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Modicon Quantum automation platform
Communications
Modbus Plus

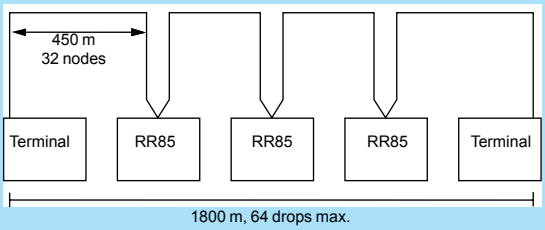
Presentation

All Quantum CPUs contain a Modbus Plus port. Modbus Plus combines high-speed peer-to-peer communication with easy implementation to simplify data sharing by nodes across a network. It is a local area network that facilitates communications between CPUs, host computers and other data sources via twisted-pair cable or optional fiber optic cable. Communications happen at up to 1 Mbaud.

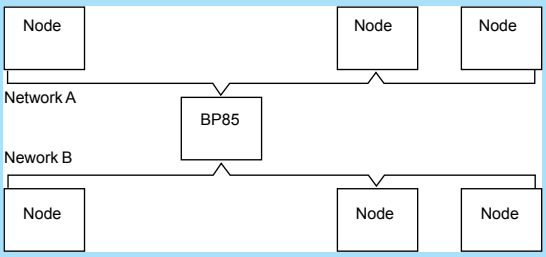
Typical applications include interlocking on control networks, data acquisition, uploading/downloading software, remote on-line programming, connecting to operator interfaces and host computer data collection. Modbus Plus is able to handle communications for real-time control devices like I/O and drives, and its performance is not degraded due to loading or traffic.

Topology

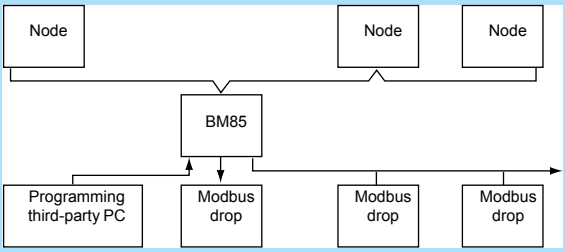
A standard Modbus Plus network based on twisted-pair cable supports up to 32 peer processors and can communicate over distances up to 450 m. If an applications requires more drops or longer distances, an RR85 Modbus Plus repeater between network links allows 64 addresses and a distances up to 900 m. As many as three repeaters can be used, supporting distances of up to 1800 m. The maximum number of network addresses support is 64.



If an application requires more than 64 drops, a BP85 Modbus Plus gateway can be used to connect two Modbus Plus networks. Bridge devices allow many small networks to be connected in order to achieve maximum performance.



If your application requires that a Modbus device, such as a programming panel, operator interface or third-party computer, needs access to data from a Modbus Plus network, you can accomplish this with a BM85 Modbus Plus bridge/MUX. The BM85 offers four Modbus-compatible serial RS232 ports, which allow Modbus master or Modbus slave devices to tie into a Modbus Plus network. The bridge/MUX connections enable data exchange between the Modbus devices as well as over the Modbus Plus network.



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Communications
Modbus Plus network

Presentation (continued)

