Netcon 500

The Modern Utility ICT Outstation

Netcon 500 Investment Protection

Utilities may conduct their retrofit program by upgrading parts of their outstations:

- Change of communication protocol for old RTU including enhancements to outstation
- Change of RTU with old protocol
- New RTU interfacing existing marshalling rack
- An important strategy in retrofitting is to use interface/adapter modules and existing wiring from the field and simply use it to interface with the new RTU technology
- The advantages of these approaches to the utility lie in the ease and swiftness of the solution

Benefits of Netcon 500

- Total cost effectiveness
- Easy customization
- Retrofitting substations in less than even one day
- Ability to integrate new features and products with legacy systems and protocols
- Easy addition of new protocols and connectivity options with the new range of IED’s

Designed for energy generation, transmission, distribution and the energy intensive industry

- Single platform with all-in-one functionality
- Remote terminal unit (RTU)
- Communication concentrator with cyber security
- Protocol converter supporting over 50 protocols
- Station automation functions
- Operator panel
- Low total cost of ownership (TCO)
- Investment protections through full retrofit capability
- Full support for remote control and unit maintenance

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Process Control with Reduced Costs
With the Netcon 500 Outstation, distributed processes can be controlled and monitored over a wide geographical area while local automation tasks can be processed – and all at reduced costs.

The Netcon 500 Outstation suits:
- Power generation substations
- Electric utility substations
- Industrial plant electricity distribution
- Rail electricity distribution
- District heating power plant and pumping stations

Investment Protection
The total cost of ownership is kept low by using mainstream technologies. Netcon 500 is an intelligent investment that is compatible with a wide range of established and emerging technologies. Netcon 500 is the most versatile solution that can protect your hardware and software investments. Netcon 500 Outstation is an efficient solution due to standard compliance and system scalability. Netcon 500 is designed for a long and trouble-free operation. Modifications and upgrades are easily added to an existing installation.

Your investment is thus protected through the flexibility and standard compliance.

High Adaptability
Netcon 500 is most adaptable to changes in the communication infrastructure. When speed and connection type changes, Netcon 500 is easily reconfigured to operate by the new principles.

As the requirements on monitoring and reporting of electric quality, customer interruptions of supply and economic compensation are set in the legislation, the availability of reliable and timely process information has reached new levels. This requires support for reliable and highly available connections.

Accurate Time Synchronization
The accuracy and resolution of the process event time stamps are crucial for disturbances analysis. The time resolution for the Netcon 500 RTU I/O is 1 millisecond and accuracy is 1 millisecond when synchronized with GPS.

Designed for Harsh Environment
Netcon 500 is designed for harsh substation environment with high electric and magnetic interference.

Netcon 500 is tested and complied with the latest EMC directives and the IEC 61850-3 standard for substations.

Cyber Security
As IP-technology based computer LAN and WAN networks becomes dominant in the utility ICT infrastructure, the Netcon Gateway platform is a cyber-secure preference.

- Firewall
- VPN
- Encryption
- Authentication

Multiple Functions Combined in One Unit
Acting as a gateway with remote terminal unit functions, the Netcon 500 Outstation provides extended features combined with classic terminal unit functionality.

Netcon 500 comprises following functions:
- Remote terminal unit
- Communication concentrator station
- Protocol conversion
- Operator panel
- Station automation
- Programmable Logic Controller (PLC)

Power automation functions can be configured ranging from simple alarm generation to automatic start/stop function for i.e. generators.

Configuration and Analysis Tools
Netcontrol provides set of user friendly tools to make the configuration and management of Netcon 500 systems easier and more flexible.

NCU Configuration Tool
Netcon 500 can be remotely configured through NCU (Netcon Configuration Utility) configuration tool. NCU is run in Windows environment and its graphical user interface presents the parameters in an intuitive tree hierarchy.

