard to graphically create the complex scenarios needed for LTE-A, HetNet, and has following features;

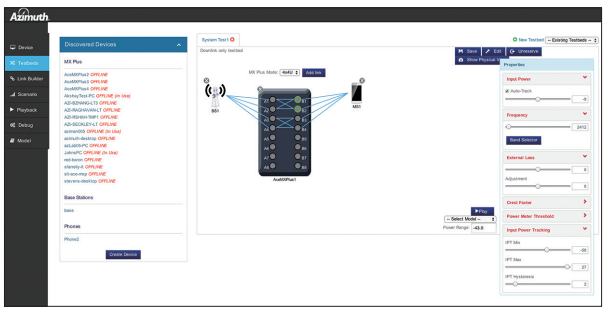
- Drag, drop and design that allows creation of complex scenarios
- Seamless, automatic computation of RF environment (power, channel conditions, etc.) for the defined scenario
- Automatic configuration of the RNX testbed to map to the scenario at hand

Server Requirements

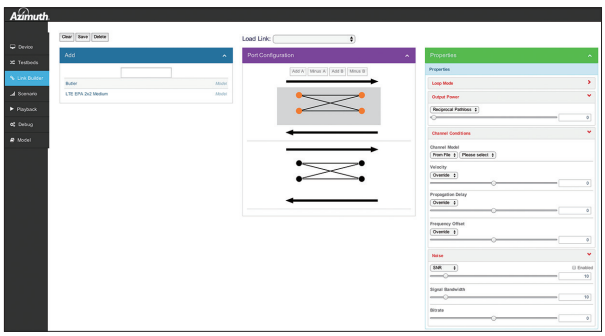
- Desktop PC or server hardware
- Processor: Intel Core i5 64-bit processor or better
- Memory: 8 GB RAM minimum (16 GB recommended)
- Hard Drive: 10 GB free space minimum
- Operating System: Windows 7 Professional or Enterprise SPI (64-bit, English)
- Network: Ethernet 10/100/1000 Adapter
- NET framework 4.5.2
- Microsoft AppFabric 1.1
- Microsoft SQL Server Express 2014

Client Requirements

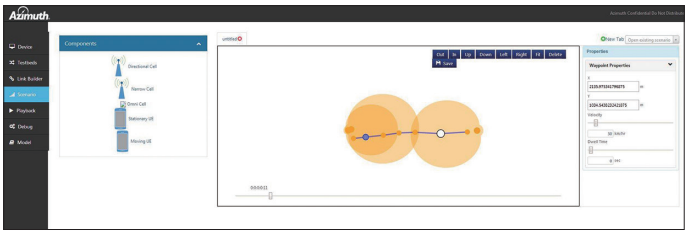
- Internet Explorer 11
- Video Resolution: 1600 x 1200 or better (1920 x 1080 recommended)



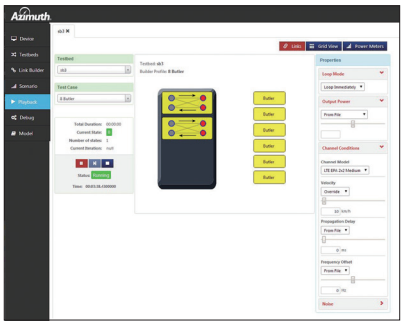
Testbed Config.



Link Builder



Scenario Builder



Playback

ACE RNX Channel Emulator Functions

Field-to-Lab™ (FTL)

Roam Globally…In Your Lab

Field testing is the final test for mobile devices prior to deployment to subscribers. It enables validation of the device in real world conditions in the environments where subscribers actually use them. However, field testing of devices in diverse conditions of terrain, population density, physical location and motion is extremely time-consuming and costly. The Azimuth Field-to-Lab (FTL) solution is a unique and effective solution that allows service providers and equipment manufacturers to take real world channel conditions collected from drive testing and re-create the same channel conditions in the lab using the ACE RNX Channel Emulator.

The need for a tightly knit end-to-end progression with significant synergy between one stage and the next has never been more relevant. A key enabler of this new testing paradigm is the ability to reliably and repeatedly recreate dynamic field environments in the lab.

Field-to-Lab Testing Has Never Been Easier or More Cost-Effective

Standard channel models are often used for standards-based testing. Although these statistical representations of channel conditions are very useful in equipment testing, certification and benchmarking, they do not represent the full range of dynamic field conditions experienced by a device in the real world. The Azimuth Field-to-Lab solution easily integrates actual drive test scan logs into the testbeds used in carrier and equipment vendors' labs. "Golden drive test routes" can be driven virtually, whenever needed.



Field-to-Lab Integration with Azimuth's Solution Portfolio

The core functionality for Field-to-Lab, integrated with Azimuth's scalable solutions, delivers unrivaled device testing.

