

ABB 500NMD20 Switch datasheet

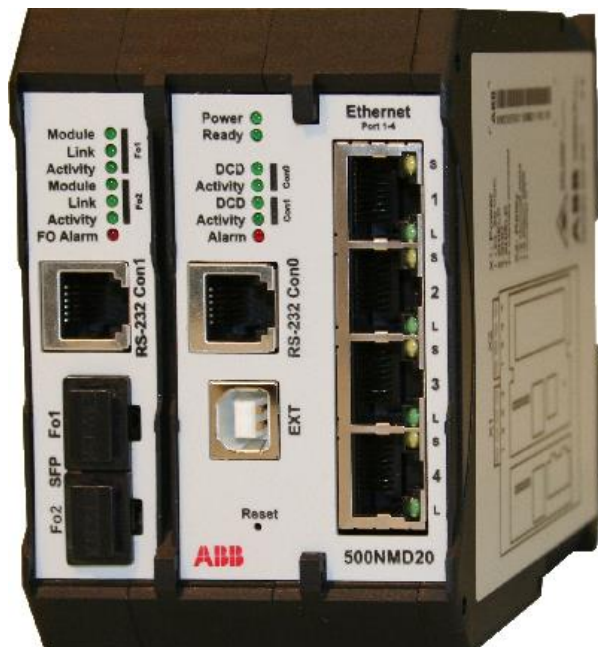
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The DIN-rail mountable 500NMD20 is a managed plug and play layer-2 switch providing four Fast Ethernet auto-negotiating RJ45-ports with auto MDI/X (Automatic Crossover Detection and Correction) and two SFP (small form-factor pluggable) module slots for use with fibre optictransceivers. Depending on the SFP module equipped, the unit is able to span distances by fibre optic cable up to 40 km (or even more with special SFP modules). The switch is able to provide redundant topologies by the (Rapid) Spanning Tree Protocol.

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Switch 500NMD20



Application

The DIN-rail mountable 500NMD20 is a managed plug and play layer-2 switch providing four Fast Ethernet auto-negotiating RJ45-ports with auto MDI/X (Automatic Crossover Detection and Correction) and two SFP (small form-factor pluggable) module slots for use with fibre optic

transceivers. Depending on the SFP module equipped, the unit is able to span distances by fibre optic cable up to 40 km (or even more with special SFP modules). The switch is able to provide redundant topologies by the (Rapid) Spanning Tree Protocol.

For documentation purposes, the Ethernet ports are labeled from 1 to 4. There is no specific uplink port. All ports are equal in function. Link and speed status of each Ethernet port are displayed by status indicators on the right side (refer to Connectors and Indicators). SFP related indicators are positioned on the left side.

The switch learns Ethernet addresses by analyzing received frames and stores them in a lookup-table (max. 2048 entries), which is used to forward frames only to the correct port. If it is a broad- or multicast address or if the target address is not found in the lookup-table, a received frame is forwarded to all ports except the receiving one. If an entry in the lookup-table is not refreshed by an incoming frame with the specific source address, it is aged out within a maximum of 304 seconds (by default, value is configurable).

Regarding IEEE 802.1Q VLAN frames, the switch can be configured to VLAN or transparent mode. In transparent mode the switch will never change any frame or TAG of a frame; in VLAN mode it can be configured to support several applications like trunk or access ports.

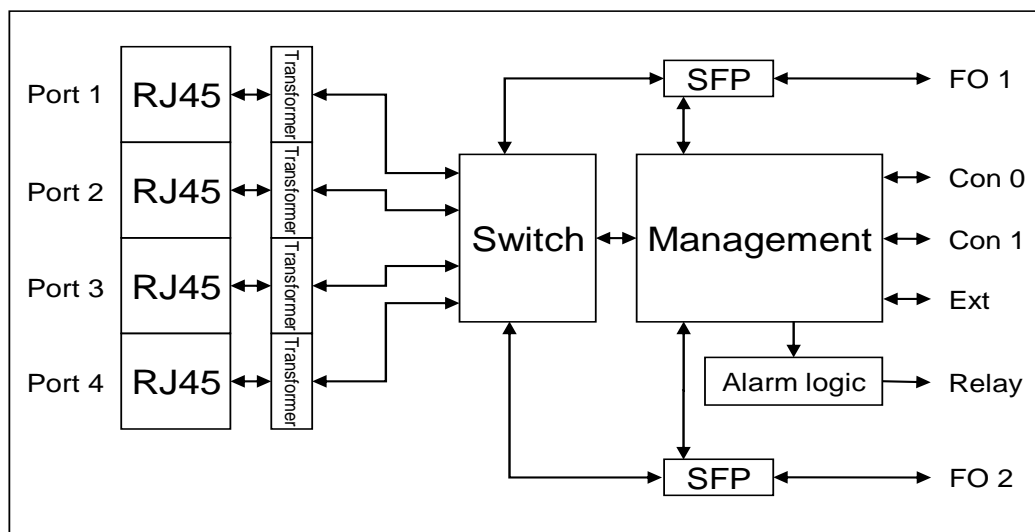


Fig. 1: Block diagram of 500NMD20

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Quality-of-Service is supported by the switch if an IEEE 802.1p compliant frame format is used. The switch can separate frames into up to four queues, which can be configured to priority based or weighted-fair queuing.

