Substation Automation Solutions

Advanced Control Systems™ (ACS™) is a leading provider of smart grid solutions to the global electric power industry. Our automation product lines include a wide range of flexible and cost-effective substation, distribution and feeder automation solutions–our NTX series of intelligent automation controllers, available in pole-top and substation models.

As older substations are modernized or new substations are built, more device integration capability and less local I/O will be required. We support all applications with highly reliable, technically advanced client/server, peer–to–peer distributed multiple 32-bit microprocessor technology. Incorporating an embedded Linux® operating system that is fully secured (with no user accessibility) provides a stable platform for all distributed microprocessor nodes in each model. Our integration of IEDs is completely vendor-transparent. And anyone with Windows® experience will find NTX Explorer Configuration and Monitor tools very intuitive. It's as close to plug–and–play as you can get.

All NTX series models can be configured with high–speed isolated RS–232 or RS–485 serial and 10/100 Base T DNP3 over TCP/IP or UDP Ethernet ports, as well as serial ports supporting most popular legacy protocols. The NTX series also incorporates both serial and TCP/IP or UDP Modbus RTU protocol. Both serial and TCP/IP DNP3 and Modbus RTU protocol emulations are configurable as a client, a server, or multiples of both. IEC 60870-5-101 is available as a server.

We offer an NTX series product for every application. Additional information about these solutions, along with a comparison of the products, is available. Contact us to determine which of our substation automation/integration products is right for your utility.

NTX-20

The NTX-20 controller is a low-cost intelligent controller, ideal for data concentrator, protocol translation, and substation distributed circuit breaker/transformer bay automation or pole–top/pad-mount switch control for distribution automation. It is DIN rail-mounted, with a small complement of external I/O modules. When combined with the D 060 AC analog input module, it delivers a capable, cost-effective solution for automated Fault Location Isolation and Service Restoration (FLISR). The NTX-20 includes an Ethernet interface, and supports DNP over TCP/IP and Modbus RTU TCP/IP, as well as several legacy protocols. It supports two serial and one Ethernet port, with up to 7 virtual ports.
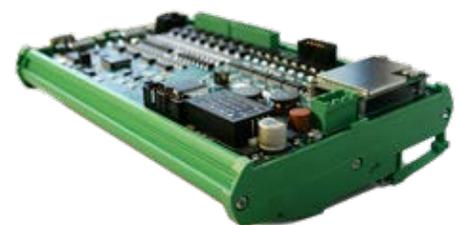
NTX-20 controller

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NTX-200

The NTX-200 Substation controller is the smallest of our NTX series modular card file substation system designs. It incorporates complete substation management functionality in a compact unit, and adds the ability to interface to large amounts of data from IEDs, and to a small to medium amount of locally-wired data acquisition and control devices in the substation.

The NTX-200 can be used in a traditional centralized equipment rack– or wall–mounted cabinet. The standard NTX-200 has a half-width card file (9" W x 5.25" H x 12" D) that can be bottom-mounted with top/rear access. A 19" rack card file is available as an option, for front/rear access rack mounting. It has a three-slot I/O motherboard that supports up to three 16-point DC Analog Input Modules; three 32-point Digital Input Modules; or three Bell 202 FSK modems–or any combination of these modules in the three slots. The I/O is not expandable beyond the base 3-slot I/O motherboard. The NTX-200 can also serve as a remote Data Acquisition and Control node in a distributed substation system. It supports up to 14 serial and 4 Ethernet ports with up to 196 virtual IP ports.

NTX-200 controller

NTX-220

Our mid-size option, providing complete substation management functionality. It has the ability to interface to a very large amount of data from integrated IEDs, and to a medium to large amount of data from hardwired local I/O devices in the substation. Multiple user-defined subsets of this data can be transmitted to one or more master stations in the master's native protocol. A medium amount of local analog and digital inputs or Bell 202 modems can be configured in the 6 I/O module motherboard slots available. When an external expansion card file is added, the inputs are expandable in groups of 12 additional I/O slots each. The expansion chassis use DNP3/IP through a built-in 2-port Ethernet switch that interfaces to the NTX-220.