- Real-World Applications—With real infrastructure (eNB or BSE), re-creates external conditions in the lab; enables interoperability, regression, network optimization, and performance testing across the full spectrum of dynamic radio environments
- Reciprocal Path Loss (RPL)—With dynamic RPL, FTL allows users to assess the impact of dynamic uplink channel conditions on overall device performance using current drive test scanner logs
- Device Automation and Control—FTL integrates Azimuth DAC for fully automated device application testing and performance benchmarking—including video streaming such as YouTube—while other apps run concurrently
- Can automate different test-bed components, including logging tools, emulators, and results analysis to re-create a complex field environment in the lab

AzMapper

The mapping function is a crucial component of the Field-to-Lab solution. Various field data of different qualities and accuracy are analyzed and used to generate a playback file. First, the field data is filtered to extract the useful and significant data from the mass of collected information. Next, the data is smoothed, making sure the playback faithfully imitates the time-varying nature of the real world. Finally, the data is analyzed for missing segments; these can be filled or closed with interpolated data to ensure continuity. All the parameters of the filtering and mapping are configurable to the user's preference.

AzPlayer

The most important part of the FTL solution is ensuring that the playback data is regenerated in the channel emulator in a way that authentically re-creates real-world conditions. The ACE MX, together with the AzPlayer application, supports real-time streaming of playback files for unlimited playback to channels on one or more ACE RNXs. Easy-to-use controls allow the data to be played back, paused, looped, and even coupled with other playback files, using both the graphic user interface or the programmable scripting interface.

Sourcing Field Data

Traditionally, drive tests are performed with commercial products that use real handsets and radios to collect field condition data and analyze the scenario through postprocessing. The raw data collected contains detailed information that can be used to map the conditions in time and, using the Azimuth AzMapper application, re-create these conditions for playback. Azimuth FTL interfaces with a wide range of commercial scanners.

Supported Technologies

LTE (FDD, TD), TD-SCDMA, UMTS (WCDMA, HSPA+), CDMA (C2K, EVDO), GSM

Supported Scanners/DM

Hardware Scanner:

JDSU E6474A-W1314A

Software Scanners/Diagnostic Monitors:

QXDM
Accuver XCAL
Anite Nemo

ACE RNX Channel Emulator Specifications

ACE RNX Channel Emulator

Channel Emulation Specifications

Digital Channels	32
Taps per Channel	24
Max Doppler Rate	2.0 kHz @ 3.8 GHz
Playback Rate	1 ms
Doppler Profiles	Classical
AWGN	+35 to –30 dB SNR, 0.1 dB
Channel Models: Model Packs	Industry standards models: • 3GPP/3GPP2 LTE/3G/2G channel models • WiMAX Forum channel models based on ITU M.1225 • 3GPP and SCM channel models (spatial channel model for MIMO simulations) • SCME channel models for linklevel extended SCM modes • IMT-A and SCME-A spatial channel models • High-speed train model scenarios • Moving propagation scenarios
Custom Model Mode	User-defined custom models
Bypass Mode (Identity Matrix)	No correlation, no fading, no multipath
Butler Mode (Butler Matrix)	No correlation, no fading, no multipath

Configurations

Test Configurations	• 1x1, 2x2, 4x4, subsets of these • Unidirectional and bidirectional • Carrier aggregation (up to 5 CC)

RF Specifications

RF Channels per RNX	8
RF Bandwidths	100 MHz
RF Input Range	+23 to –50 dBm, with 13 dB Crest factor
RF Input Peak Power	+36 dBm
RF Output Range	–25 to –120 dBm
RF Output Peak Power	0 dBm
RF Tuning Range	380 MHz to 3850 MHz
Insertion Delay	1.1 µs
EVM	< –40 dB typical
Noise Floor, Output	< –166 dBm/Hz @ –40 dBm output power

Director 3 Test Executive

Scenario Builder	Drag-and-drop wizard to design and execute multilink tests
Link Builder	Link-level GUI to create and run tests
Cloud Architecture	• Global access to the test-bed • No desktop software • Centralized test cases and results

Physical Specifications

Dimensions	17.45" (W) x 8.75" (H) x 28.5" (D) (44.32cm (W) x 22.23cm (H) x 72.39cm (D))
Mass	80 lb. (36.5 kg)
Power	100 V(ac) to 240 V(ac), 50 Hz to 60 Hz, 8.0/4.0 amps

Virtual Network Environment (VNE™)

Capabilities

Interferer	LTE downlink (no uplink)
Unique Interferers Per RNX	12
Interferers Per Link	3
Types of Interferers	Any LTE cell (macrocell, small cell)
Sync Receiver	
Mode	Synchronized (to eNB) or unsynchronized
Input Signal	Nonfaded Power range: –50 to +23 dBm
Capability	Can decode up to 4 eNBs

VNE™ unlocks repeatable, scalable HetNet testing by

(1) defining interfering cells (through the signal generation tool in Director 3)

(2) creating a HetNet environment that uses those cells

(3) developing test scenarios specifically for that environment

VNE™ is integrated into the Director 3 test executive. Users can start with a pre-existing interferer or create an interferer signal with ease, using the signal generation tool. Once the interferer has been created, it can be added to any specific scenario and configured relative to the serving signal (e.g., SIR, delay, frequency offset, etc.).

