

# Modicon Momentum automation platform

## Modbus Plus communication adapters

### Presentation

Modbus Plus communication adapters for the Momentum I/O product line can be plugged into any Momentum I/O base to create a functional I/O unit on the Modbus Plus bus, and to provide a direct connection to the Modbus Plus Network for the full family of Momentum I/O modules. This connectivity enables communications with all of the Modbus Plus compatible control products - including programmable controllers, industrial computers, operator control stations, drive systems, and other controls - to provide a flexible, cost-effective solution for distributing I/O modules throughout a large area. To expand the capabilities of the Modbus Plus Network for distributed I/O applications, the communication adapters have been designed to permit up to 64 Momentum I/O modules to be connected to the network without the need for signal repeaters.

Each Momentum I/O module is an individual node on the Modbus Plus network with its address user-selected on the dual rotary switch on the front of the communication adapter. The Momentum I/O modules can be configured for the network, and assigned program reference numbers, by using either the Peer Cop function or the MSTR function block instruction in the programmable controller or the Modbus Plus configuration in an industrial computer.

There are four types of communication adapters available:

- **170 PNT 110 20**, Single Port, IEC Data Format
- **170 PNT 160 20**, Redundant Port, IEC Data Format
- **170 NEF 110 21**, Single Port, 984 Data Format
- **170 NEF 160 21**, Redundant Port, 984 Data Format.

### IEC Data Format

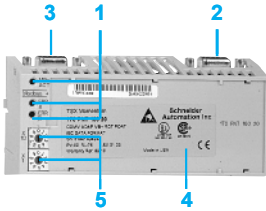
This version of the Momentum Modbus Plus communication adapter communicates I/O data to the programmable controller in the IEC data format, which has bit numbering 0 through 15, right to left, within the data word (i.e., input or output number 1 is bit number 0).

### 984 Data Format

This version of the Momentum Modbus Plus communication adapter communicates I/O data to the programmable controller in the traditional 984 data format, which has bit numbering 1 through 16, left to right, within the register (i.e., input or output number 1 is bit number 1).

Since Modbus Plus is supported by the Quantum and 984 controller families, Momentum I/O can be added to existing control systems where additional I/O capacity or a distributed I/O sub-network is needed, because of requirements for the control system. The figures below illustrate typical control systems using Momentum I/O modules on the Modbus Plus network with programmable controllers and industrial computer systems.

### Description



Each 170 PNT/NEF communication module comprises:

- 1 Three indicator lights (LEDs):
  - MB + ACT indicator light (green) : module powered up or communicating.
  - ERR A indicator light (red) : communication error network A.
  - ERR B indicator light (red) : communication error network B. (for redundant model).
- 2 A 9-way male SUB-D connector for connecting to the Modbus Plus network.
- 3 A 9-way male SUB-D connector for a redundant Modbus Plus network.
- 4 A slot for an identification label (supplied with all I/O sub-bases).
- 5 Two switches for coding the slave address on the bus.

### Characteristics

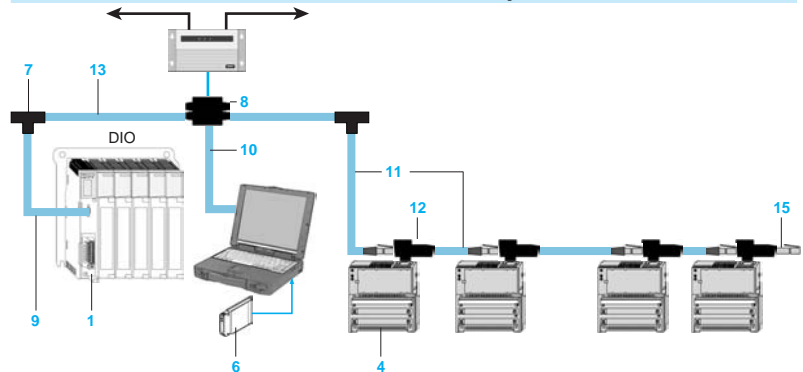
| Type of module   |               | 170 PNT 110 20   | 170 PNT 160 20 | 170 NEF 110 21       | 170 NEF 160 21 |
|--|---------------|--|----------------|----------------------|----------------|
| <b>Communication network</b>                           |               | Modbus Plus  |                |                      |                |
| <b>Master PLC on the network</b>                       |               | Quantum, Premium   | Quantum        | Quantum, Compact 984 |                |
| <b>Structure</b>                                       | Type          | Industrial   |                |                      |                |
|  | Redundancy    | No   | Yes            | No                   | Yes            |
|  | Topology      | Multi-drop, devices connected using extension cable or tap-off cable   |                |                      |                |
|  | Length        | 5,000 m (6000 ft) maximum with repeaters   |                |                      |                |
|  | Access method | Token bus  |                |                      |                |
| <b>Transmission</b>                                    | Bit rate      | 1 Mbit/s   |                |                      |                |
|  | Medium        | Twisted pairs  |                |                      |                |
| <b>Data Format</b>                                     |               | IEC Data Format  |                | 984 Data Format      |                |
| <b>Number of Momentum devices</b>                      | Per segment   | 31 connection points   |                |                      |                |
|  | Maximum       | 63 for all segments  |                |                      |                |
| <b>Power source</b>                                    |               | Power supply on-board the I/O base   |                |                      |                |
| <b>Behaviour in the event of a communication error</b> |               | Discrete I/O : forcing to state 0<br>Analogue I/O : configurable (maintain value, fallback to 0 or full scale value) |                |                      |                |
| <b>Services</b>  |               | Configuration : Peer cop and MSTR function block, "peer-to-peer" mode  |                |                      |                |
| <b>Agency approvals</b>                                |               | UL, CE, CSA, FM Class I, Div. II   |                | UL, CE, CSA          |                |

