Serial and Ethernet communication
Modems and switches
Dear Madam and Sir,

The new product catalog for modems and switches provides you with an overview of our product portfolio for serial and Ethernet communication. The areas of application include the utility networks in the sectors of electricity, gas, water, district heating, as well as industry, railways and infrastructure.

In the field of serial communication, our portfolio contains single and multi-channel AC telegraphy modems (FSK principle) for point-to-point, point-to-multipoint and multi-drop topologies with 2/4-wire connection for connecting remote control technology and meters among other things or the remote connection of other terminals.

Managed and unmanaged switches are available for Ethernet communication. DSL technology and the tunneling ability of serial protocols make it possible to switch directly from serial voice frequency telegraphy (VFT) transfer to Ethernet communication while retaining the existing copper wires and without adapting the serial terminals, such as remote control technology. To increase the availability, functions such as the Rapid Spanning Tree Protocol (RSTP), redundant line communication (e.g. in an UMTS or Tetra modem) and the use of optical communication lines are available.

The individual communication products are available as DIN rail devices as well as plug-in modules for the rack. Extensive accessories of power supplies, various racks up to line transformers complete the communications solution.

Profit from more than 40 years of experience that ABB has gained in the field of remote control and automation technology. This experience makes us a reliable and powerful partner - worldwide. With a global company presence and local contacts, not only are we close to our customers wherever they are, but we are also quick in service and support thanks to shorter distances.

For further information, please contact our specialists or send us an e-mail at rtu-sales-support@de.abb.com.

We look forward to a fruitful cooperation,

Dr. Ditmar Heinz
Global business manager

Sigbert Reimann
Global RTU product manager
Serial communication
Reliable products for analog data transmission in SCADA applications

Serial modems
In the field of serial communication, the portfolio contains single and multi-channel telegraphy modems (FSK principle) for point-to-point, point-to-multipoint and multi-drop topologies with 2/4-wire connection for connecting remote control technology and meters among other IEDs or the remote connection of other devices.
DIN rail modules as well as rack plug-in modules are available.
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Serial communication
Reliable products for analog data transmission in SCADA applications

**Highlights**
- Point-to-point, multipoint and multi-drop topologies with up to 10 remote stations
- For distances of up to 30 km with a cable diameter of 0.8 mm
- 2-wire and 4-wire connections
- Duplex and half-duplex operating mode
- Broadband or narrowband communication
- Transmission rates up to 9600 baud
- Multiple transmission channels (23WT25) with frequency and bandwidth proportion compliant with CCITT
- Plug-in modules with disconnect test sockets for diagnostics (e.g. listening) on the front of the device
- Plug-in modules with alarm relays for the failure indication of the carrier signal after 5 seconds

**Fields of application**
Serial data transmission via copper wires (e.g. telephone lines), radio relay or radio communications in the following sectors:
- Utility networks of electricity, gas, water and district heating
- Industry
- Railways
- Infrastructure
for the connection of remote control technology, meters or the remote connection of other devices.

**Your benefits**
- Reliable data transmission, even with very long cable connections, with or without coil loading
- Full transparency of the serial data signal without parameterization
- Use of multi-channel operation with 23WT25 plug-in module with limited availability of copper connections
- Use on lines with severely distorted lines: 23WT25 enables the use of a channel that does not have any fault
- DIN rail modules that are compatible with each other and rack plug-in modules are available in accordance with the scaling requirements and mounting conditions
Positioning of the serial communication solution

TCP/IP, e.g. IEC 60870-5-104

WAN (e.g. Tropos, SDH, PDH, DSL)

Substation

Control system

WAN (e.g. Tropos, GPRS/UMTS, DSL)

Substation

e.g. IEC 60870-5-101, Modbus
23WT23 – VFT modem in the voice band (300-2400 Hz) compliant with CCITT V.23

**Application**
The 23WT23 board is a serial telegraphy modem which transmits the data using the principle of binary frequency keying (FSK) with 1200 baud compliant with CCITT V.23.
The 23WT23 modem is available in two versions (rubrics):
- R0001: Supply voltage + 5 V DC
- R0002: Supply voltage + 24 V DC
The voice frequency (VF) outputs of the board can be switched to high impedance so an arrangement of up to 10 remote stations on a multi-drop line is possible.

**Description**
- VFT modem in the voice band (300-2400 Hz) compliant with CCITT V.23
- Coverage of up to 30 km with a cable diameter of 0.8 mm
- Duplex operation via 4-wire connection and half-duplex operation via 2/4-wire connection
- Point-to-point, multipoint and multi-drop topology with up to 10 remote stations
- Baud rate of 1200 baud
- Configurable by jumpers
- Disconnect test sockets for diagnostics (e.g. listening) on the front of the device
- Full transparency of the serial data signal without parameterization
- Alarm relay for indicating the fault of the carrier signal after 5 seconds
- Use in the racks 560MPR01, 560MPR03 and 560SFR02
- Board with high packing density in the rack for centralized solutions
- Option of a redundant power supply in the rack

23WT24 – VFT modem in the broadband range (300-22000 Hz)

**Application**
The 23WT24 board is a serial telegraphy modem which transmits the data using the principle of binary frequency keying (FSK) with 9600 baud.
The 23WT24 modem is available with a supply voltage of + 5 V DC.
The voice frequency (VF) outputs of the board can be switched to high impedance so an arrangement of up to 10 remote stations on a multi-drop line is possible.

**Description**
- VFT modem in the broadband range (300-22000 Hz)
- Point-to-point coverage up to 20 km and multi-drop line up to 10 km with a cable diameter of 0.8 mm
- Duplex operation via 4-wire connection and half-duplex operation via 2/4-wire connection
- Point-to-point, multipoint and multi-drop topology with up to 10 remote stations
- Baud rate of 9600 baud
- Configurable by jumpers
- Disconnect test sockets for diagnostics (e.g. listening) on the front of the device
- Full transparency of the serial data signal without parameterization
- Alarm relay for indicating the fault of the carrier signal after 5 seconds
- Use in the racks 560MPR01, 560MPR03 and 560SFR02
- Board with high packing density in the rack for centralized solutions
- Option of a redundant power supply in the rack
23WT25 – VFT multi-channel modem in the voice band (300-3400 Hz) compliant with CCITT

**Application**

23WT25 board is a serial multi-channel telegraphy modem which transmits the data using the principle of binary frequency keying (FSK) compliant with e.g. CCITT R.35 and FM 90.

The 23WT25 plug-in module is available in two versions (rubrics):
- R0001: Supply voltage + 5 V DC
- R0002: Supply voltage + 24 V DC

The voice frequency (VF) outputs of the board can be switched to high impedance so an arrangement of up to 10 remote stations on a multi-drop line is possible.

**Description**

- VFT multi-channel modem in the voice band (300-3400 Hz) compliant with CCITT
- Up to 24 channels for CCITT R.35
- Up to 32 channels for CCITT FM 90
- Further channel standards on demand
- Coverage of up to 30 km with a cable diameter of 0.8 mm
- Duplex and half-duplex operating mode via 2/4-wire connection
- Point-to-point, point-to-multipoint and multi-drop topology with up to 10 remote stations
- Baud rate up to 2400 baud depending on the number of channels, e.g. max. 50 baud per channel for 24 channels, or 2400 baud in single-channel operating mode
- Configurable by jumpers
- Digital signal processor (DSP) for the conversion of binary information to voice signals and vice-versa
- Disconnect test sockets for diagnostics (e.g. listening) on the front of the device
- Commissioning support by measuring and displaying the transmission quality
- Free choice of the transmission level per channel without mutual negative feedback from increasing the channel dampening
- Full transparency of the serial data signal without parameterization
- Alarm relay for indicating the fault of the carrier signal after 5 seconds
- Use in the racks 560MPR01, 560MPR03 and 560SFR02
- Board with high packing density in the rack for centralized solutions
- Option of a redundant power supply in the rack
Serial communication
DIN rail devices

560FSM10 – VFT modem in the voice band (300-2400 Hz) compliant with CCITT V.23
Application
The DIN rail device 560FSM10 is a serial telegraphy modem which transmits the data using the principle of binary frequency keying (FSK) compliant with CCITT V.23 with 1200 baud. 560FSM10 is functionally compatible with the 23WT23 modem (plug-in module for the rack) and can be operated as a compatible counterpart.

The voice frequency (VF) outputs of the module can be switched to high impedance so an arrangement of up to 10 remote stations on a multi-drop line is possible.

Description
- VFT modem in the voice band (300-2400 Hz) compliant with CCITT V.23
- Coverage of up to 30 km with a cable diameter of 0.8 mm
- Duplex operation via 4-wire connection and half-duplex operation via 2/4-wire connection
- Point-to-point, multipoint and multi-drop topology with up to 10 remote stations
- Baud rate of 1200 baud
- Configurable via DIP switches on the front of the device
- Full transparency of the serial data signal without parameterization
- Supply voltage: 24…60 V DC ±20%
- Simple and space-saving DIN rail mounting
- Functional compatibility with the 23WT23 plug-in module

560FSM11 – VFT modem in the broadband range (300-22000 Hz)
Application
The DIN rail device 560FSM11 is a serial telegraphy modem which transmits the data using the principle of binary frequency keying (FSK) with 9600 baud. 560FSM11 is functionally compatible with the 23WT24 modem (plug-in module for the rack) and can be operated as a compatible counterpart.

The voice frequency (VF) outputs of the module can be switched to high impedance so an arrangement of up to 10 remote stations on a multi-drop line is possible.

Description
- VFT modem in the broadband range (300-22000 Hz)
- Point-to-point coverage up to 20 km and multi-drop line up to 10 km with a cable diameter of 0.8 mm
- Duplex operation via 4-wire connection and half-duplex operation via 2/4-wire connection
- Point-to-point, point-to-multipoint and multi-drop topology with up to 10 remote stations
- Baud rate of 9600 baud
- Configurable via DIP switches on the front of the device
- Full transparency of the serial data signal without parameterization
- Supply voltage: 24…60 V DC ±20%
- Simple and space-saving DIN rail mounting
- Functional compatibility with the 23WT24 plug-in module
Serial communication
Application example

Application example of serial VFT communication

e.g. IEC 60870-5-101, Modbus, etc.

2/4-wire

Central system

Substation

Repeater

4-wire

e.g. IEC 60870-5-101, Modbus, etc.

Substation
Ethernet communication
Innovative products for Ethernet data transmission in SCADA applications

Managed and unmanaged switches are available for Ethernet communication. DSL technology and the tunneling ability of serial protocols make it possible to switch directly from traditional serial voice frequency telegraphy (VFT) transfer to Ethernet communication while retaining the existing copper wires and without adapting the serial terminals, such as the remote control technology. To increase availability, functions such as the Rapid Spanning Tree Protocol (RSTP), bypass circuitry (e.g. in an UMTS or Tetra modem) and the use of optical communication lines are available.
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Managed Ethernet switches

Highlights

- Connection via copper wires:
  - DSL coverage of up to 20 km, based on (S)HDSL
  - DSL connection via a 2-wire connection with a speed of 192 to 11400 kbps
  - Automatic speed adjustment depending on the line quality
  - Possibility of compatibility with other (S)HDSL modems via IEEE EFM (IEEE 802.3)
  - Monitoring/messaging on the DSL transmission quality (signal compared to noise level)
  - 560NMS24 offers the possibility of automatic line throughput in the event of a power outage

- Optical connection:
  - SFF slots for inserting SFP modules
  - Support of SFP modules for multimode and monomode optical fibre cables
  - Transmission speed of 100 Mbps
  - Coverage up to 40 km depending on the SFP module
  - Tunneling of serial protocols on up to two serial interfaces
  - Point-to-point, partyline and signal sampling
  - Different data rates per interface possible
  - 4 port 10/100 BaseT switch for the connection of devices (VLAN assignment possible)
  - Supported network topologies: Point-to-point, point-to-multipoint and ring
  - Redundant transmission routes via copper lines, optical fiber as well as bypass circuitry to an external TCP/IP modem (e.g. UMTS or Tetra)
  - Rapid Spanning Tree Protocol, link aggregation, VLAN, QoS, port mirroring, static and dynamic routing (RIP)
  - Repeater function
  - Transmission of system events of the switch via IEC 60870-5-101/104
  - Configurable alarm relay
  - Input/output of 2 binary signals per serial interface (external circuit necessary)
  - Configuration via RS232, simple network management protocol (SNMP), Telnet, secure shell (SSH), web interface with optional login via Radius server
  - Easy device swap via configuration flash drive
  - Suitable for harsh environmental conditions:
    - High electromagnetic compatibility (EMC) safety
    - -25... + 70 °C
    - Integrated overvoltage protection
    - Without fan or moving parts
  - Supply voltage: 24...60 V DC

Fields of application

Ethernet data transmission via copper wires (e.g. telephone lines) and optical fibers in the following areas:

- Utility networks of electricity, gas, water and district heating
- Industry
- Railways
- Infrastructure for the connection of remote control technology, meters or the remote connection of other devices.

Your benefits

- Easy to switch from traditional serial VFT transmission to Ethernet communication while retaining the existing copper lines and without adapting the serial devices, such as the remote control technology
- Ideal for use with IEC 60870-5-104 and -101 devices
- Support of copper and optical fiber lines
- Extensive redundancy options
- Independent network for private communication
- DIN rail modules that are compatible with each other and rack plug-in modules are available in accordance with the scaling requirements and mounting conditions
Unmanaged Ethernet switches

**Highlights**
- Unmanaged layer 2 switches with electrical and optical ports
- Electrical ports:
  - 10/100 BaseT with autonegotiation
  - RJ45 interface
  - Auto MDI(X)
- Optical ports:
  - SFF slots for inserting SFP modules
  - Support of SFP modules for multimode and monomode optical fibre cables
  - Transmission speed 100 Mbps
  - Coverage up to 40 km depending on the SFP module
- Supported network topologies: Point-to-point, point-to-multipoint and star without redundancy
- Transparent for QoS (Quality of Service) and VLAN
- Alarm relay, e.g. for the recognition of a line failure in the control system
- Suitable for harsh environmental conditions:
  - High EMC noise immunity
  - -25...+70 °C
  - Without fan or moving parts

**Fields of application**
Supplements the managed switch portfolio for the optical/electrical media conversion and port expansion.

**Your benefits**
- Ethernet overall solution based on a single product line
- Independent network for private communication
- Modules with high packing density in the rack for centralized solutions
- Enhanced availability due to the option of a redundant power supply in the rack solution

Positioning of the Ethernet communication solution
Ethernet communication
Application example of switches

General application example

- Control system
- RSTP Ring
- Redundant network
- Ethernet, e.g., IEC 60870-5-104, Modbus TCP/IP
- Single copper line
- Serial tunnel via Ethernet
- Copper wire
- Ethernet wire
- Optical connection
- IP telephone
- IP camera
- Service Laptop

Copper wire
Ethernet wire
Optical connection

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560NMS24 – Managed switch with 2 SDSL interfaces, 4 10/100 BaseT ports and an RS232 interface

Application
The 560NMS24 board is a managed layer-3 switch for redundant Ethernet data transmission over copper wires. Two 2-wire SDSL/WAN interfaces for maximum line lengths of up to 20 km (copper cable, 0.8 mm diameter) are available for this. Several subdevices (e.g. remote control technology, meters etc.) can be integrated via the 4 10/100 BaseT interfaces. Each terminal can be assigned its own VLAN channel. Serial terminals can be tunneled via Ethernet communication.

Description
- Layer-3 switch with VLAN routing
- 4 10/100 BaseT ports
- 2 SDSL/WAN interfaces for 2-wire copper cable, bandwidth of 192 kbit/s up to 11 Mbit/s
- RS232 interface for the tunneling of serial protocols
- Automatic line through-connection in the event of a power outage
- Alarm relay can be configured by software
- Use in the racks 560MPR01, 560MPR03 and 560SFR02
- Board with high packing density in the rack for centralized solutions
- Option of a redundant power supply in the rack
560NMS34 – Managed switch with an SDSL interface, 4 10/100 BaseT ports and an RS232 interface

**Application**
The 560NMS34 board is a managed layer-3 switch for Ethernet data transmission over a copper wire. For this purpose, a 2-wire SDSL/WAN interface for a maximum line length of up to 20 km (copper cable, 0.8 mm diameter) is available. Several subdevices (e.g. remote control technology, meters etc.) can be integrated via the 4 10/100 BaseT interfaces. Each terminal can be assigned its own VLAN channel. Serial terminals can be tunneled via Ethernet communication.

**Description**
- Layer-3 switch with VLAN routing
- 4 10/100 BaseT ports
- 1 SDSL/WAN interface for 2-wire copper cable, bandwidth of 192 kbit/s up to 11 Mbit/s
- RS232 interface for the tunneling of serial protocols
- Alarm relay can be configured by software
- Use in the racks 560MPR01, 560MPR03 and 560SFR02
- Board with high packing density in the rack for centralized solutions
- Option of a redundant power supply in the rack
560NMD01 – Managed switch with an SDSL interface, 4 10/100 BaseT ports and an RS232 interface

Application
The DIN rail device 560NMD01 is a managed layer-3 switch for Ethernet data transmission over a copper wire. For this purpose, a 2-wire SDSL/WAN interface for a maximum line length of up to 20 km (copper cable, 0.8 mm diameter) is available. Several subdevices (e.g. remote control technology, meters etc.) can be integrated via the 4 10/100 BaseT interfaces. Each device can be assigned its own VLAN channel. Serial terminals can be tunneled via Ethernet communication.

Description
- Layer-3 switch with VLAN routing
- 4 10/100 BaseT ports
- SDSL/WAN interface for 2-wire copper cable, bandwidth of 192 kbit/s up to 11 Mbit/s
- RS232 interface for the tunneling of serial protocols
- Interface for the exchange of configuration data
- Alarm relay can be configured by software
- Supply voltage: 24…60 V DC
- Simple and space-saving DIN rail mounting
- Functional compatibility with 560NMS34 plug-in module
500NMD02 – Managed switch with 2 SDSL interfaces, 4 10/100 BaseT ports and 2 RS232 interfaces

**Application**
The DIN rail device 500NMD02 is a managed layer-3 switch for redundant Ethernet data transmission over copper wires. Two 2-wire SDSL/WAN interfaces for maximum line lengths of up to 20 km (copper cable, 0.8 mm diameter) are available for this purpose.

Several subdevices (e.g. remote control technology, meters etc.) can be integrated via the 4 10/100 BaseT interfaces. Each device can be assigned its own VLAN channel. Serial terminals can be tunneled via Ethernet communication.

**Description**
- Layer-3 switch with VLAN routing
- 4 10/100 BaseT ports
- 2 SDSL/WAN interfaces for 2-wire copper cable, bandwidth of 192 kbit/s up to 11 Mbit/s
- 2 RS232 interfaces for the tunneling of serial protocols
- Interface for the exchange of configuration data
- Alarm relay can be configured by software
- Supply voltage: 24…60 V DC
- Simple and space-saving DIN rail mounting
- Functional compatibility with 560NMS24 plug-in module
Ethernet communication
Managed switches – DIN rail devices

560NMD11 – Managed switch with an SDSL interface, an SFF slot, 4 10/100 BaseT ports and 2 RS232 interfaces

Application
The DIN rail device 560NMD11 is a managed layer-3 switch for redundant Ethernet data transmission over a copper wire or an optical connection. A 2-wire SDSL/WAN interface for maximum line lengths of up to 20 km (copper cable, 0.8 mm diameter) and an SFF slot for the use of SFP modules are available for this. Multiple subdevices (e.g. remote control technology, meters etc.) can be integrated via the 4 10/100 BaseT interfaces. Each device can be assigned its own VLAN channel. Serial terminals can be tunneled via Ethernet communication.

