emtest / AMETEK

Ripple NX

High Power Ripple Generator

The Ripple NX is a high-power ripple generator that is used to perform ripple immunity tests. It offers the power to test high power high voltage components i.e. electric drives, high voltage batteries, DC-DC converters, on-board charger and other high voltage components. It can also be used to generate ripple on high power aircraft components.
The Ripple NX is a fully integrated test system that includes all necessary components:

- Low frequency amplifier 10 Hz - 300 kHz
- Coupling network consisting of coupling transformers and a switch matrix
- Measurement and control unit
- Capacitor bank 10mF (low ESR) with pre- and discharge circuits
- Connection boxes with connection cables

The **fully integrated system** guarantees for minimum setup time, error-proof cabling, and reduced operator interaction. The components are designed that they optimally work as a system, ensuring the maximum voltage, current and system power.
The Ripple NX incorporates a **transformer coupling network** that can be reconfigured. This allows to select the optimal operating mode based on the frequency range and required current or voltage. The configuration can be set manually or automatically by the system.
The **integrated measurement and control unit** monitors the operating statuses of the amplifier, coupling network and capacitor bank. The measurement channels allow to measure ripple current and voltage. They are frequency-selective (narrow band) which allows precise regulation of the ripple signal even on noisy DC lines (i.e. switching noise generatedby the EUT).

Some Ripple NX models have **two outputs** available which allows to apply the ripple signal on two EUT output connectors. This makes it possible to test through the front and rear axle connectors of a high voltage battery. For each output individual current and voltage limits can be programmed, which makes sure that the EUT is not destroyed – especially critical at resonance points. The included connection box allows to connect EUTs in difficult situations, i.e., when placed in test or climate chambers.
Several **operating modes** are available:

- Impedance Measurement Mode where the impedance of the EUT is measured using a small signal.
- Calibration Mode is used as a “learning test” which allows to optimally set the amplifier output and coupling network configuration. This enables fast switching during ripple testing.
- Single Mode where an individual point can be tested by setting the frequency and amplitude
- List Mode where a list of test points (frequency, amplitude) is programmed and executed by the ripple generator

The Ripple NX includes a display with touch-panel for local control and comes with CAN/Ethernet/IEEE/OptoLink interface for remote control (remote command set). This allows to integrate the Ripple NX into existing test benches for automation. Also available is a control software that has a large library of pre-programmed tests and report generator.

MAIN FEATURES

- **Fully integrated ripple generator**
- **10 Hz to 300 kHz ripple signal**
- **Up to 1000 V / 1000 A DC**
- **Integrated, frequency-selective measurement unit**
- **Local touch panel control or remote control (CAN, Ethernet, IEEE, OptoLink)**
- **Configurable coupling network**
- **Multiple operating modes**
- **Overvoltage and overcurrent protection**

Specifications subject to change without notice, AMETEK CTS is an ISO accredited company. Products are designed and manufactured under strict quality and environmental requirements of ISO 9001