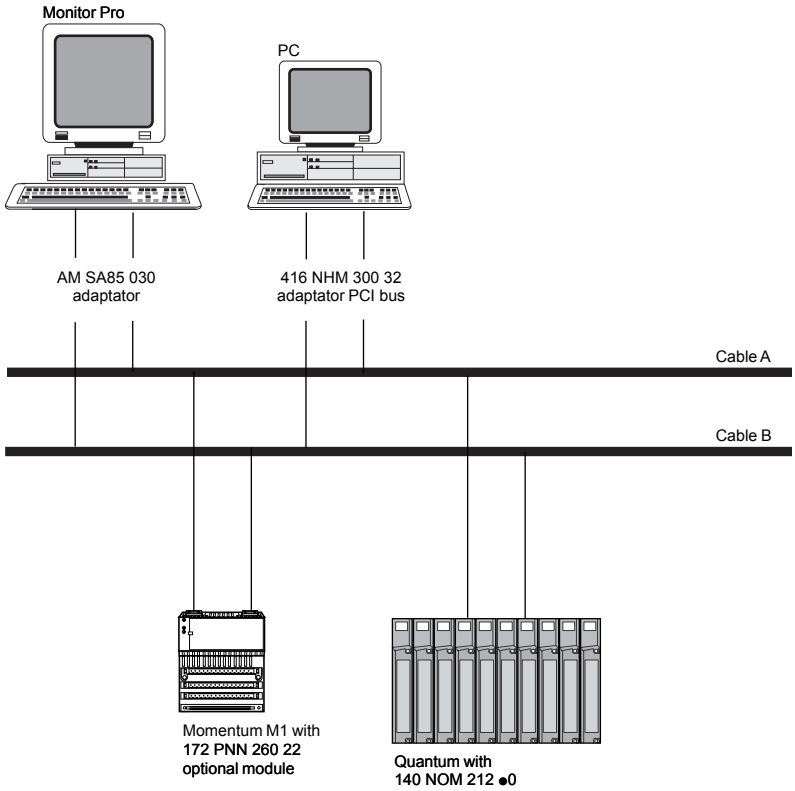
Your application program can initiate event-driven communications and integrate network diagnostics using either the MSTR ladder logic instruction or an equivalent IEC 1131 function. A host computer can implement Modbus Plus with NetBioscompatible software libraries that are called from the host application program.
Appropriate libraries are provided for each host computer interface, which are offered for all major platforms and operating systems.

Installation

Modbus Plus is a self-establishing network that establishes communication over inexpensive twisted-pair cables. It is a genuinely plug-and-play network. Modbus Plus connectivity is available across many Modicon controller families, with additional connectivity provided through our ModConnect Partners program.
Modbus Plus delivers up to 20 000 registers/second in a predictable, deterministic manner. Special features include global data and a peer-to-peer data table for easy setup and initialization.
Diagnostic programs and visual LED indicators help you troubleshoot the network.

Redundant cables

For high-availability applications, Schneider Automation offers a series of Modbus Plus network components and options for redundant operation. Redundant cabling enables Modbus Plus communication over two independent cable systems, with cable health being checked and validated on every message transfer. If one cable fails, the system automatically switches to the other cable. The defective cable is identified in the network statistics. If, for any reason, a cable stops functioning, the network continues operation on the second cable while the defective cable is being repaired.