The 500NMD20 uses a wide range power supply and works with a voltage from 24 to 60 V.

The component itself, the Ethernet ports as well as the RS-232 interfaces, the SFP transceiver and the extension bus interface (Ext) are hot-plug capable.

Connectors & Indicators

The 500NMD20 switch consists of four equal RJ45 Ethernet ports, one SFP transceiver slot and two RS232 interfaces for configuration and tunneling of serial data. Each RJ45 port can be connected with a Cat. 3 (for 10 Mbps) or Cat. 5 (for 100 Mbps) Ethernet cable with a maximum length of 100 meters. The cable should only be used for in-house connections. Since Auto MDI/X is supported by the 500NMD20 switch for the RJ45 ports, there is no need for crossover cables.

The status of the interfaces can be monitored by two LED indicators. For the Ethernet ports these are located at each above and below RJ45 jack.

Ethernet (RJ45)

A green Link LED (labeled L) indicates an active Ethernet connection. Activity status:

Off No connection
On Ethernet connection established (Link)
Flashing Ethernet activity (transmission or reception of frames)

A yellow Speed LED (labeled S) indicates a 100 Mbps connection.

Speed status:

Off Ethernet speed of 10 Mbps
On Ethernet speed of 100 Mbps

RS-232 (RJ12)

The RS-232 interfaces can be monitored by the LEDs DCD and Activity. States of DCD:

Off DCD signal not active
On DCD signal active

Activity status:

Off No data send or received
On Data is being send or received

Fibre Optic (SFP)

For the SFP interface four indicators can be monitored. The LEDs Module and Alarm define the state of the SFP slot. States of Module:

Off Module not inserted
On Module inserted

Alarm status (Fo1, left side):

Off No module dependent alarm active
On Alarm relating to module active

The SFP Alarm is always active if the interface Fo1 is enabled but no transceiver is inserted in the SFP slot.

The link and data transmission state can be monitored through the green LEDs labeled Activity and Link

Link status:

Off No connection through SFP established
On Link through SFP established

Activity status:

Off No activity
Flashing SFP activity (transmission or reception of frames).

General

Two additional LEDs labeled Power and Ready determine the state of the device itself.

Power status:

Off Device has no power
On Device power is connected

Ready status:

Off Device is not operational
On Device is operational

Detected errors are signaled by a red Error LED (labeled Alarm, right side) together with an Alarm condition. The alarm condition can also be signaled by an isolated alarm relay.

The conditions that lead to an alarm state can be configured.

An extension jack labeled (Ext) allows connection of additional hardware, e.g. a portable configuration stick for external storage of configuration data.

Topology

The 500NMD20 provides a total of six ports for use with end devices, switches, bridges, hubs and routers. While the 500NMD20 provides a dual unit ethernet-to-fibre conversion, the switches 560NMD01 or 500NMD02 may be used for copper only applications. For dsl-to-fibre application

the switch 560NMD11 may be used. Star, ring or line topologies can easily be built by this family of switches.

Redundant topologies are automatically detected and handled by the Rapid Spanning Tree Protocol (RSTP). This is fully backward compatible with the wide-spread Spanning Tree Protocol (STP).

If less than two SFP are needed any of the SFP slots may be left unused.