Technical Specifications

	Ripple NX 200-1000-2.5 [1]	Ripple NX 400-1000-2.5 [1]	Ripple NX 600-1000-5	Ripple NX 1000-1000-5	Ripple NX 1000-1000-10
	System consisting of the RippleSource NX (signal generator / amplifier) and RippleCoupler NX (coupling / decoupling / measurement unit)				
	Ripple Source NX2.5		***RippleSource NX5***		***RippleSource NX10***
Frequency	DC; 10 Hz – 300 kHz				
Power	2.5 kVA		5 kVA		10 kVA
Output AC (source mode)	single range 80 Vp ± 5% / 65 Ap ± 5% (21 Vp @ 300 kHz)		dual range High range: 160 Vp ± 5% / 65 Ap ± 5% (45 Vp ± 5% @ 300 kHz) Low range: 80 Vp ± 5% / 130 Ap ± 5% (22 Vp ± 5% @ 300 kHz)		single range 160 Vp ± 5% 130 Ap ± 5% (45Vp ± 5% @ 300 kHz)
Output DC (source mode)	± 80 Vp ± 5% ± 28 A ± 5%		High range: ± 160 Vp ± 5%/ ± 28 A ± 5% Low range: ± 80 Vp ± 5% / ± 56 A ± 5%		± 160 Vp ± 5% ± 56 A ± 5%
Mains supply	-400: 3 x 400 V ± 10 % / 10 A (16 A CEE) -208: 3 x 208 V ± 10 % / 20 A (32 A CEE) 50 - 60 Hz		-400: 3 x 400 V ± 10 % / 20 A (32 A CEE) -208: 3 x 208 V ± 10 % / 39 A (63 A CEE) 50 - 60 Hz		-400: 3 x 400 V ± 10 % / 40 A (63 A CEE) -208: 3 x 208 V ± 10 % / 77 A (125 A CEE) 50 - 60 Hz
Dimensions	built into 19" rack on wheels, 860 x 552 x 1812 mm / 33.6 x 21.7 x 71.3"				
Weight	approx. 200 kg	approx. 250 kg	250 kg / 551 lb		330 kg / 728 lb
Heat dissipation	approx. 1.5 kW		max. 1.6 kW		max. 3.2 kW
	RippleCoupler NX200-1000	***RippleCoupler NX400-1000***	***RippleCoupler NX600-1000***	***RippleCoupler NX1000-1000***	
Outputs	1		2	2	
EUT supply	200 ADC / 1000 VDC	400 ADC / 1000 VDC	600 ADC / 1000 VDC	1000 ADC / 1000 VDC	
EUT connection	at output terminals		at connection box (included) with 3 m cables (other lengths on request)		
Ripple output (at EUT terminals)	10 Hz - 300 kHz [1] max. 40 Vp ± 5% (open, 2:1) max. 250 Ap ± 5% (short, 4:1)		10 Hz - 300 kHz [1] max. 80 Vp ± 5% (open, high range, 2:1) max. 504 Ap ± 5% (short, low range, 4:1)	10 Hz - 300 kHz [1] max. 80 Vp ± 5% (open, 2:1) max. 504 Ap ± 5% (short, 4:1)	
Transformer ratio	2:1 and 4:1, switchable (automatic switching)				
Capacitor bank	inlcuded 10mF, low ESR, automatic active pre-charge and discharge circuit, additional passive discharge circuit				
Mains supply	Included in RippleSource NX rack		1kW, 230 V / 4 A or 110 V / 9 A		
Dimensions			built into 19" rack on wheels, 800 x 552 x 1812 mm / 31.5 x 21.7 x 71.3"		
Weight			410 kg / 903 lb	560 kg / 1234 lb	
Heat dissipation at max. EUT current			max. 1 kW	max. 1.2 kW	
Environmental conditions	5°C - 35°C, humidity 10% - 90% non-condensing, 86 kPa (860 mbar) to 106 kPa (1 060 mbar), altitude < 2000 m Indoor use only, overvoltage category II, IP 20, pollution degree 2				
Sound level	below 80 dBA				
Footnotes	[1] derated voltage and current performance < 300 Hz and > 50kHz				

