

Modular layout and high-performance 32-bit modular architecture provides unlimited expansion potential

Virtual RTU™ database mapping

Fast Ethernet® with DNP over TCP/IP with remote configuration over LAN/WAN

The Connex 30 addresses the needs of high-performance, large database capacity data concentrator and protocol converter applications. It has the additional ability to process (using 32-bit CPU architecture) a vast amount of data from IEDs, and to interface a large number of discrete data acquisition and control devices in the substation. DIN rail-mounting the local I/O modules in a 19-inch rack or NEMA 12 floor or wall-mounted cabinet makes the Connex 30 an ideal substation system solution for medium to large transmission or distribution substation or power plant applications.

## Design Features

- 19" rack-mount card file(s); front/rear plug-in expansion modules (meets IEEE 1101/11 & 1011.10 3-U standard)
- Distributed processing architecture; multiple 32-bit microprocessors, linked using a peer-to-peer type network
- Multiple Virtual RTU database mapping
- Multiple master and IED isolated serial communication interfaces (configurable per port for RS-232C to external modems or fiber optics, or RS-485 for copper)

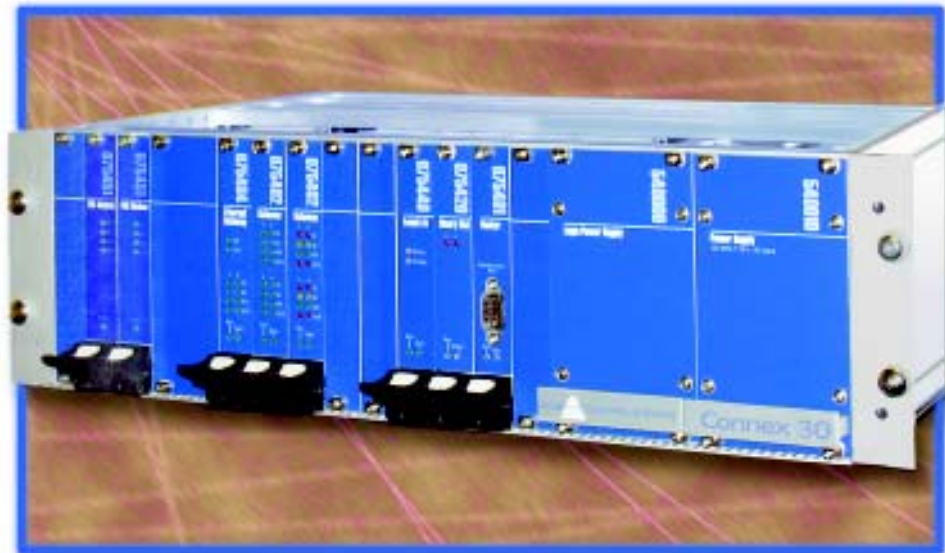
# Connex™ 30 substation manager

DIN rail-mounted I/O modules for easier expansion

Database and communications profiling for most IEDs

Library of master and IED protocols, including ACS, DNP, Modbus and legacy SCADA

DNP Level Two conformance tested and certified



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## Application and expansion

The Connex 30 can be used in a traditional centralized equipment rack or a floor- or wall-mounted cabinet, and expanded if and when the substation grows. It can communicate with one or more master stations, exchanging a different subset of data with each one. It can also serve as a substation/power plant master to a distributed substation system.



## Technical specifications

### Local binary inputs <sup>1</sup>

Maximum capacity	480 points per input node, in groups of 32 inputs
Scan period	1 millisecond
Resolution	1 millisecond
Change memory	512 events
Binary input filter	Software filter: changed contact must be in the same state for 4 consecutive millisecond scans
Input isolation	Optically isolated
Time clock	On-board UTC time/date clock, non-volatile; optional external IRIG-B or GPS satellite clock time synchronization

### Local counter inputs <sup>1</sup>

Maximum capacity	240 Form C or 480 Form A points per input node, in groups of 1 input
Input isolation	Optically isolated
Freeze command	From master station based on protocol or locally frozen by the real-time clock. May be frozen or running counts.
Counter register size <sup>2</sup>	Minimum of 16-bits <sup>2</sup>

<sup>1</sup> Binary inputs include binary with time (SOE), binary without time (Status/Alarm), and counter input points

<sup>2</sup> Protocol dependent

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## Local DC analog inputs

Maximum capacity	256 points per input node, in groups of 16 inputs
Analog inputs	Standard: $\pm 1$ mA Optional: $\pm 10$ mA, 4–20 mA, $\pm 5$ VDC, etc.
A/D resolution	16 bits
A/D conversion time	10 microseconds per point, in groups of 16 points
Analog accuracy	0.1% (0° to 60°C)
Multiplexing hardware	Differential—all solid-state (CMOS FET)
Common mode rejection	85 dB @ 0 to 60 Hz
Normal mode rejection	> 70 dB @ 60 Hz

## Local AC analog inputs

Power input	24 VDC (18–36 VDC range)
Consumption	Less than 12 watts
Signal input	Two 3-phase AC voltages (from 150V PTs), either side of the switch One 3-phase AC current from 0–5.0 amp CT
Current input	Rated input: 5 amp Frequency: 45–65 Hz Burden: $\leq 0.5$ VA phase @ 1 A Overload rating: 2 x rated input, continuous; 10 x rated input, 16 seconds; 40 x rated input, 1 second
Voltage input	Rated input: 150 VAC Frequency: 45–65 Hz Burden: $\leq 0.5$ VA phase @ 125 V Overload rating: 1.2 x rated input, continuous; 1.4 x rated input, 10 seconds
Measured and calculated parameters	(all available as output values) Two 3-phase volts, per phase and average, line-to-neutral or line-to-line 3-phase amps, per phase and average Two 3-phase angles across an open switch 3-phase watts 3-phase VARs