Multiple high-performance ARM9E 32-bit RISC microprocessors, each programmed to support specific functions, are linked together using a peer-to-peer type network. The ARM9E microprocessor-controlled, high capacity NTX quad-serial/Ethernet gateways make it an ideal, low-cost substation solution for data concentrator and protocol converter for small- to medium-sized transmission or distribution substation installation. A full-width 19" card file supports up to 18 serial and 5 Ethernet ports, with up to 259 virtual IP ports.

NTX-220, front view

NTX-240 expanded chassis

NTX-240

Used in small to large substation installations that have large serial and Ethernet port requirements for data concentration/integration applications. It is primarily used to upgrade legacy ACS RTUs, as well as legacy RTUs from other vendors. It is available in a standard half-width card file with front/rear or front-only access, which supports up to 18 serial and 5 Ethernet ports, with up to 259 virtual IP ports. An optional 19" rack-mounted full-width card file is also available.

NTX-260, front card file

NTX-260

Our top-of-the-line substation system. Ideal for very large substation or power plant installations, with extra-large serial and Ethernet port requirements, it incorporates complete substation management functionality with support for a sizable amount of local I/O for full integration of old and new substation designs. It is also ideal for applications requiring heavy-duty data concentration/ protocol translators. Throughout the NTX-260, servers (such as NTX Gateway to IEDs) produce data, and clients (such as the NTX gateway supplying the virtual databases to the master) receive data. It can also transmit numerous selected subsets of this data to one or more master stations in the master's native protocol.

In order to take maximum advantage of the client/server model, the NTX-260 uses a distributed CPU processing architecture. Multiple high-performance ARM9E (Advanced RISC Machine) 32-bit microprocessors, each programmed to support specific functions, are linked together using a peer-to-peer type network. The ARM9E microprocessor-controlled high capacity NTX serial and Ethernet gateways makes it an ideal, high performance substation solution for data concentrator and protocol converter for large power plants, transmission and distribution substation installation. A full-width 19" card file supports up to 30 serial and 8 Ethernet ports, with up to 448 virtual IP ports. DNP3/IP interfaces to the NTX-260 using a built-in 2-port Ethernet switch.

NTX Explorer Configuration and Monitor

The NTX Explorer and Monitor programs work on a personal computer using the Microsoft® Windows® (XP, WIN7, WIN8, WIN 10) operating system. It emulates the standard PC Windows Explorer file management system in order to minimize special training requirements. Drag-and-drop techniques are employed for database-mapping. NTX Explorer is used for configuration of the unit; in the field or the convenience of your office. Using Ethernet links to the NTX provides an easy way to remotely download or upload a configuration to or from the NTX via the WAN. Configuration parameters include baud rate, Virtual RTU addresses, modem type, local I/O configurations, etc. All configuration changes can be made independently, stored in a file on the PC, and downloaded to the NTX when it is convenient. Configuration in an NTX can also be uploaded to a PC.

NTX Monitor is used for field diagnostics. It is used to display real-time data and functions such as binary and counter inputs, SOE data, analog points, IED inputs and outputs, state and activity of the binary output system, and internal LAN traffic. Local and IED control points can be tested directly in NTX Monitor. It is helpful in troubleshooting IED communications (through the monitor of communications statistics for each connected device) and application problems.

Monitored local input data can be modified manually by a technician for testing or database verification purposes. Monitored data has two quality flags associated with each data value in the database:

- data that is not updating from the external source (off-line IED, etc.) is displayed with a grey background
- manually modified data is displayed with a red background

With a 10/100 Base T Ethernet interface to the NTX, NTX Explorer can be connected via a WAN for remote configuration.

Successful legacy RTU upgrade program

In the early 1980s, we began an upgrade program to upgrade our MPR-3000 series RTUs, which were built in the 1970s and 1980s. We have added successive generations of our RTU products, and continue this upgrade policy today with the latest in our line of substation automation controllers–the NTX series. We then began to examine legacy RTUs from other manufacturers to see where we could repeat these successes. We started with the Moore Power Systems RTUs–formally dropped from support by the original product vendor. These products have a card file design similar to our own models. We successfully implemented an Moore Power Systems MPS-9000 and MPS-9000S upgrade in a single day at a large mid-western utility, at a tremendous cost saving to the utility versus the replacement cost. The utility had previously replaced seven similar L&G legacy RTUs with another vendor's RTUs–a project that took over two years to complete.