Description
− Layer-3 switch with VLAN routing
− 4 10/100 BaseT ports
− SDSL/WAN interface for 2-wire copper cable, bandwidth of 192 kbit/s up to 11 Mbit/s
− SFF slot, optical SFP module is additionally required (see 560NFOxx)
− 2 RS232 interfaces for the tunneling of serial protocols
− Interface for the exchange of configuration data
− Alarm relay can be configured by software
− Supply voltage: 24…60 V DC
− Simple and space-saving DIN rail mounting
SFP modules (small form-factor pluggable) for 560NMD11 for monomode and multimode fibers

- 560NFO13
  - Monomode, maximum 15 km
  - Connection: LC/PC duplex
- 560NFO15
  - Monomode, maximum 40 km
  - Connection: LC/PC duplex
- 560NFO85
  - Multimode, maximum 2 km
  - Connection: LC/PC duplex

Configuration adapter for 5x0NMDxx

560NMA01

- Saving or transmitting the configuration of a DIN rail device
- Enables quick device replacement without the use of a computer

560NFO13, 1KHW001893R0001
560NFO15, 1KHW001894R0001
560NFO85, 1KHW001895R0001
560NMA01, 1KHW027870R0001
560NUS04 – Unmanaged switch with 4 10/100 BaseT ports

**Application**
The 560NUS04 board is an unmanaged layer-3 switch for the port extension of the managed switch portfolio. Several subdevices (e.g. remote control technology, meters etc.) can be integrated via the 4 10/100 BaseT interfaces.

**Description**
- Layer-2 switch
- 4 10/100 BaseT ports
- Alarm relay
- Plug and play – no configuration required
- Use in the racks 560MPR01, 560MPR03 and 560SFR02
- Board with high packing density in the rack for centralized solutions
- Option of a redundant power supply in the rack
560NUS12 – Unmanaged switch with 2 10/100 BaseT ports and 2 SFF slots

**Application**
The 560NUS12 board is an unmanaged Layer-2 switch for the optical/electrical media conversion of the managed switch portfolio. Several devices can be integrated via 2 10/100 BaseT interfaces. 2 SFF slots for the use of SFP modules are available for optical/electrical media conversion.

**Description**
- Layer-2 switch
- 2 ports 10/100 BaseT
- 2 SFF slots, optical SFP modules are required in addition (see 560NFOxx)
- Alarm relay
- Plug and play – no configuration required
- Use in the racks 560MPR01, 560MPR03 and 560SFR02
- Board with high packing density in the rack for centralized solutions
- Option of a redundant power supply in the rack

**SFP modules (small form-factor pluggable) for 560NUS12, for monomode and multimode fibers**
- 560NFO13
  - Monomode, maximum 15 km
  - Connection: LC/PC duplex
- 560NFO15
  - Monomode, maximum 40 km
  - Connection: LC/PC duplex
- 560NFO85
  - Multimode, maximum 2 km
  - Connection: LC/PC duplex

560NFO13, 1KHW001893R0001
560NFO15, 1KHW001894R0001
560NFO85, 1KHW001895R0001
Ethernet communication
Application example – Single line copper connection

Description
- 560NMS34/560NMD01 usage with a DSL interface at the beginning (first node) and at the end (last node) of the single line. To connect nodes/stations within the wiring section, a 560NMS24/500NMD02 with two DSL interfaces is required.
- As no alternative route is usually available on site via an additional optical fibre route, an Ethernet modem (Tetra, LTE etc.) can be connected as an alternative route via 560NMSxx/5x0NMDxx.
- Using 560NMS24 offers the possibility of automatic line through-connection in the event of a power outage within the station. This means that other non-affected nodes/stations can still be reached.
- An own VLAN-channel with bandwidth assignment and priority (QoS) can be assigned to terminals. For remote configuration and the transmission of status messages, another VLAN channel can be assigned to the managed switch. Alternatively, status messages of the managed switches can be transmitted to the control system via IEC 60870-5-104/-101.
- Possibility of the tunneling of serial devices.
Description

- At the branching point of two single lines, 560NMS24/500NMD02 with two DSL interfaces must be used.
- 560NMS34/560NMD01 usage with a DSL interface at the end (last node) of the respective single line. To connect nodes/stations within the wiring section, a 560NMS24/500NMD02 with two DSL interfaces is required.
- As no alternative route is usually available on site via an additional optical fibre route, an Ethernet modem (Tetra, LTE etc.) can be connected as an alternative route via 560NMSxx/5x0NMDxx.
- Using 560NMS24 offers the possibility of automatic line through-connection in the event of a power outage within the station. This means that other non-affected nodes/stations can still be reached.
- A separate VLAN-channel with bandwidth assignment and priority (QoS) can be assigned to devices. For remote configuration and the transmission of status messages, another VLAN channel can be assigned to the managed switch. Alternatively, status messages of the managed switches can be transmitted to the control system via IEC 60870-5-104/-101.
- Possibility of the tunneling of serial devices.
Ethernet communication
Application example – Mixed copper/optical fibre ring