Interferer Signals-Link-Level Parameters

Interferer proportion (SIR)	–15 to +40 dB (0.1 dB resolution)
Delay	–1 to 1s (100ns resolution)
Frequency	Anywhere within the channel bandwidth
Frequency offset	–100 kHz to +100 kHz (10 Hz resolution)

Interferer Parameters

Bandwidth	1.4, 3, 5, 10, 20 MHz (or 6, 15, 25, 50, 75, 100 RBs)
Cyclic prefix	Normal, extended
PHICH duration	Normal
Number of eNB antennas	1, 2, 4
Type of eNB array	Uniform linear
PCI (cell ID)	0 to 503
PDSCH	
Transmission mode	1, 3, 4
Traffic loading	0 to 100%
Rank proportion	0 to 100%
ABS pattern	Standard: Patterns 1–7, as per 3GPP 36.101 Custom: User-defined patterns
CFI value	1, 2, 3
Propagation Conditions	
Channel model	Butler, LTE EVA, EPA, ETU
Correlation	Low, medium, high
Doppler/velocity	5, 70, 300 Hz

Ordering Information

ACE RNX Channel Emulator

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

Model/Order No.	Name
	Main Frame
ACE-RNX-NEW	ACE RNX Channel Emulator
ACE-RNX-ADD	ACE RNX Channel Emulator (Add-on)
	Hardware Option
RNX-1200	Advanced Capabilities Expansion Card
	Software Module
D3-1001	Director 3 Test Executive
D3-1002	Remote Client License
	Software Option
D3-1003	Director 3 Scenario Builder
D3-1201	Director 3 Signal Generation & Management Tool
RNX-2201	LTE DL Signal Generation/Playback License
	Application Parts
DIR-601	AzMapper
RPE-401L/AC	RadioProof Enclosures
RPE-402	RadioProof Enclosures
ACC-261	RadioProof - MIMO AP Cable Kit
ACC-262	RadioProof - MIMO Laptop Cable Kit
ACC-308	MIMO Amplifier
ACC-312	MIMO Connectivity Unit
ACC-313	Trigger Synch Cable
ACC-314	Fading Synch Cable
ACC-315	Field To Lab Multi-Unit Connection Kit
	Support services
SVC-101	Engineering and/or Training Service per hour
SVC-701	Annual Software Maintenance and System Technical Support
SVC-703	HW Advanced Replacement Service
SVC-710	Return To Factory Repair Evaluation
SVC-613	ACE-RNX Calibration Fee

Anritsu envision : ensure

Azimuth

Specifications are subject to change without notice.

• United States
Anritsu Company
1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• Canada
Anritsu Electronics Ltd.
700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• Brazil
Anritsu Eletronica Ltda.
Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - Sao Paulo - SP
Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• Mexico
Anritsu Company, S.A. de C.V.
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• United Kingdom
Anritsu EMEA Ltd.
200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• France
Anritsu S.A.
12 avenue du Québec, Bâtiment Iris 1- Silic 612,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• Germany
Anritsu GmbH
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• Italy
Anritsu S.r.l.
Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

• Sweden
Anritsu AB
Kistagången 20B, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• Finland
Anritsu AB
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• Denmark
Anritsu A/S
Torveporten 2, 2500 Valby, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

• Russia
Anritsu EMEA Ltd.
Representation Office in Russia
Tverskaya str. 16/2, bld. 1, 7th floor.
Moscow, 125009, Russia
Phone: +7-495-363-1694
Fax: +7-495-935-8962

• Spain
Anritsu EMEA Ltd.
Representation Office in Spain
Edificio Cuzco IV, Po. de la Castellana, 141, Pta. 5
28046, Madrid, Spain
Phone: +34-915-726-761
Fax: +34-915-726-621

• United Arab Emirates
Anritsu EMEA Ltd.
Dubai Liaison Office
902, Aurora Tower,
P O Box: 500311- Dubai Internet City
Dubai, United Arab Emirates
Phone: +971-4-3758479
Fax: +971-4-4249036

• India
Anritsu India Private Limited
2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,
Indiranagar, 100ft Road, Bangalore - 560038, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

• Singapore
Anritsu Pte. Ltd.
11 Chang Charn Road, #04-01, Shriro House
Singapore 159640
Phone: +65-6282-2400
Fax: +65-6282-2533

• P.R. China (Shanghai)
Anritsu (China) Co., Ltd.
Room 2701-2705, Tower A,
New Caohejing International Business Center
No. 391 Gui Ping Road Shanghai, 200233, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

• P.R. China (Hong Kong)
Anritsu Company Ltd.
Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

• Japan
Anritsu Corporation
8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
Phone: +81-46-296-1208
Fax: +81-46-296-1248

• Korea
Anritsu Corporation, Ltd.
5FL, 235 Pangyoyeok-ro, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13494 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

• Australia
Anritsu Pty. Ltd.
Unit 20, 21-35 Ricketts Road,
Mount Waverley, Victoria 3149, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• Taiwan
Anritsu Company Inc.
7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

1706

Printed on Recycled Paper

Printed in Japan 31/AUG/2017 ddch/CDT Catalog No. ACE-RNX-E-A-1-(1.00)

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP