

NTS 03-G+

Network Time Server



Features

- References GPS and GLONASS networks
- Multilevel password protection
- Isolated singular or dual power supplies
- High-power line drivers
- Low-noise characteristics due to balanced pair distribution
- UTC and Local Standard Time (LST) with user-defined Daylight Savings Time (DST)
- Up to six independent Ethernet connections
- Supports IEC 61850-9-3
- Enhanced security and encryption that exceeds the requirements of NERC CIP 007-01
- Remote configuration and firmware upgrades
- Oven-Controlled Crystal Oscillator (OCXO) and rubidium oscillator options

Applications

- Synchronization of station and bay level equipment
- Time synchronization for digital substation with process bus
- Industrial automation and Supervisory Control and Data Acquisition (SCADA)

Flexibility

The needs of every substation being slightly different, so it is important that the substation time server can meet the needs of the differing output or input requirements. The NTS 03-G+ does this by allowing you to choose the required input or output medium and different oscillator types for different redundant power supply voltage levels.

Redundancy

NTS 03-G+ has robust redundancy features that enable continuous and reliable time synchronization. It supports PRP to allow seamless failover between network paths and eliminate single points of failure. Multiple independently addressable and logically isolated Ethernet ports enable connection to separate networks, further enhancing redundancy and network security. The device also offers oscillator options such as rubidium and OCXO for high-precision timekeeping even in the event of external signal loss. Dual, redundant power supplies offer uninterrupted operation by providing backup power in case one supply fails, further strengthening the reliability of the system.

Security

Secure management interfaces and secure time distribution protect against unauthorized access and tampering. In security and surveillance applications, this provides trustworthy, synchronized timestamps for video feeds and access logs—critical for incident investigation, compliance and reliable evidence gathering.

Time Accuracy Output Suppression

It is critical that the time provided to end devices in the substation can be trusted to be extremely accurate. We have included time accuracy output suppression in the NTS 03-G+. If the clock deviates past your configured threshold, it will suppress the output, which will prevent the device from outputting inaccurate time and triggering a false trip.

Configuration Tool

Configure the NTS 03-G+ with our power utility timing systems configuration tool. This is a common executable tool that is used to configure all current-generation power utility timing system products. It provides an easy-to-use, secure interface to allow the configuration of all available output options and status displays for performance monitoring.

Oscillator Options

Each NTS 03-G+ is equipped with a TCXO crystal oscillator that when GNSS is lost will provide a few seconds of accurate time and frequency. After these few seconds however, the clock is no longer able to provide accurate network time. With an OCXO or rubidium oscillator option a few seconds of accurate time and frequency turns into hours.

Industry Standard Protocols

The power industry uses several standardized timing protocols. The NTS 03-G+ has the flexibility to support all relevant timing needs.

Key protocols supported include:

- Precision Time Protocol (PTP)
- Network Time Protocol (NTP)
- IRIG-B (B004–B007, B124–B127)
- Programmable pulses such as PPS, PPM, PPH
- DCF77

Holdover Accuracy (One Day)

Oscillator	Holdover Drift (First 24 Hours)
TCXO	< 550 microseconds
OCXO*	10 microseconds
Rubidium**	< 1 microsecond

*Not compatible with fiber Ethernet on 4- or 6-port options

** NTP and IRIG-B client operations are not available with OCXO or rubidium options

Output Accuracy to UTC

Output	Accuracy
TTL/Fiber	< 100 ns
1 PPS	<100 ns
PTP Time Stamp	< 100 ns
NTP Time Stamp	< 50 µs

Mechanical/Environmental

Specification	Details
Size	(W) 430 mm × (D) 270 mm × (H) 45 mm
2-Pin, Medium-Voltage Power Supply	20–75 VDC
2-Pin, High-Voltage (DC) Power Supply	90–250 VDC
High-Voltage (AC/DC) Power Supply – IEC 60320 C14	85–250 VAC 90–250 VDC
Power Drain	12–28W (variant dependent)
Operating Temperature	–10°C–65°C –10°C–60°C (rubidium)
Storage Temperature	–10°C–85°C
Operational Humidity	≤ 95%, non-condensing
Certifications	CE, FCC, CSA, RCM EN: 55 032:2015
Weight	2.0 kg
Ingress Protection	IP40

Specifications

GNSS Receiver

- 32 parallel-channel GNSS receiver
- Acquisition time
 - Cold start: 50s
 - Hot start: 2s
- Cable delay compensation configuration
- Available constellations
 - GPS L1
 - GLONASS L1

LCD Display and LEDs

- 2-line × 16-character FSTN LCD
 - Sync status, clock information, satellite acquisition status, alarm information
- Two LEDs indicating sync and alarm status

Network Protocols (General)

- Dynamic Host Configuration Protocol (DHCP) auto-configuration with fallback to Address Resolution Protocol (ARP)-tested link-local address
- Virtual LAN (VLAN) packet tagging
- Auto-MDIX
- Auto-negotiation
- IPv4

NTP *

- Supports NTP v1, v2, v3 and v4
- Optional MD5 authentication
- Multicast and broadcast server capability
- Stratum 1 NTP and Simple Network Time Protocol (SNTP) time server

PTP*

- One- or two-step operation
- End-to-end, peer-to-peer or manual delay calculations
- Layer 2 (Ethernet) or Layer 3 (UDP) transport
- Server and client-only mode
- Default profile support
- Support for IEEE C37.238-2011 and IEEE C37.238-2017 power profiles
- Support for ITU- T G.8265.1 telecom profile (client only)
- Support for ITU- T G.8275.1 telecom profile (server and client)
- Support for IEC 61850-9-3 power utility profile
- Supports C37.238 -2011 Type, Length, Value (TLV)
- Supports C37.238 -2017 Type, Length, Value (TLV)
- Alternate time offset TLV supported with automatic or manual offset
- Supports C37.238-2011 Simple Network Management Protocol (SNMP) Management Information Base (MIB)