Description

- Due to the ring structure and the support of Rapid Spanning Tree Protocol (RSTP), communication to all stations is ensured even if part of the communication is interrupted.
- 560NMS24/500NMD02 with two DSL interfaces must be used for stations with two copper wires.
- For stations with a copper wire and an optical fibre connection, 560NMS24 in conjunction with 560NUS12 must be used as optical/electrical media converters. As an alternative, the 560NMD11 DIN rail variant is available.
- In addition, an Ethernet modem (Tetra, LTE, etc.) can be connected as an (additional) alternative route via 560NMSx/5x0NMDxx.
- Using 560NMS24 offers the possibility of automatic line through-connection in the event of a power outage within the station. This means that other non-affected nodes/stations can still be reached.
- A separate VLAN-channel with bandwidth assignment and priority (QoS) can be assigned to devices. For remote configuration and the transmission of status messages, another VLAN channel can be assigned to the managed switch. Alternatively, status messages of the managed switches can be transmitted to the control system via IEC 60870-5-104/-101.
- Possibility of the tunneling of serial devices.
Ethernet communication
Application example – Simple optical fibre ring with unmanaged switches

Description
- The unmanaged switches 560NUS12 with two optical interfaces must be used for the stations within the optical ring.
- The managed switches 560NMS34/560NMD01 must be used for the management of the optical ring and the connection to the control system.
- The stations within the optical ring can be addressed in two different ways by the control system. This ensures redundancy in the communication. The line interruption of an optical fibre route can be issued on the alarm relay of the plug-in module 560NUS12.
Meshed copper/optical fibre rings

Description

- Due to the ring structure and the support of Rapid Spanning Tree Protocol (RSTP), communication to all stations is ensured even if part of the circuit piece is interrupted.
- In this arrangement, the auxiliary rings can support the communication of the main ring, even if a part communication in the main ring is interrupted.
- 560NMS24/500NMD02 with two DSL interfaces must be used for stations with two copper wires.
- For stations with a copper wire and an optical fibre connection, 560NMS24 in conjunction with 560NUS12 must be used as optical/electrical media converters. As an alternative, the 560NMD11 DIN rail is available.
- For stations with two optical fibre connections, 560NMS24 in conjunction with 560NUS12 must be used as optical/electrical media converters.
- In addition, an Ethernet modem (Tetra, LTE, etc.) can be connected as an (additional) alternative route via 560NMSxx/5x0NMDxx.
- The use of 560NMS24 offers the possibility of the automatic line through-connection in the event of a power outage within the station. This means that other non-affected nodes/stations can still be reached.
- A separate VLAN-channel with bandwidth assignment and priority (QoS) can be assigned to devices. For remote configuration and the transmission of status messages, another VPN channel can be assigned to the managed switch. Alternatively, status messages of the managed switches can be transmitted to the control system via IEC 60870-5-104/-101.
- Possibility of the tunneling of serial devices.
**Ethernet communication**

**Application example – Migration from serial to Ethernet communication**

**Description**

- **Situation prior to the migration:** Stations are serially (e.g. via VFT modems) connected with a control system over copper wires, e.g. in partyline.

- **Transitional phase:** The serial modems are replaced by 560NMSxx or 5x0NMDxx. The configuration of the devices/control system concerning the serial communication is retained as the serial protocol is tunneled over the DSL route. A subsequent upgrade of the devices to the Ethernet protocol can be carried out and a new control system with Ethernet protocol support, for example, can be set up in addition to the existing control system. Thus, both control systems can be operated in parallel over a DSL Ethernet connection. New stations (e.g. station 4) can be added at any time.

- **Final situation:** The original control system and the serial communication can be restored if required.

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[Diagram showing the migration process from serial to Ethernet communication]

**Prior to migration**

- **Control system**
  - z.B. IEC 60870-5-101

- **Stations**
  - Station 1
  - Station 2
  - Station 3

- **Connections**
  - RS 232
  - RJ 45

**After migration**

- **Control system**
  - z.B. IEC 60870-5-101
  - z.B. IEC 60870-5-104

- **New control system**

- **Stations**
  - Station 1
  - Station 2
  - Station 3
  - Station 4

- **Connections**
  - RS 232
  - RJ 45

**Migration from serial to Ethernet communication**

_Copper wire_ | _Ethnic wire_
Serial and Ethernet communication

Accessories

Accessories for rack assembly
- Rack 560MPR01 4/2
- Rack 560MPR03 4/3
- Rack 560SFR02 4/4
- Further accessories for rack assembly 4/5
- Power supply unit 560PSR00 4/6
- Power supply unit 560PSU01 4/7
- Power supply unit 560PSU02 4/7

Accessories for DIN rail mounting
- Power supply unit 560PSU40 4/8
- Power supply unit 560PSU41 4/8
- Power supply unit 23VG23 4/9
- Power supply unit 23VG24 4/9

Accessories for serial communication
- Line transformer 25LU40 4/10
- Line transformer 560LTD00 4/11
Accessories – Rack assembly

Rack 560MPR01

560MPR01 – Rack for mounting panel, short, 9 slots

Application
The 560MPR01 rack is designed for up to 9 periphery modules.

