

High-performance multiple 32-bit distributed CPU processing

Manage substation communications through a single resource

Database and communications profiling for most IEDs

The Connex 60 incorporates complete substation management functionality and adds the ability to interface (using 32-bit CPU architecture) to a vast amount of data from IEDs and DAC devices in the substation. It can also transmit numerous selected subsets of this data to one or more master stations in the master's native protocol. DIN rail-mounting the local I/O modules in a 19-inch rack or NEMA 4 wall-mounted cabinet makes it an ideal, low-cost substation solution for small- to medium-sized transmission or distribution substation applications.

Design Features

- Distributed processing architecture featuring multiple 32-bit microprocessors in a peer-to-peer type LAN
- Multiple Virtual RTU database mapping
- Fast Ethernet with DNP over TCP/IP
- Field-programmable
- On-line configuration, monitoring and diagnostic facilities
- Multiple master/IED isolated communication serial interfaces (configurable per port for RS-232C to external modems or fiber optics, or RS-485 for copper)

Connex™ 60 substation manager

Virtual RTU™ database mapping

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

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

DNP Level Two conformance tested and certified



Application and expansion

The Connex 60 can be used in a traditional centralized equipment rack– or wall– mounted cabinet. It can communicate with one or more master stations, exchanging a desired subset of data with each one. The flexible, DIN rail–mounted, modular I/O circuit board design supports easy expansion as part of the Connex 60 architecture. Incremental modular growth is supported without pre–wiring for expansion at the factory at the time of order. Connex/NTU Explorer software makes it easy to configure or expand the type and number of ports and protocols communicating with the master stations or IEDs, defining local I/O points, and/or other components. It can also serve as a remote DAC node in a distributed substation system.



Technical specifications

Local binary inputs ¹

Maximum capacity	480 points, 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 IRG–B or GPS satellite clock time synchronization

Local counter inputs ¹

Maximum capacity	240 Form C or 480 Form A points, 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 ²	Minimum of 16–bits ²

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

² Protocol dependent

Local DC analog inputs

Maximum capacity	256 points, in groups of 16 inputs
Analog inputs	Standard: ± 1 mA Optional: ± 10 mA, 4–20 mA, ± 5 VDC, etc.
A/D resolution	16 bits
A/D conversion time	10 μ seconds 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: ≤ 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: ≤ 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</p> <p>Scaling error</p> <p>Setpoint error</p> <p>Address error</p>
Local DC analog outputs	
Maximum capacity	16 analog outputs, in groups of 1 channel
D/A resolution	16-bit
Analog outputs	Isolated 4–20 mA
Output impedance	25 m Ω
Isolation	Galvanic

Local SBO binary control output features

Maximum capacity	256 relays, in groups of 6, 8 or 16 relays
Contact types	Momentary or latching (AC only)
Control sequence ²	Select-before-operate ²
Momentary contact ratings	10 A @ 277 VAC (or 32 VDC) Optional: 10 A or 25 A @150 VDC
Contact closure times ²	Selectable: 0.001 second increments

Gateway nodes

Network gateway	10/100 Base T Ethernet (RJ-45), configurable as a server, a client, or both. Includes two serial RS-232 DTE/RS-485 DNP3 9-pin ports, configurable as a master or slave each
Serial ports per gateway node	4 per Quad Serial gateway node, with expansion for up to four 4-port 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 C37.90.1-1989) 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	60 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

Enclosures

Enclosure ratings	Various sizes NEMA 12 or NEMA 4 cabinets
Card file	4-slot; 152 x 203 x 76 mm (6 x 8 x 3 in)
External power supply	159 x 102 x 102 mm (6.25 x 4 x 4 in)
Rack mounting	Rear panel or 19" rack DIN rail for local I/O modules, panel for base card file and power supply mounting
Access	Standard: front only; optional: front and rear

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 and Monitor programs

User interface	Keyboard- and mouse-driven menus and views emulate Windows Explorer
Platform	Portable PC, IBM-compatible
Operating system	Windows 98SE/2000/ME or XP
Data link	Local RS-232 NTU maintenance port or remote access via TCP/IP LAN/WAN port
File location	Stored in Connex 60 and PC; download/upload database to/from PC or Connex 60
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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