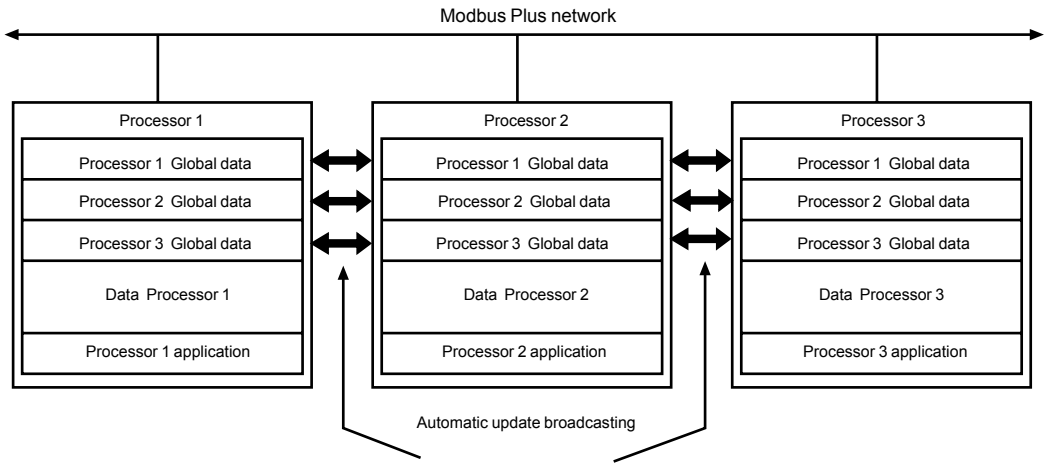


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Global data

Global data allows you to share global variables across a Modbus Plus network of programmable logic controllers. It is an easy way for CPUs to keep track of process-sensitive information, and because the global database is broadcast, updating of global information happens extremely fast.
Each CPU has as many as 32 registers of global data; Modbus Plus nodes can support 2048 registers (32 registers x 64 CPUs) of global data. Each of up to 64 CPUs on the network is responsible for updating its own 32 registers of global data using an MSTR instruction. Each CPU also has the ability to read the 32 global registers from all the other CPUs on the network. When a CPU updates its global data, this information is broadcast automatically to all other CPUs on the network. Each receiving controller collects the new global data and stores it in its network interface memory. A CPU looking to read another peer's global data is actually pulling the information out of its own network interface.
Global data works only within a single layer of the Modbus Plus network. It cannot be transmitted through a NW BM85 C00● bridge MUX or NW BPBP85 002 bridge plus device.

Global data structure



Peer Cop

Peer cop is a software utility in Modsoft and Concept that enables you to define point-to-point data transactions between a CPU and other nodes across a Modbus Plus network. Peer cop uses defined data references (such as discretes or registers) as sources and destinations. A block of registers could constitute the data source for the transmitting node, and another block of registers could be the destination for the receiving device. A maximum of 32 words can be addressed in a CPU via peer cop, where a 16-point discrete module equals one word.
Peer cop offers two methods of data transaction–global and specific. Because all Modbus Plus nodes monitor the network, any one device can extract the data addressed specifically to it. Likewise, all nodes can extract global data. Peer cop enables the Modbus Plus device currently holding the token to direct specific data to individual nodes and broadcast global data to all nodes as part of its token frame. Each sending node can specify unique references as data sources, and each receiving node can specify the same or different references as data definitions. When nodes receive global data, each node can index to specific locations in the incoming data and extract specific lengths of data from those points. Data transactions can therefore happen quickly as part of the token rotation and can be directly mapped between data references in the sending and receiving nodes.
Network and data security are obtained with the CPU's write-protect feature. You can configure sections of references within the CPU as read-only so that those references cannot be corrupted over the network.
Peer cop, like global data, works only within a single layer of the Modbus Plus network.

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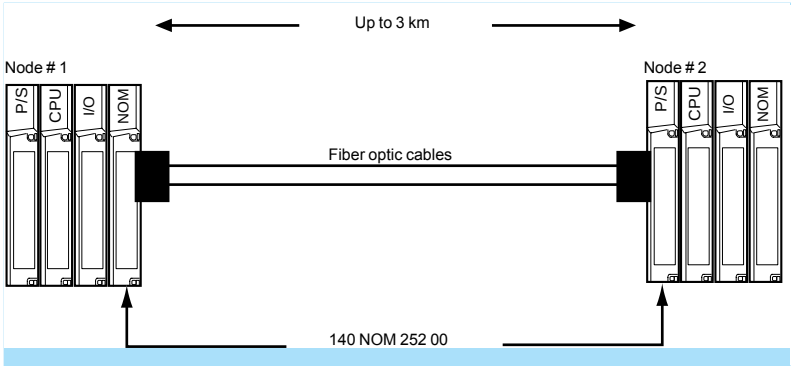
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Communications
Modbus Plus

Fiber optic network

Optional fiber optic cabling is available for a Modbus Plus network. With fiber optics, the total length of the network can be increased to as much as 3 km. The fiber optic medium provides intrinsically safe links, which may be required in certain hazardous environments. Fiber cabling is not susceptible to the effects of electromagnetic interference, RF interference or lightning. It also provides total isolation between terminal points on the link.