Description
- Mounting panel rack
- Max. 9 slots for peripheral modules
- 23XS20 not included

Additional material

Process connectors 2/17/19-pole

- 19-pole process connector with screw-type clamping units
  AWG12 for process wiring of the I/O modules 560MPR01 and
  560MPR03 (one connector per module); 100 pcs. per packaging
  unit
  23XS20 R0019
- 17-pole process connector with screw-type clamping units
  AWG12 for process wiring of the I/O modules 560MPR01 and
  560MPR03 (one connector per module); 100 pcs. per packaging
  unit
  23XS20 R0017
- 2-pole process connector with screw-type clamping units
  AWG12 for process wiring of the 560MPR01 and 560MPR03; 100
  pcs. per packaging unit
  23XS20 R0002

Cover front plate

- Light beige color, plastic
- Front plate for covering free slots in a rack (1 slot, handle with
  ABB logo)
- Incl. screws
- 100 pcs. per packaging unit

560MPR01 – Rack assembly

Rack 560MPR01

23XS20 R0019, 1KGN000556R0019
23XS20 R0017, 1KGN000556R0017
23XS20 R0002, 1KGN000556R0002

23VF21 R0001, 1KGT007900R0001
Accessories – Rack assembly

Rack 560MPR03

560MPR03 – Rack for the mounting panel, optionally for redundant power supply units

Application

The rack 560MPR03 is intended for use with or without redundant power supply. For this purpose, there are 2 slots for redundant power supply units (PSU) and 17 slots for the use of peripheral modules. The second PSU can only be used and operated as a redundant power supply unit in slot 19. Slot 18 is freely available if the option of a second PSU is not used.

Description

- The rack 560MPR03 is intended for mounting on a panel in the cabinet
- 23XS20 not included

Additional material

Process connectors 2/17/19-pole

23XS20 R0019
- 19-pole process connector with screw-type clamping units AWG12 for process wiring of the I/O modules 560MPR01 and 560MPR03 (one connector per module); 100 pcs. per packaging unit

23XS20 R0017
- 17-pole process connector with screw-type clamping units AWG12 for process wiring of the I/O modules 560MPR01 and 560MPR03 (one connector per module); 100 pcs. per packaging unit

23XS20 R0002
- 2-pole process connector with screw-type clamping units AWG12 for process wiring of the 560MPR01 and 560MPR03; 100 pcs. per packaging unit

Cover front plate

23VF21 R0001
- Light beige color, plastic
- Front plate for covering free slots in a rack (1 slot, handle with ABB logo)
- Incl. screws
- 100 pcs. per packaging unit
Accessories – Rack assembly

Rack 560SFR02

560SFR02 – Rack for swing frame mounting, optionally for redundant power supply units

Application
The rack 560SFR02 is intended for use with or without redundant power supply. For this purpose, there are 2 slots for redundant power supply units (PSU) and 17 slots for peripheral devices. The second PSU can only be used and operated as a redundant power supply unit in slot 19. Slot 18 is freely available if the option of a second PSU is not used.

Description
- The rack 560SFR02 is intended for mounting in the swing frame
- 23XS40 not included

Additional material
Process connector housing
23XS40 R1001
- 18-pole connector housing for 560SFR02
  (only housing, without contact pins)
- 100 pcs. per packaging unit

Snap-in contacts for 23XS40 R1001
23XS40 R2001
- Snap-in contacts for 23XS40 R1001 (18 snap-in contacts necessary per connector housing)
- 500 pcs. per packaging unit
Crimp tool for 23XS40 R2001
23XS41 R0001
– Tool to connect wires to snap-in contacts (23XS40 R2001)

Removal tool for snap-in contacts
23XS42 R0001
– Tool to extract the snap-in contacts (23XS40 R2001)

Removal tool for process connector housing 23XS40 R1001
23XS43 R0001
– Tool to remove the connector housing (23XS40 R1001) from rack 560SFR02

Blanking front plate
23VF21 R0001
– Light beige color, plastic
– Blanking front plate to cover free slots within a rack
  (1 slot, handle with ABB logo)
– Incl. screws
– 100 pcs. per packaging unit
Accessories – Rack assembly

Power supply unit 560PSR00

The power supply unit 560PSR00 supplies both supply voltages (5 V DC and 24 V DC) for racks 560SFR02 and 560MPR03. For projects with high reliability requirements there is the possibility of projecting a redundant voltage supply. Two 560PSR00 work in parallel operation in this configuration. They are able to take over the load if a supply unit fails. In parallel operation, only power supply units of the same type and the same category can be used.

The power supply unit 560PSR00 is available in the following version (category):
- R0001: Range 24...60 V DC (-20...+15%)

560PSR00 – Power supply unit 24...60 V DC, 44.3 W

Application

Description

Power supply unit for racks
- Input voltage: 24...60 V DC
- Output voltage: 5 and 24 V DC
- Suitable for redundant voltage supply in 560MPR03/560SFR02
Accessories – Rack assembly
Power supply units 560PSU01 and 560PSU02

560PSU01 – Power supply unit 110...220 V DC, 44.3 W

Application
The power supply unit 560PSU01 supplies both supply voltages (5 V DC and 24 V DC) for the plug-in modules in the racks 560SFR02 and 560MPR03.

For projects with high reliability requirements there is the possibility of projecting redundant power supply units. In this configuration, two 560PSU01 work in parallel operation. Each power supply unit is able to take over the total load if one power supply unit fails.

