# Modicon
# 140 CPU 434 12
# CPU Module

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## Specifications

| User Logic/Reference Capacity | | | | Extended | IEC Application |
|---|---|---|---|---|---|
| | User Logic | Discrete | Register | Register | Memory |
| | 64 k words | 64 k | 57 k * | 96 k | 896 k |
| | * 57,766 4XX registers max Only if 0XXX = 16 and 1XXX = 16 and 3XXX = 16 | | | | |

| Reference Capacity | |
|---|---|
| Discrete | 64 k – any mix |
| **Local I/O (Main Backplane)** | |
| Maximum I/O Words | 64 In and 64 Out * |
| Maximum Number of I/O Racks | 1 |
| **Remote I/O** | |
| Maximum I/O Words per Drop | 64 In and 64 Out * |
| Maximum Number of Remote Drops | 31 |
| **Distributed I/O** | |
| Maximum Number of Networks per System | 3 ** |
| Maximum Words per Network (For every DIO drop, there is a minimum of two words input of overhead.) | 500 In and 500 Out |
| Maximum Words per Node | 30 In and 32 Out |
| **Maximum Number of Option Module Interfaces** | 6 |
| **Watchdog Timer** | 250 ms (S/W adjustable) |
| **Logic Solve Time** | 0.1 ms / k to 0.5 ms / k |
| **Battery** | 3 V Lithium |
| Service Life | 1200 mAh |
| Shelf Life | 10 years with 0.5% loss of capacity per year |
| **Battery Load Current @ Power-off** | |
| Typical | 7 µA |
| Maximum | 210 µA |
| **Communication** | |
| Modbus (RS–232) | 2 serial ports (9–pin D–shell) |
| Modbus Plus (RS–485) | 1 network port (9–pin D–shell) |
| **Programming Software Compatability** | Modsoft Ver. 2.6, Concept Ver. 2.1 |

* This information can be a mix of Discrete or Register I/O. For each word of register I/O configured, one word of I/O words must be subtracted from the total available. The same holds true for each block of 8 bits or 16 bits of Discrete I/O configured–one word of Register I/O must be subtracted from the total available.

** Requires the use of two 140 NOM 21x 00 Option Modules.

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## Specifications (cont'd)

| General | | |
|---|---|---|
| Diagnostics | **Power Up** | **Runtime** |
| | RAM | RAM |
| | RAM Address | RAM Address |
| | Executive Checksum | Executive Checksum |
| | User Logic Check | User Logic Check |
| | Processor | |
| Bus Current Required | 1.8 A | |
| TOD Clock | +/- 8.0 seconds/day  0 ... 60°C | |

# Front Panel Switches

One three-position slide switch and one three-position key switch are located on the front of the CPU.

### Slide Switch

The slide switch is used to select the comm parameter settings for the Modbus (RS-232) ports. Three options are available:
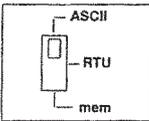


☐ Setting the slide switch to the top position assigns ASCII functionality to the port; the following comm parameters are set and cannot be changed:

**ASCII Comm Port Parameters**

| Baud | 2,400 |
|---|---|
| Parity | Even |
| Data Bits | 7 |
| Stop Bits | 1 |
| Device Address | Rear panel rotary switch setting |

☐ Setting the slide switch to the middle position assigns remote terminal unit (RTU) functionality to the port; the following comm parameters are set and cannot be changed:

**RTU Comm Port Parameters**

| Baud | 9,600 |
|---|---|
| Parity | Even |
| Data Bits | 8 |
| Stop Bits | 1 |
| Device Address | Rear panel rotary switch setting |

◻ Setting the slide switch to the bottom position gives you the ability to assign comm parameters to the port in software; the following parameters are valid:

**Valid Comm Port Parameters**

| Baud | 19,200 | 1,200 |
|---|---|---|
| | 9,600 | 600 |
| | 7,200 | 300 |
| | 4,800 | 150 |
| | 3,600 | 134.5 |
| | 2,400 | 110 |
| | 2,000 | 75 |
| | 1,800 | 50 |
| Data Bits | 7 / 8 | |
| Stop Bits | 1 / 2 | |
| Parity | Enable/Disable Odd/Even | |
| Device Address | 1 ... 247 | |