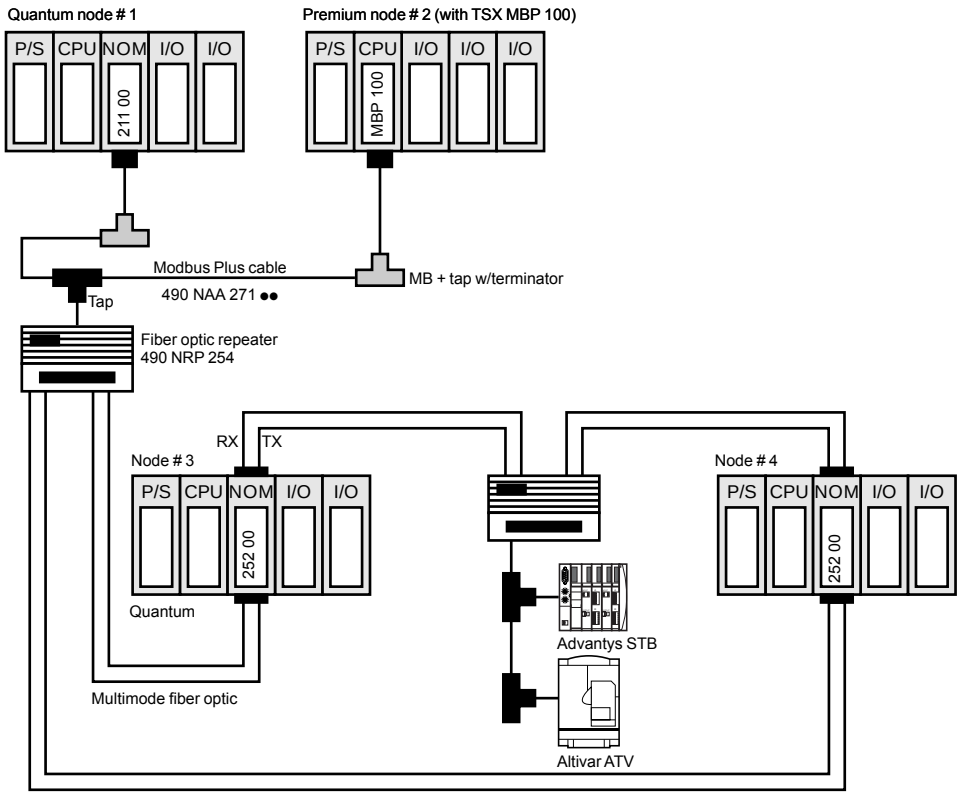
A point-to-point configuration

A point-to-point link between CPUs on a Modbus Plus network allows safe communications in a harsh environment over distances up to 3 km.



A self-healing ring

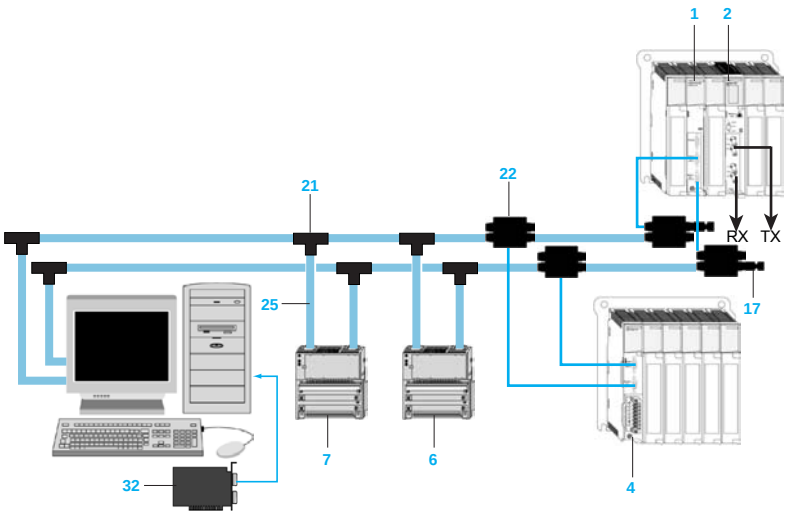
You can create a self-healing ring in a mixed fiber/twisted pair network by connecting the unused fiber optic ports of the first and last 140 NOM 252 00 modules, either directly or through the fiber optic repeater. This type of configuration maintains all the advantages previously described including built-in redundancy. A broken connection between any two Quantum modules in the ring will automatically reconfigure the network to the bus configuration and continue communicating.