# Modicon Momentum automation platform

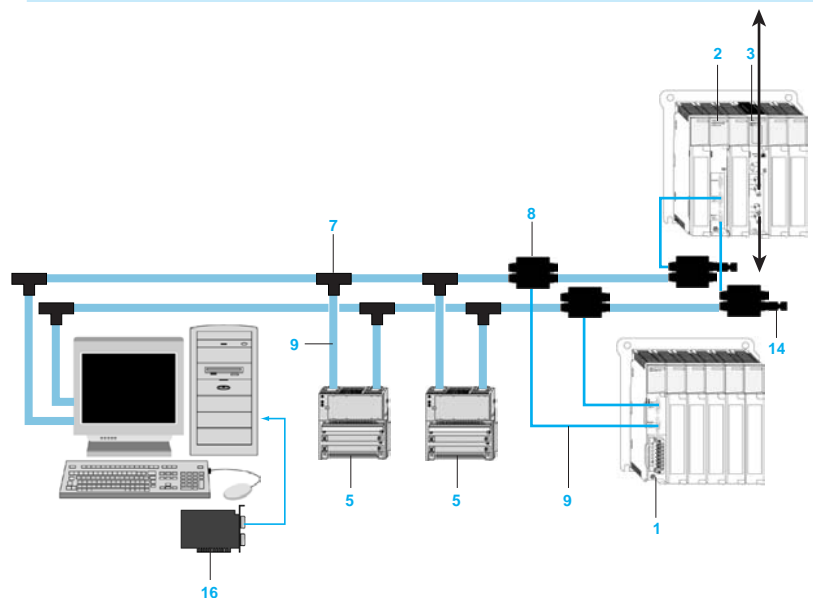
## Modbus Plus communication adapters

### Network topology

#### Momentum I/O modules in a distributed control system



#### Momentum I/O modules with Modbus Plus double cable in a distributed and redundant control system



- 1 **140 CRA 211 10**: Quantum Modbus Plus drop interface and power supply, single-cable support, 115/230 VAC.
- 2 **140 NOM 212 00**: Quantum Modbus Plus head-end interface, redundant support, twisted pair cable.
- 3 **140 NOM 252 00**: Quantum Modbus Plus Head-end Interface, single-cable support, fiber optic cable.
- 4 **170 PNT 110 20** or **170 NEF 110 21**: Momentum Modbus Plus communication adapter, non-redundant network.
- 5 **170 PNT 160 20** or **170 NEF 160 21**: Momentum Modbus Plus communication adapter, redundant network.
- 6 **416 NHM 212 33**: Modbus Plus type III PCMCIA Card, single port ;  
Or **416 NHM 212 34**: Modbus Plus type III PCMCIA Card, single port, "plug and play".
- 7 **990 NAD 230 00**: Modbus Plus tap, IP 20.
- 8 **990 NAD 230 10**: Modbus Plus tap, IP 65.
- 9 **990 NAD 211 10/30**: Modbus Plus drop cable (lengths: 2 or 4 or 6 m).
- 10 **990 NAD 215 10**: Modbus Plus ruggedized tap programming Cable, 3.05 m.
- 11 **170 MCI 020/021 ●●**: Modbus Plus RJ45 cable (lengths: 0.25 , 1 , 3 or 10 m).
- 12 **170 XTS 020 00**: Modbus Plus "T" connector (DB9 base).
- 13 **490 NAA 271 0●**: Standard Modbus cable (lengths: 30, 150, 300, 450 or 1500 m).
- 14 **990 NAD 230 11**: Modbus Plus ruggedized tap terminators.
- 15 **170 XTS 021 00**: Modbus Plus RJ45 terminator.
- 16 **416 NHM 300 32**: Modbus Plus PCI PC adapter Card, dual ports.