## Key Switch

The key switch is used to protect memory from programming changes while the controller is in operation.
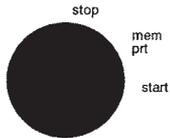


| Key switch Position | Controller Status | Memory Protected From Programmer Changes | Will Accept Programmer Stop or Start | Key switch Transition |
|---|---|---|---|---|
| Stop | Controller is stopped and disables Programmer changes | Y | N | **From Start or Memory Protect:** Stops controller, if running, and disables Programmer changes |
| Memory Protect | Controller may be either stopped or running and Programmer changes are disabled | Y | N | **From Stop or Start:** Prevents Programmer changes, controller run status is not changed |
| Start | Controller may be either stopped or running, Programmer may make changes and start/stop the controller | N | Y | **From Stop:** Enables Programmer changes, starts controller. **From Memory Protect:** Enables programmer changes, starts controller if stopped |

## Modbus Connector Pinouts

The Quantum 140 CPU 434 12 is equipped with two nine-pin RS-232C connectors that support Modicon's proprietary Modbus communication protocol. The following is the Modbus port pinout connections for nine-pin and 25-pin connections.

| IBM-AT 9-Pin Female | | Quantum 9-Pin Male | IBM-XT 25-Pin Female | | Quantum 9-Pin Male |
|---|---|---|---|---|---|
| CD | 1 | 1 SHIELD | SHIELD | 1 | 1 SHIELD |
| RX | 2 | 2 RX | TX | 2 | 2 RX |
| TX | 3 | 3 TX | RX | 3 | 3 TX |
| DTR | 4 | 4 DTR | RTS | 4 | 4 DTR |
| GROUND | 5 | 5 GROUND | CTS | 5 | 5 GROUND |
| DSR | 6 | 6 DSR | DSR | 6 | 6 DSR |
| RTS | 7 | 7 RTS | GROUND | 7 | 7 RTS |
| CTS | 8 | 8 CTS | NC | 8 | 8 CTS |
| | 9 NC | | DTR | 20 | 9 NC |
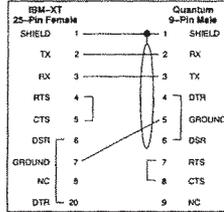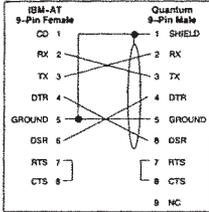
**TX:** Transmitted Data   **DTR:** Data Terminal Ready
**RX:** Received Data   **CTS:** Clear to Send
**RTS:** Request to Send   **N/C:** No Connection
**DSR:** Data Set Ready   **CD:** Carrier Detect

☞ **Note:** Although the Modbus ports electrically support existing Modbus cables, it is recommended that a Modbus programming cable (Part # 990 NAA 263 20) be used. This cable has been designed to fit under the door of a Quantum CPU or NOM module.

## Rear Panel Switches

Two rotary switches (refer to the illustration and table below) are located on the rear panel of the CPU. They are used for setting Modbus Plus node and Modbus port addresses.

☞ Note: The highest address that may be set with these switches is 64.

SW1 (the top switch) sets the upper digit (tens) of the address;
SW2 (the bottom switch) sets the lower digit (ones) of the address.
The illustration below shows the correct setting for an example address of 11.

SW1 (Top)

SW2 (Bottom)

| SW1 and SW2 Address Settings | | |
|---|---|---|
| Node Address | SW1 | SW2 |
| 1 ... 9 | 0 | 1 ... 9 |
| 10 ... 19 | 1 | 0 ... 9 |
| 20 ... 29 | 2 | 0 ... 9 |
| 30 ... 39 | 3 | 0 ... 9 |
| 40 ... 49 | 4 | 0 ... 9 |
| 50 ... 59 | 5 | 0 ... 9 |
| 60 ... 64 | 6 | 0 ... 4 |

☞ Note: If "0" or an address greater than 64 is selected, the Modbus + LED will be "on" steady, to indicate the selection of an invalid address.

## Option Module Interface Support

The 140 CPU 434 12 supports up to six network modules (i.e., Modbus Plus, Ethernet and Multi-Axis Motion option modules) using the option module interface technique. However, only two Modbus Plus modules can have full functionality, including Quantum PIO support.

The following tables list the Quantum networking modules and describe the type of services provided by Modbus and Modbus Plus.