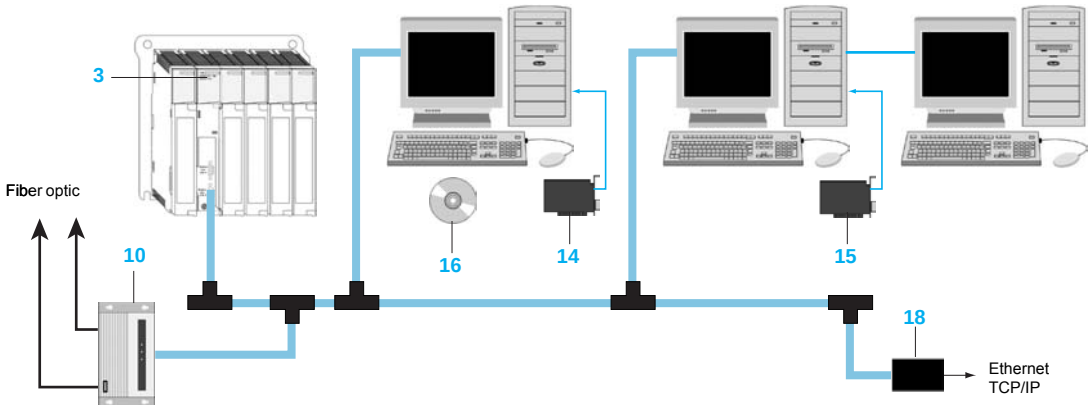
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Modbus Plus network