Basic Netcon 500 setup
- Communication ports
- Master protocols
- Slave protocols
- Process IO-units of Netcon 500
- Cross references between masters and slaves
- Mirrored data
- Redundancy

PLC Application Workbench
Netcon 500 has embedded PLC functionality, Application Workbench, for local applications like the control of hydro power generation. Integrated PLC eliminates the need for separate stand-alone PLCs thus reducing the site complexity.

Application Workbench is a complete programming environment used to develop highly portable applications. It supports six different automation languages; the five IEC 1131-3 languages plus flow chart.

Netcon NSA Analyzer
The Netcon NSA Analyzer is a tool for troubleshooting serial communications.

NSA records serial data and telecontrol protocols. It can be used for locating protocol problems and verifying the correct implementation of different protocols on various devices.
Netcon 500 Modules

**Netcon 500 Racks**
There are three different racks available for Netcon 500: a full rack with 14 slots, a half rack with 7 slots and a quarter rack with 3 slots. All the racks are suitable for 19" cards.

**Netcon Process IO**
The Netcon 500 direct process interface is placed in the 19" rack. The process IO-units are powered, synchronized and communicate with over the internal IO-bus. Each of the Netcon 500 parallel process IO-units operates as independent RTUs. When using GPS time synchronization of the IO-units the accurate PPS timing pulse from the GPS is connected over the internal bus to each IO-unit.

**Netcon GW502 Main Processor**
Netcon GW502 main processor unit handles the cyber security, communication, protocol conversion and RTU functionality. It provides option for redundant communication and processing. GW502 also powers the rack and modules.

- Voltage range 24-48V
- Power consumption < 12W
- Dual 10/100Base-TX Ethernet
- 4x10/100Base-TX + 100Base-FX Switch
- Three V.24 serial ports
- V.24 console port
- Rack Bus interface
- V.11 GPS receiver interface

**Netcon SIO508 Serial Port Server**
The Netcon SIO508 Ethernet serial port server provides eight V.24 (RS232) serial ports. It can power the rack and modules together with GW502 module.

- One 10 baseT Ethernet
- Eight V.24 serial ports with handshake, rear connector/cable interface
- One V.24 console port, RJ45 interface
- Four channel plastic optical fiber (POF) module attached to rear connector
- GPS PPS synchronization pulse input

**The Netcon POF4**
The Netcon POF4 is a V.24 to Plastic Optical Fiber adapter interfacing serial communication devices. It’s powered from SIO508. The Netcon POF4 is typically used for serial bus attached protection relays. The response and bandwidth can be significantly increased by splitting the communication to physically separate loops with a minimum of one device per loop.

**Analog In – AI16**
- 16 differential inputs channels
- 14bit accuracy
- ±22mA
- Common-mode voltage ±60VDC

**Digital In – DI64**
- 64 DI/PI (8 floating groups of 8 DI/group)
- Positive or negative common
- 24VDC, 48VDC or 110VDC

**Digital Out – DO32**
- 32 outputs (4 floating groups of 8 outputs/group)
- Load 24...110VDC / 1Acont / 3Apeak
- Electronic short circuit protection
- Impedance measurement

**Combi IO – IO64**
The combi unit Netcon 500 IO64 provides analog inputs, digital inputs and digital outputs in one unit. It is most cost effective in smaller stations needing only few cards.

- 40 DI/PI, 16 DO, 8 AI
- 24VDC or 48VDC

**Netcon SAM Module**
Sum Alarm Module combines any number of alarms into both one single and one double point summary alarm signal. Each input signal of a summary alarm may be delayed. The state of the substation Local/Remote switch may also be connected to the summary alarm.

