

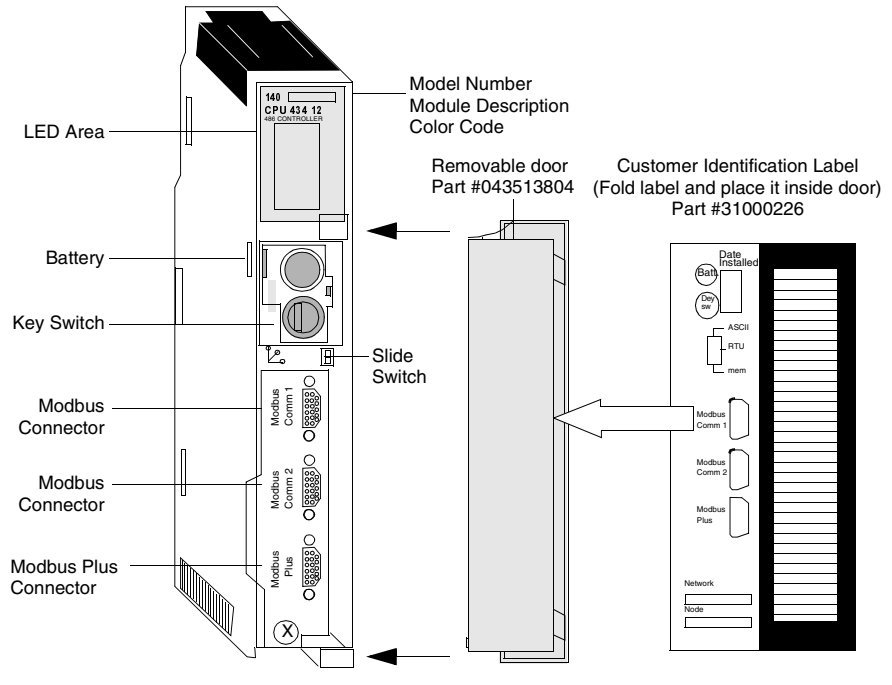
140CPU43412 CPU Module

Overview

The following provides information on the 140CPU43412 Controller module – CPU 2M, 1xModbus Plus, Max IEC Program – 896 k.

CPU Module

The following figure shows the CPU Module and its components.



Specifications

The following table shows the specifications for the CPU43412 CONTROLLER module.

Specifications				
User Logic/Reference Capacity	984 Ladder Logic	Discrete	Register	Extended Register
	64 k words	64 k	57 k	96 k
57,766 4XX registers max Only if: 0XXX = 16 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	2 (Requires expander)			
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 words input of overhead.)	500 In and 500 Out			
Maximum Words per Node	30 In and 32 Out			
Maximum Number of Option Module Interfaces	Supports up to six network modules (i.e., Modbus Plus, Ethernet and Multi-Axis Motion option modules) using the option module interface technique (see p. 33). Note: Only two Modbus Plus modules can have full functionality, including Quantum DIO support.			
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 at Power-off				

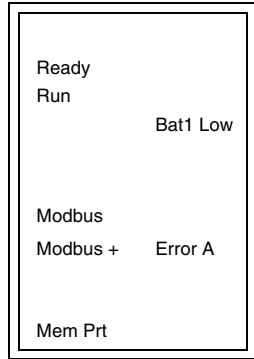
Specifications		
Typical	7 μ A	
Maximum	210 μ A	
Communication		
Modbus (RS-232)	2 serial port (9-pin D-shell)	
Modbus Plus (RS-485)	1 network port (9-pin D-shell)	
General		
Diagnostics	Power Up	Runtime
	RAM	RAM
	RAM Address	RAM Address
	Executive Checksum	Executive Checksum
	User Logic Check	User Logic Check
	Processor	
Bus Current Required	1.8 A	
Power Dissipation	9W	
TOD Clock	+/- 8.0 seconds/day 0 ... 60° C	
Operating Temperature	0 ... 60° C	

*This information can be a mix of Discrete or Register I/Os. 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 140NOM21x00 Option Modules.