Quantum redundant Modbus Plus network



Network with PC cards for Modbus Plus

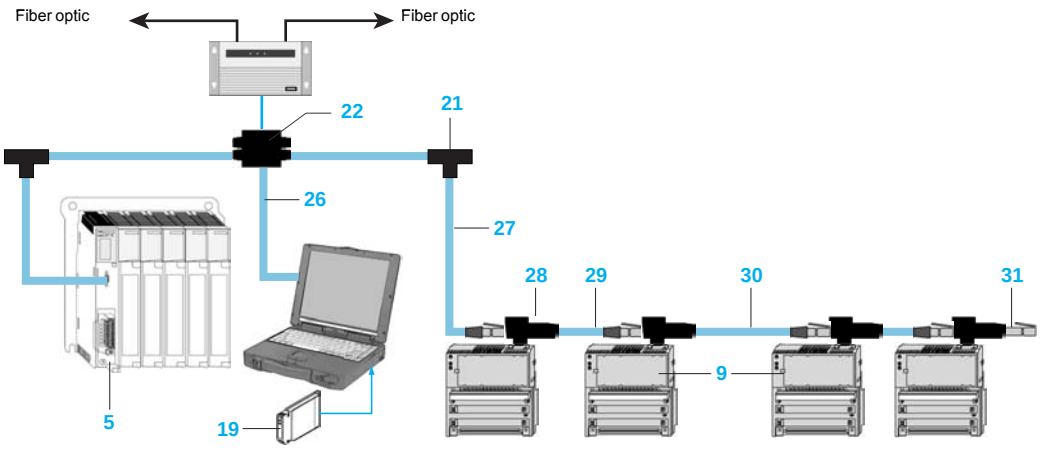


1 **140 NOM 212 00:** Quantum Modbus Plus Head-end Interface, redundant support, twisted pair cable.
2 **140 NOM 252 00:** Quantum Modbus Plus Head-end Interface, single-cable support, fiber optic cable (TX/RX).
3 **140 CPU:** Quantum Modbus Plus Head-end Interface, single-cable support, twisted pair cable.
4 **140 CRA 212 10:** Quantum Modbus Plus Drop Interface and power supply, redundant support, 115/230 VAC.
5 **140 CRA 211 10:** Quantum Modbus Plus Drop Interface and power supply, single-cable support, 115/230 VAC.
6 **170 PNT 160 20:** Momentum Modbus Plus Communication Adapter, redundant network, IEC support.
7 **170 NEF 160 21:** Momentum Modbus Plus Communication Adapter, redundant network, 984 support.
8 **170 NEF 110 21:** Momentum Modbus Plus Communication Adapter, non-redundant network, 984 support.
9 **170 PNT 110 20:** Momentum Modbus Plus Communication Adapter, non-redundant network, IEC support.
10 **490 NRP 254 00:** Modbus Plus Repeater, line/drop, fiber optic support.
11 **490 NRP 253 00:** Modbus Plus Repeater, point-to-point, fiber optic support.
12 **NW-BM85C-002:** Modbus Plus Bridge/Multiplexer, panel or shelf mount, 4 Modbus Plus ports.
13 **NW-RR85-001:** Modbus Plus Repeater, coaxial cable.
14 **AM-SA85-030:** Modbus Plus ISA PC Adapter Card, single port.
15 **416 NHM 300 30:** Modbus Plus PCI PC Adapter Card, single port.
16 **SW-MXDS-001:** Modbus Plus Driver Suite.

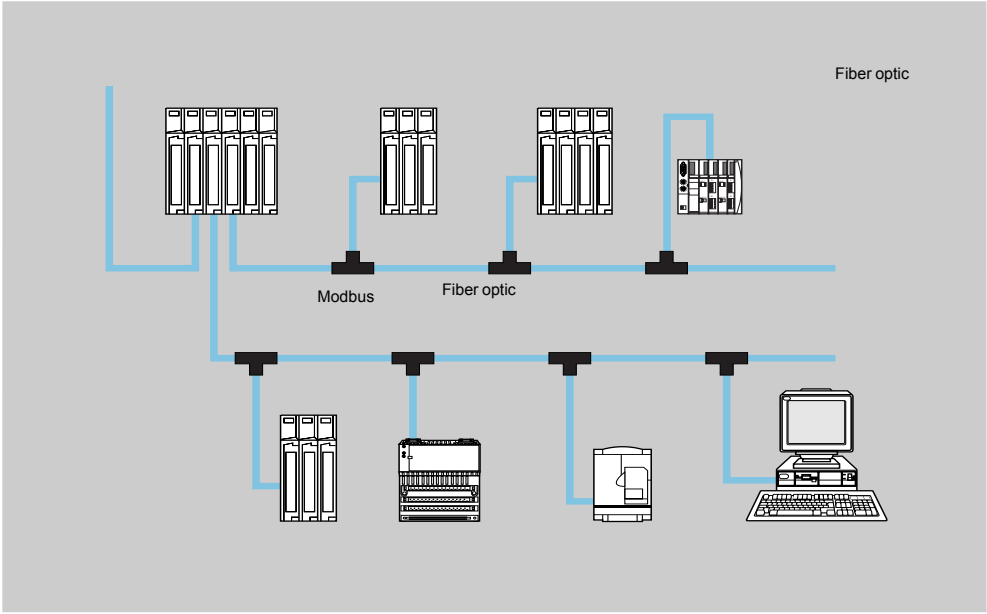
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Modicon Quantum automation platform
Modbus Plus network