Summary of Quantum Communications and Networking Modules

| Model Number | Description | Module Interface Technique | Loadable Required | Backplane Support | | | Bus Power mA |
|---|---|---|---|---|---|---|---|
| | | | | Local | RIO | DIO | |
| 140CRP93100 | Remote I/O Head Interface, single cable | Direct CPU Driver | N | Y | N | N | 780 |
| 140CRP93200 | Remote I/O Head Interface, dual cable | Direct CPU Driver | N | Y | N | N | 780 |
| 140CHS21000 | Hot Standby Processor Kit | Direct CPU Driver | Y | Y | N | N | 700 |
| 140NOA61110 | Interbus Master | Direct CPU Driver | Y | Y | N | N | 700 |
| 140NOM21100 | Modbus Plus Options, single cable | Option Module | N | Y | N | N | 780 |
| 140NOM21200 | Modbus Plus Option, dual cable | Option Module | N | Y | N | N | 780 |
| 140NOM25200 | Modbus Plus Option, single channel fiber | Option Module | N | Y | N | N | 900 |
| 140NOE21100 | Ethernet TCP/IP Twisted Pair | Option Module | N | Y | N | N | 1000 |
| 140NOE25100 | Ethernet TCP/IP Fiber Optic | Option Module | N | Y | N | N | 1000 |
| 140NOE31100 | Ethernet SY/MAX Twisted Pair | Option Module | N | Y | N | N | 1000 |
| 140NOE35100 | Ethernet SY/MAX Fiber Optic | Option Module | N | Y | N | N | 1000 |
| 140NOE5100[1] | Ethernet MMS Twisted Pair | Option Module | N | Y | N | N | 1000 |
| 140NOE55100[1] | Ethernet MMS Fiber Optic | Option Module | N | Y | N | N | 1000 |
| 140MMS42500 | Multi-Axis Motion Controller w/SERCOS | Option Module | N | Y | N | N | 2500 |
| 140NOL91100 | LonWorks Interface, twisted pair FTT10 | I/O Map (16/16) | Y | Y | Y | N | 950 |
| 140NOL91110 | LonWorks Interface, twisted pair TPT/XF-78 | I/O Map (16/16) | Y | Y | Y | N | 950 |
| 140NOL91120 | LonWorks Interface, twisted pair TPT/XF-1250 | I/O Map (16/16) | Y | Y | Y | N | 950 |

1. The software for this module is a ModConnect product.

Quantum Modbus and Modbus Plus Services

| Type | Service Description | Native CPU Ports | | NOM 1-2 Ports | | NOM 3-6 Ports[1] | |
|---|---|---|---|---|---|---|---|
| | | Mod-bus | Mod-bus Plus | Mod-bus | Mod-bus Plus | Mod-bus | Mod-bus Plus |
| Modbus Services | Default Modbus Port Parameters | Y | -- | Y | -- | Y | -- |
| | Configurable Modbus Port Parameters | Y | -- | Y | -- | Y[5] | -- |
| | Modbus to Modbus Plus Bridging | Y[2] | -- | Y[3] | -- | Y[3] | -- |
| | Local CPU Programming | Y[4] | -- | Y[4] | -- | N | -- |
| | Remote CPU Programming over Modbus Plus | Y[4] | -- | Y[4] | -- | Y[2] | -- |
| | Modbus access to local CPU | Y | -- | Y | -- | N | -- |
| | Modbus access to remote CPU over Modbus Plus | Y | -- | Y | -- | Y | -- |
| | Modbus Network Slave Support | Y | -- | N | -- | N | -- |
| | Modbus Master support with XMIT Loadable | Y | -- | N | -- | N | -- |
| | Executive Firmware Loading Support | Y | -- | N | -- | N | -- |
| Modbus Plus services | MSTR read/write register messaging[6] | -- | Y | -- | Y | -- | Y |
| | MSTR read/write Global Data messaging | -- | Y | -- | Y | -- | Y |
| | MSTR get/clear local/remote statistics | -- | Y | -- | Y | -- | Y |
| | Config Extension Global Data Support | -- | Y | -- | Y | -- | N |
| | Config Extension Peer Cop Support | -- | Y | -- | Y | -- | N |
| | Distributed I/O Support | -- | Y | -- | Y | -- | N |
| | CPU Programming | -- | Y[4] | -- | Y[4] | -- | Y[4] |
| | Executive Firmware Loading Support | -- | Y | -- | N | -- | N |

1. Only supported on the 140CPU42402, 140CPU43412 and 140CPU53414 Quantum Controllers.
2. The native CPU Modbus port can be disabled from bridge mode operation with the native Modbus Plus Port.
3. Modbus ports on NOMs are always in bridge mode with their associated Modbus Plus port.
4. Only one programmer connection can be logged in at a time to any CPU, and only one program monitor can be attached at a time to any CPU.
5. Modbus port parameters on NOMs 3-6 are defined by Modbus Port 3 in Concept and Modsoft when the comm parameter selector switch is in mem.
6. Up to 4 MSTR read/write register instructions can be serviced per CPU scan per Modbus Plus port.

For complete information concerning this and other modules, please obtain a copy of the *Quantum Automation Series Hardware Reference Guide* (840 USE 100 00) from your distributor or local sales office.