Control and Measurement

	Ripple NX 200 and 400-1000-2.5	Ripple NX600-1000-5/-10 Ripple NX1000-1000-10
Signal Generator	internal 1 channel, 0 – 500kHz, max. 20 MSa/s (adaptive), sine waveform (square / triangle / sawtooth on request), additonal waveforms with external signal generator	
Measurement channels	2 channels 1x voltage, max. 1000V 1x current, max. 250 A	4 channels: 2x voltage, max. 1000V, AC/DC coupling 2 x current, max. 1000A
Measurement frequency	0 - 500 kHz, frequency selective/narrow band or wideband (selectable), 2.5 MSa/s per channel (adaptive), accuracy ± 0.2 %	
Measurement voltage	Range: 0 - 64 Vrms Accuracy: 10 Hz - 10 kHz: 1.3 % of rdg + 0.8 % of rng, 10 kHz - 100 kHz: 1.4 % of rdg + 0.9 % of rng, 100 kHz - 300 kHz: 1.5 % of rdg + 1.0 % of rng	
Measurement current	Range: 2 - 300 Arms Accuracy: 10 Hz - 300 kHz: 2.5 % of rdg + 0.8 % of rng	
Safety features	Emergency circuit, interlock circuit, auxiliary contact for external breaker control, warning lamp (optional), high voltage indicator, active and passive discharge circuit (C-Bank), door interlock, EUT fuses (variable fuse holder)	
Control functions	Automatic control of amplifier, coupling network configuration and capacitor bank charging/discharging	
Operating modes	Impedance measurement, calibration, single point and multi-mode (table)	
EUT Monitoring	Voltage and current measurement and programmable limits, individually settable per output channel	
User Interface	Touch panel for local control, web interface (LXI)	
Communication Interfaces	CAN, Ethernet, GPIB/IEEE and OptoLink Remote command set, IVI-C and LabView driver	
Software	optional control software for remote control of ripple generator, including library with pre-programmed standards and tests, enhanced analysis and report generator	
Analog In/Out	Analog control input (0-10V), analog control output (0-10V) for external source control, trigger out	

Ordering information

Model	Item Nr.	Description
Ripple NX200-1000-2.5-400	1007821	fully integrated ripple generator, 200 A / 1000 VDC, 2.5 kVA amplifier, measurement and control unit, 3 x 400 V mains input
Ripple NX200-1000-2.5-208	1007822	fully integrated ripple generator, 200 A / 1000 VDC, 2.5 kVA amplifier, measurement and control unit, 3 x 208 V mains input
Ripple NX400-1000-2.5-400	1007823	fully integrated ripple generator, 400 A / 1000 VDC, 2.5k VA amplifier, measurement and control unit, 3 x 400 V mains input
Ripple NX400-1000-2.5-208	1007824	fully integrated ripple generator, 400 A / 1000 VDC, 2.5 kVA amplifier, measurement and control unit, 3 x 208 V mains input
Ripple NX600-1000-5-400	1006200	fully integrated ripple generator, 600 A / 1000 VDC, 5 kVA amplifier, measurement and control unit, 3 x 400 V mains input, incl. connection box CBP-1000-1000-2-3m
Ripple NX600-1000-5-208	1006201	fully integrated ripple generator, 600 A / 1000 VDC, 5 kVA amplifier, measurement and control unit, 3 x 208 V mains input, incl. connection box CBP-1000-1000-2-3m
Ripple NX1000-1000-5-400	1006202	fully integrated ripple generator, 1000 A / 1000 VDC, 5 kVA amplifier, measurement and control unit, 3 x 400 V mains input, incl. connection box CBP-1000-1000-2-3m
Ripple NX1000-1000-5-208	1006203	fully integrated ripple generator, 1000 A / 1000 VDC, 5 kVA amplifier, measurement and control unit, 3 x 208 V mains input, incl. connection box CBP-1000-1000-2-3m
Ripple NX1000-1000-10-400	1006204	fully integrated ripple generator, 1000 A / 1000 VDC, 10 kVA amplifier, measurement and control unit, 3 x 400 V mains input, incl. connection box CBP-1000-1000-2-3m
Ripple NX1000-1000-10-208	1006205	fully integrated ripple generator, 1000 A / 1000 VDC, 10 kVA amplifier, measurement and control unit, 3 x 208 V mains input, incl. connection box CBP-1000-1000-2-3m
CBP 2-1000-1000-3m	1006206	Connection box for Ripple NX600 and NX1000, max. 1000 V / 1000 A, 3 m cable
CBP 2-1000-1000-10m	1007526	Connection box for Ripple NX600 and NX1000, max. 1000 V / 1000 A, 10 m cable
CBP 1-400-1000-3m	1008828	Connection box for Ripple NX200 and NX400, max. 1000 V / 400 A, 3m cable
CBM 2-1000-1000	1006207	Connection box measure, all models, max. 1000 V
-ACC	-ACC	accredited calibration of Ripple NX according ISO 17025