Modbus Plus network for Quantum and Momentum



Modbus Plus bridges, repeaters and taps



17 **990 NAD 230 11:** Modbus Plus Ruggedized Tap Terminators.
18 **74 CEV 300 20:** Modbus Plus-to-Ethernet Bridge.
19 **16 NHM 212 33:** Modbus Plus Type III PCMCIA Card, single port.
20 **416 NHM 212 34:** Modbus Plus Type III PCMCIA Card, single port with Plug-and-Play capability.
21 **990 NAD 230 00:** Modbus Plus Tap, IP20.
22 **990 NAD 230 10:** Modbus Plus Tap, IP65.
23 **AS-MBKT-085:** AS-MBKT-085 Modbus Plus Inline Connector.
24 **AS-MBKT-185:** AS-MBKT-185 Modbus Plus Terminating Connector.
25 **990 NAD 211 10:** Modbus Plus Drop Cable, 2.4 m (8 ft).
26 **990 NAD 215 10:** Plus Ruggedized Tap Programming Cable, 3.05 m (10 ft).
27 **170 MCI 021 20:** Modbus Plus RJ45 cable, 3.05 m (10 ft).
28 **170 XTS 020 00:** Modbus Plus “T” Connector (DB9 base).
29 **170 MCI 020 10:** Modbus Plus RS 485 cable, 25 cm (10 in).
30 **170 MCI 020 80:** Modbus Plus RJ45 cable, double-ended, 10 m (30 ft).
31 **170 XTS 021 00:** Modbus Plus RJ45 Terminator.
32 **416 NHM 300 32:** Modbus Plus PCI PC Adapter Card, dual ports.
33 **NW-BP85-002:** Modbus Plus Bridge Plus, 4 Modbus Plus ports.

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Modicon Quantum automation platform
Modbus Plus network

References

Modbus Plus bridges and repeaters

Description	Supply	Support	No and type of ports	Rep.	Reference	Weight kg(lb)
Modbus Plus Bridge multiplexer	∿ 115/220 V or ⎓ 24 V	Panel or shelf	2 Modbus Plus 4 RS 232 Modbus	12	**NW BM85C002**	–
	∿ 115/220 V	Rack-mount	1 Modbus Plus 4 RS 232 Modbus	–	**NW BM85000**	–
	⎓ 24 V or ⎓ 115V	Rack-mount 19"	2 Modbus Plus 4 RS 232 Modbus	–	**NW BM85D008**	–
Modbus Plus programmable bridge/ multiplexers	∿ 115/220 V or ⎓ 24 V	Panel or shelf	2 Modbus Plus 4 RS 232	–	**NW BM85S232**	–
			2 Modbus Plus 4 RS 485	–	**NW BM85S485**	–
Modbus Plus bridge Plus	∿ 115/220 V or ⎓ 24 V	Panel or shelf	4 Modbus Plus	33	**NW BP85 002**	–
Modbus Plus repeater		Coaxial cable		13	**NW RR85 001**	–
Point-to-point		Fiber optic/copper		11	**490 NRP 253 00**	–
Line/drop		Fiber optic/copper		10	**490 NRP 254 00**	–

Modbus Plus communication devices *(1)*

Description		Support	Type	Rep.	Reference	Weight kg(lb)
Quantum Modbus Plus	Drop interface and power supply	Single-cable	∿ 115/230	5	**140 CRA 211 10**	–
			⎓ 24	–	**140 CRA 211 20**	–
		Redundant	∿ 115/230	4	**140 CRA 212 10**	–
			⎓ 24	–	**140 CRA 212 20**	–
	Quantum CPU Head-end interface n#1	Single-cable	–	3	**140 CPU** *(2)*	–
	Head-end interface n#2 and n#3	Single-cable	Twisted pair cable	–	**140 NOM 211 00**	–
		Redundant	Twisted pair cable	1	**140 NOM 212 00**	–
		Single-cable	Fiber optic cable	2	**140 NOM 252 00**	–
Momentum Modbus Plus	Communication adapter	Non redundant	IEC support	9	**170 PNT 110 20**	–
		Network	984 support	8	**170 NEF 110 21**	–
		Redundant	984 support	6	**170 PNT 160 20**	–
		Network	984 support	7	**170 NEF 160 21**	–

PC Interface Kits

Description	Sold by lot of	Rep.	Reference	Weight kg(lb)
Modbus Plus ISA PC Adapter Card	1	14	**AM SA85 030**	–
	2	–	**AM SA85 032**	–
Modbus Plus PCI PC Adapter Card	1	15	**416 NHM 300 30**	–
	2	32	**416 NHM 300 32**	–
Modbus Plus Type II PCMCIA Card	1	–	**416 NHM 212 30**	–
Modbus Plus Type III PCMCIA Card	1	19	**416 NHM 212 33**	–
Modbus Plus Type III PnP PCMCIA Card	1	20	**416 NHM 212 34**	–

(1) Other devices: TSX Micro/Premium, Advantys STB, … see our catalogues.
(2) See pages 48280/7 and 48202/5.