Our success with upgrading these Moore Power Systems legacy RTUs led us to explore other upgrade opportunities. We have implemented programs at many utilities, upgrading more than 25 different models. For a detailed list, please contact your ACS Sales Representative.

Substation Automation Solutions

NTX series model comparisons

The chart below briefly compares the NTX series models. This is not a comprehensive comparison. For a copy of the comprehensive product comparison, or detailed information on a specific product, please contact your ACS sales representative.

	NTX-20	NTX-200	NTX-220	NTX-240	NTX-260
Replaces previous ACS model	NTU-7575 base	Fully expanded NTU-7575; small Connex 30/ Connex 60	Small Connex 30/ larger Connex 60 gateway; smaller I/O capacity for Connex 30	Connex 60 or Connex 30 data concentrator/protocol translation applications	Fully-loaded Connex 30 plus
Carrier/card file dimensions	200 x 108 x 70 mm (8" x 4.25" x 2.75")	42 HP wide, 3 U high (9"w x 5.25"h x 12"d) Optional 84 HP (19")	84 HP wide, 3 U high (19"w x 5.25"h x 12"d)	42 HP wide, 3 U high (9"w x 5.25"h x 12"d) Optional 84 HP (19")	84 HP wide, 3 U high (19"w x 5.25"h x 12"d)
Ethernet quad-serial gateway node: maximum installed	N/A	3	4; no I/O 1 slot (control output); 1 slot (optional expanded I/O)	4; no I/O 2 slots used for legacy I/O interfaces	7; no I/O 2 slots used for I/O interfaces
Virtual Ethernet ports	15	196	259	259	448
Total NTX ports supported: isolated serial ports	2	14	18; no control and DA050235 I/O controller used	18; no I/O; 2 node slots used for legacy I/O interfaces	30; no I/O; 2 node slots used for I/O interfaces
Local binary inputs supported	Base 16 + 4 expansion; groups of 8 inputs each (48 points max.); isolated 18-36 VDC contact wetting	32 point modules; card file mounted; max. of 3 slots (96 points max. with no analog inputs); isolated 24 VDC contact wetting	32 point modules, card file mounted; max. of 6 slots (192 points max. with no analog inputs); isolated 24 VDC contact wetting	For legacy ACS or 2nd source upgrades; can support max. of 512 points	32 point modules, card file mounted; max. of 8 slots (256 points max. with no analog inputs); isolated 24 VDC contact wetting; expansion card files with 12 slots each
Local DC analog inputs supported	6 (expansion) 35 mm DIN rail-mounted (groups of 6 inputs each); 36 points max.	16 DC analog input modules, card file mounted; max. of 3 slots (groups of 16 inputs each; 48 points max. with no binary inputs)	16 DC analog input modules, card file mounted; max. of 6 slots (groups of 16 inputs each; 96 points max. with no binary input points)	For legacy ACS and 2nd source upgrades with max. of 256 DIN rail or card file analog input points	16 DC analog input modules, card file mounted; max. of 8 slots (groups of 16 inputs each; 128 points max. with no binary input points) Expansion card files with 12 modules each
Local DC analog outputs supported	2; 35 mm DIN rail-mounted	Up to 16; 35 mm DIN rail-mounted	Up to 16; 35 mm DIN rail-mounted	Up to 16; 35 mm DIN rail-mounted	Up to 16; 35 mm DIN rail-mounted
Local control relay outputs supported	24	24	256 relays (less one quad-gateway) and for legacy ACS and 2nd source RTU control interfaces	256 relays (less one quad-gateway) and for legacy ACS and 2nd source RTU control interfaces	256 relays (less one quad-gateway) and for legacy ACS and 2nd source RTU control interfaces

ACS

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