170 PNT 110 20/NEF 110 21



170 PNT 160 20/NEF 160 21

## References

| Description                                       | Connection                        | Item (1) | Bus master PLC      | Reference  | Weight kg   |
|---|-----------------------------------|----------|---------------------|--|-------------|
| Communication adapters for Momentum I/O sub-bases | Non-redundant Modbus Plus network | 4        | Premium, Quantum    | 170 PNT 110 20   | –           |
|   | Redundant Modbus Plus network     | 5        | Compact 984 Quantum | 170 NEF 110 21<br>170 PNT 160 20<br>Compact 984 170 NEF 160 21 | –<br>–<br>– |

| Description                         | Use   | Mounting on | Item (1) | Reference      | Weight kg |
|-------------------------------------|---|-------------|----------|----------------|-----------|
| Modbus Plus taps                    | IP 20 junction box for tap-off connection "T"   | –           | 7        | 990 NAD 230 00 | 0.230     |
|                                     | IP 20 junction box for tap-off connection "T", connection of cable on screw terminal block with one RJ45 connector in front | DIN profile | –        | 990 NAD 230 20 | –         |
|                                     |   | Panel       | –        | 990 NAD 230 21 | –         |
|                                     | Modbus Plus Tap (IP 20), standard Modbus cable with one RJ45 connector in front   | Panel       | 8        | 990 NAD 230 10 | 0.650     |
| –                                   | IP 20 "T" with 2 RJ45 connectors for Modbus cable and one 9-way SUB-D connector for tap link devices                        | –           | 12       | 170 XTS 020 00 | 0.260     |
| Terminator connector kit (set of 2) | 2 impedance adaptors for box (IP 20)  | –           | 1        | 990 NAD 230 22 | –         |
|                                     | 990 NAD 230 20/21   | –           | 14       | 990 NAD 230 11 | –         |
|                                     | 2 impedance adaptors for tee (IP 20)  | –           | 15       | 170 XTS 021 00 | –         |

## Connection cables

| Description                 | Use   |   | Item (1) | Length         | Reference      | Weight kg |
|-----------------------------|---|---|----------|----------------|----------------|-----------|
|                             | From  | To  |          |                |                |           |
| Standard Modbus Plus cables | T-junction box<br>990 NAD 230 00,<br>990 NAD 230 11             | T-junction box<br>990 NAD 230 00,<br>990 NAD 230 11 | 13       | 30 m           | 490 NAA 271 01 | –         |
|                             |   | 150 m   |          | 490 NAA 271 02 | –              |           |
|                             |   | 300 m   |          | 490 NAA 271 03 | –              |           |
|                             |   | 450 m   |          | 490 NAA 271 04 | –              |           |
|                             |   | 1500 m  |          | 490 NAA 271 06 | –              |           |
| Modbus Plus cable for RJ45  | "T" 170 XTS 020 00  | "T" 170 XTS 020 00                                  | 11       | 0.25 m         | 170 MCI 021 10 | –         |
|                             |   | 1 m   |          | 170 MCI 021 36 | –              |           |
|                             |   | 3 m   |          | 170 MCI 021 20 | –              |           |
|                             |   | 10 m  |          | 170 MCI 021 80 | –              |           |
| Modbus Plus Drop cables     | Communication modules for Momentum I/O sub-bases<br>170 PNT/NEF | T-junction box<br>990 NAD 230 00/10                 | 9        | 2.4 m          | 990 NAD 211 10 | –         |
|                             |   | 6 m   |          | 990 NAD 211 30 | –              |           |

| Description            | Use               |   | Length | Reference      | Weight kg |
|------------------------|-------------------|---|--------|----------------|-----------|
|                        | From junction box | To equipment, cable outlet of 9-way SUB-D type connectors |        |                |           |
| Modbus Plus Drop Cable | Flying leads      | Left side   | 2.4 m  | 990 NAD 218 10 | –         |
|                        |                   |   | 6 m    | 990 NAD 218 30 | –         |
|                        |                   | Right side  | 2.4 m  | 990 NAD 219 10 | –         |
|                        |                   |   | 6 m    | 990 NAD 219 30 | –         |

## Connecting accessories

| Description                  | Use for  | Reference        | Weight kg |
|------------------------------|--|------------------|-----------|
| RJ45 Crimp tool              | Crimping the RJ connectors                             | 490 NAB 000 10   | –         |
| 9-way female SUB-D connector | Communication module connection                        | AS MBKT 085      | –         |
| Wiring tool                  | Fitting trunk cables and drop cables in local site tap | 043 509 383      | –         |
| Other connection accessories |  | See page 48247/5 |           |

(1) Item, see page 48232/4.



AS MBKT 085