LED Indicators and Descriptions

The following figure shows the LED indicators.



The following table shows the LED descriptions.

LEDS	Color	Indication when On
Ready	Green	The CPU has passed power-up diagnostics.
Run	Green	The CPU has been started and is solving logic.
Bat Low	Red	The battery needs replacing or is not present.
Modbus	Green	Communications are active on the Modbus port 1 or 2.
Modbus +	Green	Communications are active on the Modbus Plus port.
Error A	Red	Indicates communications error on the Modbus Plus port.
Mem Prt	Amber	Memory is write-protected (the memory protect switch is on).

LED Error Codes The following table shows the run LED error codes for the 140CPU43412.

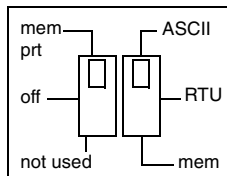
LED Error Codes		
Number of Blinks	Code	Error
Continuous	0000	requested kernel mode
2	80B	ram error during sizing
	80C	run output active failed
	82E	MB command handler stack error
3	769	bus grant received
	72A	not master asic on cpu
	72B	master config write bad
	72C	quantum bus DPM write failure
	72F	plc asic loopback test
	730	plc asic BAD_DATA
4	604	UPI timeout error
	605	bad UPI response opcode
	606	UPI bus diagnostic error
	607	modbus cmd-buffer overflow
	608	modbus cmd-length is zero
	609	modbus abort command error
	614	mbp bus interface error
	615	bad mbp response opcode
	616	timeout waiting for mbp
	617	mbp out of synchronization
	618	mbp invalid path
	619	page 0 not paragraph aligned
	61E	bad external uart hardware
	61F	bad external uart interrupt
	620	bad receive comm state
	621	bad transmit comm state
	622	bad comm state trn_asc
	623	bad comm state trn_rtu
	624	bad comm state rcv_rtu
	625	bad comm state rcv_asc
626	bad modbus state tmr0_evt	
627	bad modbus state trn-int	

LED Error Codes		
Number of Blinks	Code	Error
	628	bad modbus state rcv-int
	631	bad interrupt
5	503	ram address test error
	52D	P.O.S.T BAD MPU ERROR
6	402	ram data test error
7	300	EXEC not loaded
	301	EXEC Checksum
8	8001	Kernal prom checksum error
	8002	flash prog / erase error
	8003	unexpected executive return

Front Panel Switches

Two, three-position slide switches are located on the front of the CPU. The left switch is used for memory protection when in the top position and no memory protection in the middle and bottom positions. The three-position slide switch on the right is used to select the comm parameter settings for the Modbus (RS-232) ports.

The following figure shows the three options that are available for the 140CPU43412 module.



Note: The CPU hardware defaults to bridge mode when the front panel switch is set to RTU or ASCII mode. When networking controllers, a panel device connected to the CPU Modbus port can communicate with the controller to which it is connected, as well as log into any nodes on the Modbus Plus network.

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
Parity	Enable/Disable Odd/Even	
Data Bits	7 / 8	
Stop Bits	1 / 2	
Device Address	1 ... 247	

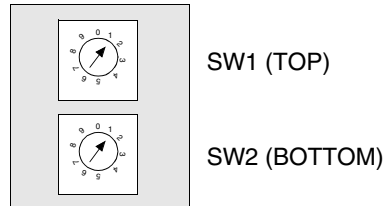
Rear Panel Switches

Two rotary switches (see the following illustration and table) 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.

The following figure shows SW1 and SW2.



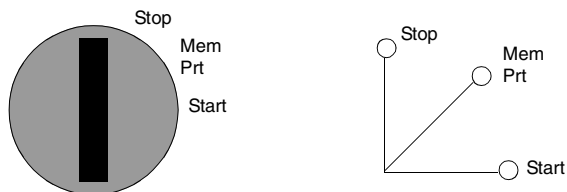
Note: If "0" or an address greater than 64 is selected, the Modbus + LED will be "on" steady, to indicate the selection of an invalid address.