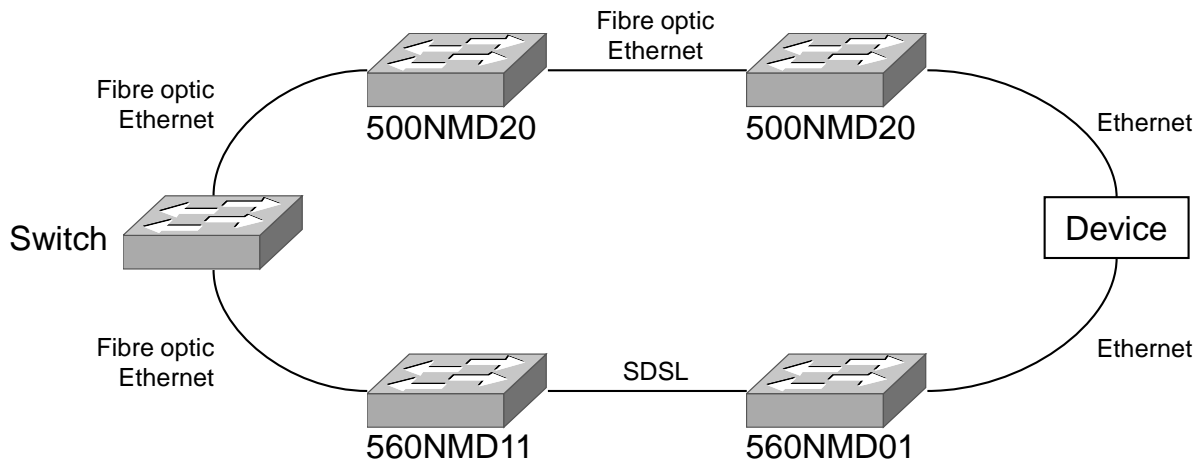


Fig. 2: Typical topology for use with 500NMD20

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Management and Configuration

Management and configuration of the 500NMD20 can be performed by Telnet, Secure Shell (SSH), SNMP, RS232 or web interface. All methods can be used to either read or write parameters of the device.

Additionally the interface and alarm state of the device can be monitored by IEC 60870-5-101 or -104.

An existing configuration can be saved as well as restored. The configuration can also be stored to an external configuration stick (560NMA01), which supports the simple exchange of a device without trained personnel.

By default, the IP address for the configuration of a 500NMD20 switch is 10.0.0.2 with a subnet mask of 255.0.0.0 and a gateway of 10.0.0.1. Reset to default values could be done via RS232 interface, while press 'i' during startup process.. Connections for configuration purposes are accepted through any interface. All Ethernet ports are administratively up in default state.

The default setting for the RS-232 interfaces are baudrate 57600, 8 databits, no parity, 1 stopbit (57600, 8N1). The command line interpreter for configuration via this interface can be accessed by any terminal software (e.g. Hyperterminal).

Ports

All ports of the device can be disabled or enabled by configuration. Furthermore, the speed and duplex setting of any Ethernet port can be set to 10 or 100 Mbps, Full or Half duplex. It is also possible to use an auto-detect setting.

The SFP port for use with fibre optic transceivers always works in 100 Mbps mode, Full or Half duplex. The parameters of the SFP (e.g. type, wavelength, range, receive power, ...) may be read and monitored by the switch 500NMD20.

Ports connected to a RTU from RTU500 series should be configured with auto detect.

The switch 500NMD20 supports various advanced functions like port mirroring, port rate limiting and quality-of-service (QoS).

All ports are equipped with frame counters, which are readable by management software.

Alerts, Notifications and Logging

The 500NMD20 provides Syslog and SNMP capabilities to send alerts and notifications to one or more predefined destinations. There is also a relay for configurable out-of-band alerts.

For each Syslog server entry a severity can be entered to filter outgoing messages.

A system log stores critical messages. The log implements a timestamp either by uptime, or date and time if a time server is configured.

For Syslog and local logging, a SNTP time server can be used to synchronize clocks and to enable the generation of date and time timestamps instead of uptime referencing messages.

Redundancy Support

The redundancy protocols Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP) are fully supported. Without configuration, RSTP is enabled for all ports. Switching from RSTP to STP is done automatically to ensure the compatibility to existing STP installations.

For every port, the (R)STP parameters can be configured separately. This includes port priority for root bridge control as well as point-to-point and edge connection settings. A global bridge priority is also settable.

Authentication

Access to the Telnet and SSH interface of the 500NMD20 is controlled by a two-level password protection. The first level enables the user to access parameters in read-only mode and has to be entered as soon as a connection is established. To read and write parameters, the device has to be put in a configuration mode that requires an additional password. Optionally the passwords can be disabled. Some security sensitive information, such as the configuration file, is not available in read-only mode.

Besides the two-level password protection, users may be authenticated by a standard RADIUS server.