Measurement accuracy	<p>Currents: 0.5% @ rated input; 5% for fault magnitude</p> <p>Voltage: 0.5% at rated input</p> <p>Power: 0.5% at rated input</p> <p>Phase angle: 1 degree</p>
Fault detection outputs	<p>(all available as output values)</p> <p>Phase-to-phase (1 status point)</p> <p>Phase-to-ground (3 status points)</p> <p>RMS fault magnitude (1 analog point)</p> <p>Fault direction (1 status point)</p>
Fault detection download parameters	<p>Phase-to-phase fault—magnitude and duration as setpoint values; 4 current and 4 time values remotely downloaded</p> <p>Phase-to-ground fault—magnitude and duration as setpoint values; 4 current and 4 time values remotely downloaded</p>
Internal binary error flags	<p>(available as output values)</p> <p>Zero error; scaling error; setpoint error; address error</p>
<b>Local DC analog outputs</b>	
Maximum capacity	16 analog outputs per node, in groups of 1 channel
D/A resolution	16-bit
Analog outputs	Isolated 4–20 mA
Output impedance	25 m $\Omega$
Isolation	Galvanic
Analog accuracy	0.1%; 0° to 60°C (32° to 140°F)
<b>Local SBO binary control output features</b>	
Maximum capacity	256 relays per binary output node, in groups of 6, 8, or 16 relays
Contact types	Momentary or latching
Control sequence <sup>2</sup>	Select-before-operate
Momentary contact ratings	10 A @ 277 VAC (or 32 VDC) Optional: 10 A or 20 A @ 150 VDC
Contact closure times <sup>2</sup>	Selectable: 0.001 second increments

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## Local binary pulse output

Maximum capacity	16 relays per binary pulse output node, in groups of 6, 8, or 16 relays
Contact types	Momentary
Control sequence <sup>2</sup>	Direct operate
Momentary contact ratings	10 A @ 277 VAC (or 32 VDC) Optional: 10 A or 20 A @ 150 VDC
Contact closure times <sup>2</sup>	Selectable: 0.001 second increments

## Gateway nodes

Network gateway	10/100 Base T Ethernet, configurable as a server, client, or both. Includes 2 isolated RS-232 DTE/RS-485 ports with RJ-45/EIA-561 connectors, configurable as primary or secondary protocol devices. Unlimited number of Ethernet gateway nodes.
Serial gateway	4 isolated RS-232 DTE/RS-485 ports with RJ-45 DTE/EIA-561 connectors per quad serial gateway node, with an unlimited number of quad serial gateway nodes
Virtual RTU addresses	Up to 16 per port recommended
Database size maximum	7000 data values per serial gateway; 10,000+ per Ethernet gateway
Serial communication ports	Isolated digital RS-232C DTE or RS-485 serial interfaces, configurable per port; optional fiber optic transceiver
Serial operation channel	Analog: two- or four-wire (with optional external modem)
Serial baud rate	300 to 115,200 bits per second
Alternate application	Virtual PLC node

## I/O protection certifications

Inputs and outputs	IEEE SWC protected (certified to ANSI/IEEE C37.90.1-2002) Impulse voltage protected (certified to IEC 255-5 Standards)
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## Power requirements

Input voltage	24, 48, 130 VDC; 115, 220 VAC Tolerance range: $\pm 15\%$ minimum
Power consumption	80 watts, typical
Power supply certifications	Internal noise < 1.5% of input voltage (certified to IEEE Standard C37.1-1994) Input voltage range > $\pm 15\%$ nominal (certified to CFE U0000-11)
Optional battery	Sealed lead-acid; 2 hours backup, typical
Backup with AC	Automatic no-break failover

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## Enclosures

Enclosure ratings	Various sizes NEMA 12 or NEMA 4 cabinets
Card file	8-slot; 483 x 133 x 290 mm (19 x 5.25 x 11.4 in) per IEEE 1101/11 and IEEE 1011.10 standard. Multiple card files permitted
Rack mounting	19" rack; DIN rail for local I/O modules
Access	Standard: front and rear; optional: front only

## Operating range

Operating temperature	0° to 60°C (32° to 140°F)
With heater option	For operation down to -30°C (-22°F)
Humidity	10% to 95% non-condensing

## Connex/NTU Explorer

User interface	Keyboard- and mouse-driven menus and views emulate Microsoft® Windows® Explorer
Platform	Portable PC, IBM-compatible
Operating system	Windows 98SE/2000/ME/XP
Data link	Local RS-232 to Connex maintenance port or remote access via TCP/IP LAN/WAN port
File location	In Connex 30 and PC; database can be downloaded/uploaded to/from PC or Connex 30
Accessibility	File transfer
Monitor parameters	Input and output state/values; control relay or IED tests, internal network traffic. Manually modify analog, counter or binary data values for on-line simulation testing of all inputs.

## Options

Custom enclosures; custom relay configuration; custom terminal blocks

## Protocols

Master and IED protocol compatibility expands constantly. Visit our web site for a complete and up-to-date list.

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