The following table shows the SW1 and SW2 address settings.

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

Key Switch

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



Note: The key switch positions shown next to the switch (above) are for reference only and are marked on the module as indicated on the right.

The following table shows the key switch information.

Key Switch Description				
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
Mem Prt	Controller may be either stopped or running and Programmer changes are disabled. User cannot write to unlocated variables.	Y	N	From Stop or Start: Prevents Programmer changes, controller run status is not changed

Key Switch Description				
Key switch Position	Controller Status	Memory Protected From Programmer Changes	Will Accept Programmer Stop or Start	Key switch Transition
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

All Quantum CPUs are equipped with a nine-pin RS-232C connector that support Modicon's proprietary Modbus communication protocol. The following is the Modbus port pinout connections for nine-pin and 25-pin connections.

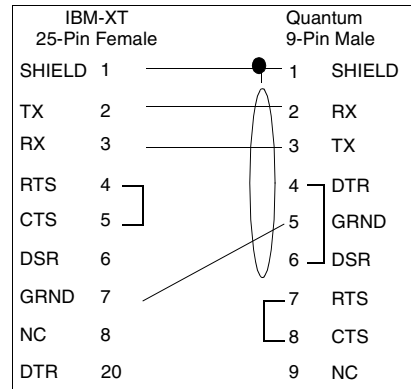
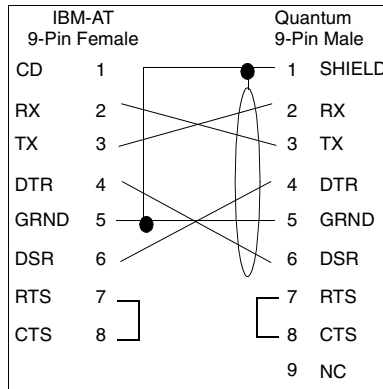
Note: Although the Modbus ports electrically support existing Modbus cables, it is recommended that a Modbus programming cable (Part # 990NAA26320 or 990NAA26350) be used. This cable has been designed to fit under the door of a Quantum CPU or NOM module.

Modbus Port Modem Support

Modbus Port 1 has full modem interfacing ability. Modbus Port 2 RTS/CTS connections function properly for normal non-modem communications but do not support modems.

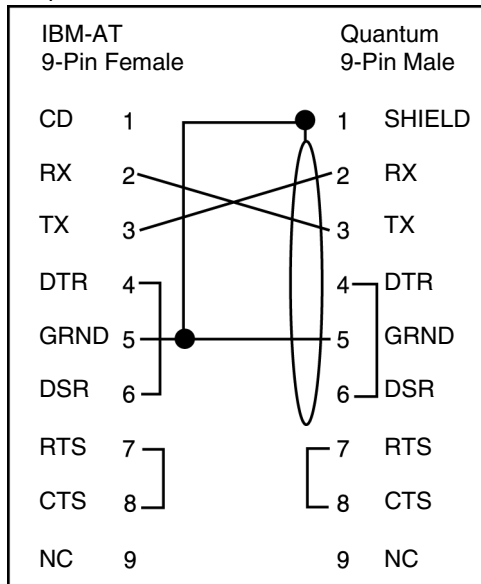
**Modbus Ports
Pinout
Connections**

The following figure shows the Modbus port pinout connections for 9-pin and 25-pin connections.



**Modbus Ports
Pinout
Connections for
Portable
Computers**

The following figure shows the Modbus port pinout connections for 9-pin portable computers.



The following is the abbreviation key for the above figures.

TX: Transmitted Data	DTR: Data Terminal Ready
RX: Received Data	CTS: Clear to Send
RTS: Request to Send	NC: No Connection
DSR: Data Set Ready	CD: Carrier Detect