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Technical Data

In addition to the RTU500 series general technical data, the following applies:

Power

Operating Voltage	24-60 VDC \pm 20%
Power Consumption	Typ. 10.00 W, max. 13.00 W (All ports active)

Alarm

Status Indicator	Red LED, Label: Alarm
Relay Contact	Isolated change over contact
Relay, max. switching voltage / current	60 VDC (SELV), max. 0,5 A

Mechanical Layout

Abmessungen	115 x 68 x 120 (H x W x D)
Montage	35 mm DIN-rail
Gewicht	approx. 325 g

Connection Type

Power / Alarm	via Connector
Connector Power	Phoenix Contact Type MSTBT 2,5/4-ST BK Order-No. 1893313
Connector Alarm	Phoenix Contact Type MSTBT 2,5/4-ST BK Order-No. 1893313

Environment

Operating Temperature	-25...70 °C
rel. Humidity	5...95 % (non-condensing)

Electromagnetic Compatibility

Radio Interference Power supply Field strength	IEC 55011 Class A Class A
Electrostatic Discharge 8 kV Air, 6 kV Contact	IEC 61000-4-2 Criteria A
Electromagnetic Field Immunity 80 MHz to 3 GHz	IEC 61000-4-3 Criteria A
Surge & Burst Immunity Surge 4 kV, Power Supply Burst 4 kV, Power Supply	IEC 61000-4-4 und -5 Criteria A Criteria A
Conducted Disturb- ances Immunity 10 V, 0.15 MHz bis 80 MHz, 80% AM 1 kHz	IEC 61000-4-6 Criteria A
Mains Frequency Im- munity 300 V	IEC 61000-4-16 Criteria A
Oscillatory Wave Im- munity 2.5 kV	IEC 61000-4-18 Criteria A

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Ethernet

Connectors	4 x RJ-45
Status Indicators	Speed (10/100 Mbps): Amber LED Link/Activity: Green LED
Cable Type (RJ-45)	EIA/TIA Category 3 or ISO/IEC Class C cable or better for 10 Mbps EIA/TIA Category 5 or ISO/IEC Class D cable or better for 100 Mbps
Max. Cable Length	100 m for RJ45, for optical connection refer to SFP Module Data
Protocol	Fast-Ethernet according to IEEE 802.3-2005 Cl. 25 and IEEE 802.3u-1995 Ethernet according to IEEE 802.3-2005 Cl. 14 Auto-Negotiation (NWAY) according to IEEE 802.3-2005 Cl. 28 Auto-Crossover (Auto MDI/X)

Serial Interface

Connectors	2 x RJ12
Status Indicators	DCD: Green LED Activity: Green LED
Max. Cable Length	5 m
Protocol	RS232

Ext Connector

Connector	Custom
For use with configuration stick 1KHW027870R0001 to backup the configuration of the device.	

SFP Modules

Operating / Storage Temperature	0...70°C / -40...85°C
rel. Humidity	5...95% / 5...98% (non-condensing)
Laser wavelength	1310 nm
Fibre glass diameter	
560NFO85	50/125 & 62.5/125 µm
560NFO13	9/125 µm
560NFO15	9/125 µm
min./max. optical output power	
560NFO85	-23.5 dBm / -14 dBm
560NFO13	-15 dBm / -8 dBm
560NFO15	-5 dBm / 0 dBm
max. receiver sensitivity	
560NFO85	-31.8 dBm
560NFO13	-31 dBm
560NFO15	-34 dBm
approx. fiber optic cable length	
560NFO85	2 km
560NFO13	15 km
560NFO15	40 km
Connector type	LC/PC Duplex

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Switching

Flow Control	Full Duplex Flow Control according to IEEE 802.3-2005 An. 31B and IEEE 802.3x-1997 Half Duplex Back Pressure
Max. Frame size	1552 Bytes
Quality of Service	IEEE 802.1p Tag based Priority
MAC Lookup Table	Max. 2048 entries Max. 304 s hold time
Switching Mode	Store and Forward

Supported Protocols

Telecontrol Comm.	IEC 60870-5-101 IEC 60870-5-104
Link Layer Discovery	IEEE 802.1AB-2009
Spanning Tree	IEEE 802.1D-2004
Class of Service	IEEE 802.1p
VLAN Tagging	IEEE 802.1Q-2005
Network Access Ctrl.	IEEE 802.1X-2001
UDP	RFC-768
IP	RFC-791
ICMP	RFC-792
TCP	RFC-793
ARP	RFC-826
Telnet	RFC-854
SNMP	RFC-1155 to RFC-1157 RFC-1901 to RFC-1908
SNMP MIB-II	RFC-1213
TFTP	RFC-1350
CIDR	RFC-1519
RIP	RFC-2453
HTTP	RFC-2616
L2TP	RFC-2661
RADIUS	RFC-2865
Syslog	RFC-3164
SSHv2	RFC-4254 and RFC-5251
SNTP	RFC-4330

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Ordering Information

500NMD20 R0001	1KHW 025 098 R0001
Optional:	
560NMA01 R0001 configuration adapter	1KHW 027 870 R0001
560NFO85 R0001 SFP module	1KHW 001 895 R0001
560NFO13 R0001 SFP module	1KHW 001 893 R0001
560NFO15 R0001 SFP module	1KHW 001 894 R0001

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