- 40 DI/PI, 16 DO, 8 AI
- 24VDC or 48VDC
Netcon 500 Protocol Support

Protocol Support

Master (client) protocols
- IEC 61850
- IEC 60870-5-101
- IEC 60870-5-103
- IEC 60870-5-104
- DNP3
- Comli
- Modbus Client
- Siemens 3964R
- Nortroll
- Tele102, Tele109, Tele112, Telegyr 600
- ADLP80, ADLP180
- RP60, RP70
- Ideccta 23, Indactics 33/34, Indactics 35
- Felek 400, Felek UST4000
- Swedish Neutral RCC
- Netcon 8830, Netcon 8810
- Nortroll
- Radius RIP
- Lyngsø UST220/224, Lyngsø Gamma
- Robofon (Central Unit)
- Telecoma/Telecam
- Schlumberger 7915 FC
- Mobitex
- ANSI X3.28
- IEC62056-21

Slave (server) protocols
- NFELink
- Procol
- ADLP80, ADLP180
- RP60
- IEC 60870-5-101
- IEC 60870-5-104
- DNP3
- Netcon8830
- Tefi
- Modbus RTU
- Modbus Server
- Comli
- Mobitex

Netcon 500 Main Entities

**Netcon 500 Outstation Concept**
The Netcon 500 Outstation concept extends the option to integrate utility ICT infrastructure, communication, process interface, local monitoring, local automation and local control demands into one modular product portfolio. The Netcon 500 Outstation may be divided into main entities, the Netcon Gateway, the Netcon 500 RTU and the Netcon 500 Operator Station.

**Netcon 500 Gateway**
The main processing unit of Netcon 500 is called GW502. It handles the cyber security, communications, protocol conversion and RTU functionality. It also powers the rack modules.

To assure redundant processing, Netcon 500 may house two GW502 units which back up each other. In case of failure on one, the other takes automatically over.

**Netcon 500 RTU**
The central functions of the RTU are the traditional process interface and the communication services including protocol conversion.

The Netcon 500 RTU can be powered either from GW502 or SIO508 cards. The power supply is redundant. The communication can also have redundant paths from two GW502 cards. In case of failure on the main connection, the back-up connection takes automatically over.

**Netcon 500 Operator Station**
The Netcon 500 Operator Station provides local monitoring and control at the outstation based on proven Netcon technology family. The Netcon 500 Operator Station makes handling of the network more efficient within the primary equipment, between the process and upstream information systems.

The Netcon 500 Operator Station connects to the Netcon 500 RTU over local network adding more functions to the whole outstation installation without interfering with the basic functions.

The Netcon 500 RTU interfaces the process and IEDs while the Netcon 500 Operator Station performs the process monitoring, control and visualization on the HMI.

The HMI includes for example an alarm display, an event list, a station diagram, control functions, a trend display and automation features. The control and automation features provide functionality to implement regulators and sequences that can be managed and triggered either locally or remotely.

There are different hardware options available for the Operator Station, such as a panel PC or an industrial grade PC.

**Netcon 500 Extensive Connectivity**
Netcon 500 has extensive connectivity ranging from classic low speed telecontrol to modern IP-network based protocols.

Netcon 500 supports for example following standards for master station communication:
- IEC 60870-5-101
- IEC 60870-5-104 (KEMA certified)
- DNP3

Netcon 500 supports also multiple concurrent master station connections on different media and protocol if there is a need to connect several master stations to one outstation. Netcon 500 can also function as an intermediate concentrator stations for numerous small outstations and IEDs.

For the station level communication Netcon 500 supports for example following standards:
- IEC 61850-8-1
- IEC 60870-5-103
- DNP3

IEDs of various ages and protocols are connected to Netcon 500 over serial interfaces in multi-drop or in point-to-point star configuration.

**IEC 61850 Support**
Netcon 500 has full support for the emerging IEC 61850 standard. The implementation is open with proven multivendor interoperability. As Netcon 500 is capable to act as a communications gateway and a protocol converter, a 61850 substation can be connected to a control centre using any standard protocol, like IEC-104.

IEC 61850 key advantages are:
- Simpler substation structure: IEC 61850 offers a single, uniform method to integrate Intelligent Electronic Devices (IED), like protection relays
- Enhanced engineering, implementation, operation and service. Savings on time and costs on configuration, commissioning and maintenance.
- Reduction of wiring costs: IEC 61850 replaces wiring between feeders, control switches, and signaling devices.
- Increased reliability: A single, real time communication channel for all data – using standard Ethernet as the medium for communications.