* Some optional features may incur extra costs

Parallel Redundancy Protocol (PRP)*

- IEC 62439-3:2016 - Section Four: Parallel Redundancy Protocol
- Supports up to two PRP pairs
- Supports:
 - IEEE 1588v2 default profiles
 - PTP power profiles
 - IEEE C37.238-2017
 - IEC 61850-9-3:2016

SNMP and Syslog

- v1, v2c and v3 support can be independently enabled
- Configurable v1 and v2c community names and security groups
- Fully configurable via SNMP
- v3 User-based Security Module (USM) support
- USM authentication methods: MD5 and SHA
- USM privacy methods: DES and AES
- USM MIB support
- SNMP trap generation v1, v2c and v3
- SNMP v3 traps can be authenticated and privatized via USM
- Syslog (RFC-3164 and 5424) support

IRIG-B

- DCLS IRIG-B (B00x*) with configurable C37.118.1-2011 and AFNOR S87-500 extensions
- AM IRIG-B (B12x*) with configurable C37.118.1-2011 and AFNOR S87-500 extensions
- Modified Manchester (B22x*)
- Up to two simultaneous formats supported on different output ports

*Where x is 4, 5, 6 or 7

Programmable Pulse

- User-defined pulse duration, offset and interval
- 1 PPS, 1 PPM, 1 PPH and 1 PPD

IRIG-B Input

- DCLS IRIG-B input
- Event recording

DCF77

- DCF77-time code
- 1 kHz square wave

Port Isolation

- Outputs to base unit: 2.5 kV
- Power supply to I/O: 3.5 kV

Alarm Relays

- Four Form A contacts
- Power supply A and B alarms
- Antenna alarms
- Sync relay

Three-Port NTS 03-G+



Front Panel

Specification	Details
Display	2-line × 16-character FSTN backlit display
Buttons	Three navigation buttons
LEDs	One green sync LED One red alarm LED
Admin USB	Type B to access config tool

Back Panel

Specification	Details
Eth 1	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μm , λ 1300 nm
Eth 2	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μm , λ 1300 nm
Eth 3	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μm , λ 1300 nm

Specification	Details
P1a	Medium, 2 pin, 20–75 VDC or High, 2 pin, 90–250 VDC or High (AC), IEC 60320 C14, 85–250 VAC/90–250 VDC
P1b	Medium, 2 pin, 20–75 VDC or High, 2 pin, 90–250 VDC or High (AC), IEC 60320 C14, 85–250 VAC/90–250 VDC
P2	3 pin, IRIG-B input, RS422, $\pm 3.3\text{V}$, no load
P3	3 pin, IRIG-B output, RS422, 150 k Ω impedance
P4a	2 pin, antenna alarm, Form A relay
P4b	2 pin, sync alarm, Form A relay
P5a	2 pin, Power A alarm, Form A relay
P5b	2 pin, Power B alarm, Form A relay

Four-Port NTS 03-G+



Specification	Details
P1a	Medium, 2 pin, 20–75 VDC or High, 2 pin, 90–250 VDC or High (AC), IEC 60320 C14, 85–250 VAC/90–250 VDC
P1b	Medium, 2 pin, 20–75 VDC or High, 2 pin, 90–250 VDC or High (AC), IEC 60320 C14, 85–250 VAC/90–250 VDC
P2	3 pin, IRIG-B input, RS422, ± 3.3 V, no load
P3	3 pin, IRIG-B output, RS422, 150 k Ω impedance
P4a	2 pin, antenna alarm, Form A relay
P4b	2 pin, sync alarm, Form A relay
P5a	2 pin, Power A alarm, Form A relay
P5b	2 pin, Power B alarm, Form A relay
P6	BNC, DC IRIG-B, DCF77 or pulse, TTL: 0–5V, 150 mA or ST fiber, unmodulated IRIG-B, DCF77 or pulses, 62.5/125 μ m, λ 820 nm
P7	
P8	
P9	
P10	BNC, DC IRIG-B, DCF77 or pulse, TTL: 0–5V, 150 mA
P11	BNC, DC IRIG-B, DCF77 or pulse, TTL: 0–5V, 150 mA

Specification	Details
Eth 1	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 2	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 3	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 4	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm

Six-Port NTS 03-G+



Specification	Details
Eth 1	RJ45, admin port, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 2	RJ45, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 3	RJ45, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 4	RJ45, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 5	RJ45, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm
Eth 6	RJ45, 10/100 Mbps, auto negotiate or ST fiber, 100 Mbps, 62.5/125 μ m, λ 1300 nm

Specification	Details
P1a	Medium, 2 pin, 20–75 VDC or High, 2 pin, 90–250 VDC or High (AC), IEC 60320 C1485–250 VAC/90–250 VDC
P1b	Medium, 2 pin, 20–75 VDC or High, 2 pin, 90–250 VDC or High (AC), IEC 60320 C14, 85–250 VAC/90–250 VDC
P2	3 pin, IRIG-B input, RS422, ± 3.3 V, no load
P3	3 pin, IRIG-B output, RS422, 150 k Ω impedance
P4a	2 pin, antenna alarm, Form A relay
P4b	2 pin, sync alarm, Form A relay
P5a	2 pin, Power A alarm, Form A relay
P5b	2 pin, Power B alarm, Form A relay