The power supply unit 560PSU01 is available in the following version (category):
- R0002: Input voltage 110...220 V DC (-20...+ 15 %)

Description
Power supply unit for racks
- Input voltage: 110...220 V DC
- Output voltage: 5 and 24 V DC
- Suitable for redundant voltage supply in 560MPR03/560SFR02

560PSU02 – Power supply unit 48...220 V DC, 85 W

Application
The power supply unit 560PSU02 supplies both supply voltages (5 V DC and 24 V DC) for the plug-in modules in the racks 560SFR02 and 560MPR03.

For projects with high reliability requirements there is the possibility of projecting redundant power supply units. In this configuration, two 560PSU02 power supply units work in parallel operation. Each power supply unit is able to take over the total load if one power supply unit fails.

The power supply unit 560PSU02 is available in the following version (category):
- R0001: Input range 48...220 V DC (-20...+ 15 %)

Description
Power supply unit for racks
- Input voltage: 48...220 V DC
- Output voltage: 5 and 24 V DC
- Suitable for redundant voltage supply in 560MPR03/560SFR02
Accessories – DIN rail mounting
Power supply units 560PSU40 and 560PSU41

560PSU40 – Power supply unit for the DIN rail 110...220 V DC, 230 V AC
Application
The power supply unit 560PSU40 is a galvanically insulated power supply unit for DIN rail mounting. It is designed to supply the DIN rail modules.
In order to increase availability, 2 power supply units can be used in parallel. External decoupling diodes are not required.

Description
Power supply unit for the DIN rail:
– Input voltage: 85...264 V AC / 85...375 V DC
– Output voltage: 24 V DC, max. 2.5 A, 60 W
– Supplies up to 8 rail modules

560PSU41 – Power supply unit for the DIN rail 24...60 V DC
Application
The power supply unit 560PSU41 is a galvanically insulated power supply unit for DIN rail mounting. It is designed to supply the DIN rail modules.

Description
Power supply unit for the DIN rail:
– Input voltage: 24...60 V DC
– Output voltage: 24 V DC, max. 2.5 A, 60 W
– Supplies up to 8 DIN rail modules
Accessories – DIN rail mounting
Power supply units 23VG23 and 23VG24

23VG23 – Power supply unit 115...230 V AC -> 24 V DC, 48 W
Application
The mains adapter 23VG23 is an AC/DC converter for use as an uninterruptible power system (UPS) in connection with an external backup battery. It has a wide-supply power range without change-over for input voltages of 92 to 265 V AC. The device supplies an output voltage of 24 V DC with an output current of min. 0.2 A and max. 2 A.

Description
Mains adapter as an AC/DC converter for 230 or 115 V AC rated voltage and 24 V DC output voltage, max. 2 A.
– Use of a 24 V DC backup battery rated for a maximum of 1.5 hours of full load operation
– Charging current: Max. 0.35 A

23VG24 – Power supply unit 115...230 V AC -> 24 V DC, 240 W
Application
The mains adapter 23VG24 is an AC/DC converter for an input AC voltage of 115 or 230 V AC. It supplies an output voltage of 24 V DC with an output current of max. 10 A. It can be used for supplying the racks as well as the peripheral modules with an output power of approx. 240 W.

Description
Mains adapter as an AC/DC converter for 230 or 115 V AC rated voltage and 24 V DC output voltage, max. 10 A.
25LU40 – Line transformer 600Ω/600Ω + lightning protection

**Application**
The low-frequency line transformer 25LU40 can be mounted on the DIN rail and is used for the isolation of the telegraphy modem voice frequency telegraphy (VFT) from the communication route and for the protection of the devices against high voltage disturbances.

Here, the 25LU40 works with very low transmission losses in the frequency range of 300 to 3400 Hz suitable for line impedances of 600 Ohm and the ABB modems 23WT23, 23WT25 and 560FSM10. The test voltage is 2.5 kV at 50 Hz. Protection is ensured by an integrated spark gap, fuses and a 10 kA conductor.

A high impedance distribution is possible for multiple point-to-point and for multi-drop connections as the line transformer does not pose an additional load on the communication line.

**Description**
- Isolated line transformer
- Lightning protection 7.5 kV
- Test voltage 2.5 kV at 50 Hz
- Input and output values: 600/600 Ohm
- Overvoltage protection and/or isolation of communication lines
- DIN rail mounting
Accessories – Serial modems
Line transformer 560LTD00

560LTD00 – Line transformer 150/150 Ω, 7.5 kV

**Application**
The line transformer 560LTD00 serves the protection and the isolation of the telegraphy modem (VFT) 23WT24 and 560FSM11, with transmission rates of 9600 baud with respect to the communication route. Furthermore, the line transformer can also be used with other communication equipment. It works in a frequency band of 2 kHz to 50 kHz and is designed for a line impedance of 150 Ohm in accordance with the 23WT24/560FSM11.

A high impedance distribution is possible for multi-drop connections as the line transformer does not pose an additional load on the communication line. Two line transformers are required for full-duplex connections and one transformer for the transmission and received direction respectively.

**Description**
- Isolated line transformer
- Test voltage: 7.5 kV at 50 Hz/10 s
- Input and output values: 150/150 Ω
- Suitable for the frequency range of 2 kHz to 50 kHz (23WT24 and 560FSM11)
- Transmission ratio 1:1
- Insulation resistance: 10000 M Ohm at 500 V between winding and housing
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