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Modbus Plus network

References (continued)

Cables

Description	Lenght in m (ft)	Rep.	Reference	Weight kg (lb)
Standard Modbus Plus Cable	30.5 (100)	–	490 NAA 271 01	–
	152.5 (500)	–	490 NAA 271 02	–
	305 (1000)	–	490 NAA 271 03	–
	457 (1500)	–	490 NAA 271 04	–
	1525 (5000)	–	490 NAA 271 06	–
Modbus Plus Drop Cable	2.4 (8)	25	990 NAD 211 10	–
	6 (20)	–	990 NAD 211 30	–
Modbus Plus Ruggedized Tap Programming Cable	3.05 (10)	26	990 NAA 215 10	–
Modbus Plus RS 485 cable	25 cm (10 in)	29	170 MCI 020 10	–
	1 (3)	–	170 MCI 020 36	–
Modbus Plus RS 485 master Communication Cable (RJ45/RJ45)	0.3 (1)	–	170 MCI 041 10	–
Modbus Plus RJ45 cable	3 (10)	27	170 MCI 021 20	–
Modbus Plus RJ45 cable, double-ended	3 (10)	–	170 MCI 021 80	–
	10 (30)	30	170 MCI 020 80	–
Cable (RJ45/RJ45)	1 (3)	–	110 XCA 282 01	–
	3 (10)	–	110 XCA 282 02	–
	6 (20)	–	110 XCA 282 03	–

Wiring accessories

Description	Type	Rep.	Reference	Weight kg (lb)
Field Power Connector	IP 20 rated	–	140 XTS 005 00	–
Modbus Plus D-shell Adapter for AT serial port	RJ45 to 9-pin, adapter for AT serial port	–	110 XCA 203 00	–
Modbus Plus D-shell Adapter for XT serial port	RJ45 to 25-pin D shell adapter for XT serial port	–	110 XCA 204 00	–

Cable tools

Description		Rep.	Reference	Weight kg (lb)
Modbus Plus network cable installation tool	–	–	AS MBPL 001	–
RJ crimping tool	–	–	170 XTS 023 00	–
Ground Clamp	–	–	424 244 739	–

Connectors

Description	Sold by lot of	Rep.	Reference	Weight kg (lb)
Modbus Plus inline	1 per kit	23	AS MBKT 085	–
Modbus Plus “T” connector (DB9 base)	2 per kit	24	AS MBKT 185	–
RJ 45 terminator	1	28	170 XTS 020 00	–
RS 485 (DB9 base) cable connector “T” for RJ 45	2 per kit	31	170 XTS 021 00	–
RJ 45 shielded connectors	–	–	170 XTS 040 00	–
RS 485 (RJ485) cable connector “T” for RJ 45	20 per kit	–	170 XTS 022 00	–
RS 485 multi-master RJ 45 shunt plugs	1	–	170 XTS 041 00	–
Modbus Plus “T” connector (DB9 base)	2	–	170 XTS 042 00	–

Taps

Description	Sold by lot of	Rep.	Reference	Weight kg (lb)
Modbus Plus tap, IP 20	1	21	990 NAD 230 00	–
Modbus Plus ruggedized tap, IP 65	1	22	990 NAD 230 10	–
Modbus Plus ruggedized tap terminators	2 per kit	17	990 NAD 230 11	–
Modbus Plus ruggedized tap DIN rail mounting bracket assembly	1	–	990 NAD 230 12	–
Modbus Plus lightning arrestor	1	–	490 NAC 721 00	–

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