Quantum Unity CPUs
140 CPU 311 10,
140 CPU 434 12A,
140 CPU 534 14A, and
140 CPU 534 14B

June 2009 eng

3100513805

Schneider Electric

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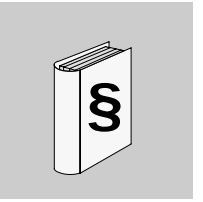
Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death, serious injury, or equipment damage.

WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

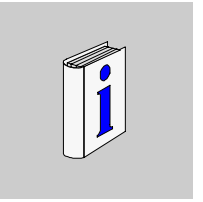
CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE

Electrical equipment should be serviced only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.

About the Book



At a Glance

Document Scope

This instruction sheet provides information on the Quantum Unity CPUs: 140 CPU 311 00, 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B.

Validity Note

The data and illustrations found in this book are not binding. We reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be construed as a commitment by Schneider Electric.

This document applies to the installation and use of ProWORX 32 in Windows 98, Windows Me, Windows XP, Windows NT 4.0, and Windows 2000 environments and ProWORX Server in Windows XP, Windows NT 4.0, and Windows 2000 environments.

Related Documents

Title of Documentation	Reference Number
Modicon Quantum Automation Series Hardware Reference Guide	840 USE 100 00
Quantum with Unity Pro Hardware Reference Manual	UNYUSE10010V11X

Product Related Warnings

Schneider Electric assumes no responsibility for any errors that may appear in this document. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When controllers are used for applications with technical safety requirements, please follow the relevant instructions.

Failure to use Schneider Electric software or approved software with our hardware products may result in improper operating results.

Failure to observe this product related warning can result in injury or equipment damage

User Comments

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Quantum Unity CPUs

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At a Glance

Overview

This chapter provides information on the specifications and topology of the Quantum Unity CPUs 140 CPU 311 10, 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B. In addition, information is provided on network modules that are supported by these Quantum Unity CPUs.

What's in this Chapter?

This chapter contains the following topics:

Specifications

Overview

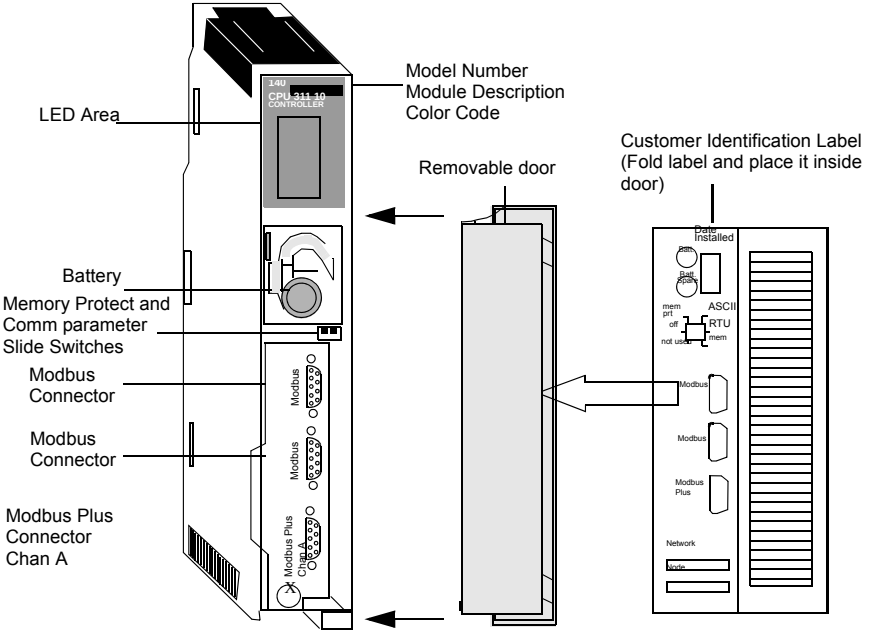
The following provides information on the specifications of the 140 CPU 311 10, 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B Quantum modules. The 140 CPU 311 10 module is supported only by Unity. The 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B modules are supported by Concept and ProWORX and, via an upgrade of their executive, by Unity.

Related Documentation

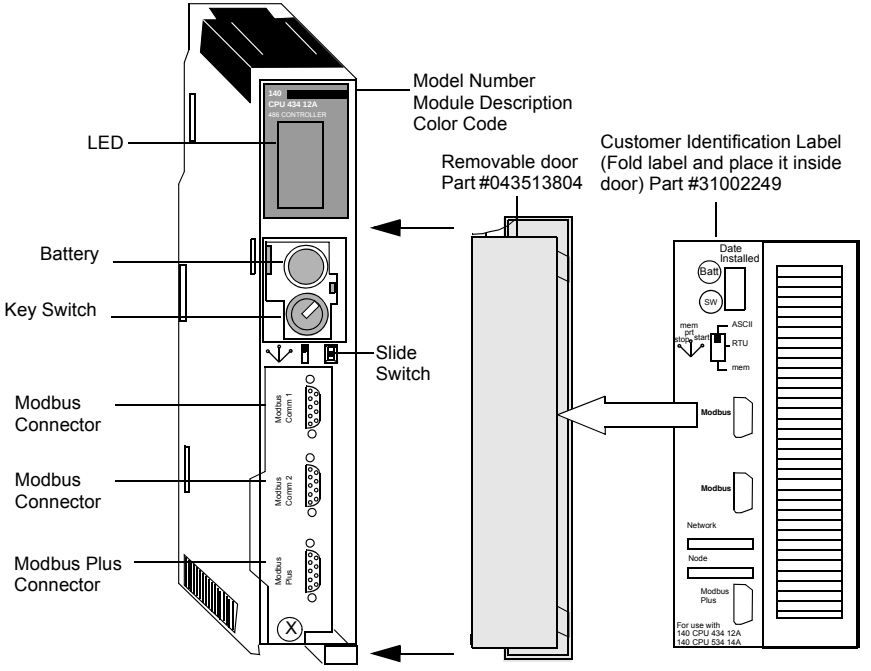
For more information concerning these modules, see the *Quantum with Unity Pro Hardware Reference Manual*, UNYUSE10010V11X or the *Quantum Automation Series Hardware Reference Guide*, 840USE10000 (140 CPU 434 12 A, 140 CPU 534 14A, and 140 CPU 534 14B only).

CPU Modules

The following illustration shows the 140 CPU 311 10 module and its components.



The following illustration shows the 140 CPU 434 12A module and its components. The 140 CPU 534 14A and 140 CPU 534 14B modules have the same components.



Specifications The following table shows the specifications for the 140 CPU 311 10, 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B modules.

Specifications				
Model	**140CPU31110**	**140CPU43412A**	**140CPU53414A**	**140CPU53414B**
Processor	80486	80486	80586	80486
Math Coprocessor	Yes	Yes	Yes	Yes
Clock Speed	66 MHz	66 MHz	133 MHz	100 MHz
User Logic/Reference Capacity Maximum IEC program (Concept/ProWorx) IEC Application without PCMCIA (Unity) Program and unlocated data (min) Located data and config (max) 984 Ladder Logic (not in Unity) Discrete Register Unity Concept/ProWORX	 N/A 400 k 148 k N/A 51.7 k 10 k N/A	 846 k 800k 256 k 64 k 64 k 64 k 57 k	 2.5 M 2.7 m 256 k 64 k 64 k 64 k 57 k	 2.5 M 2.7 m 256 k 64 k 64 k 64 k 57 k
Local I/O Maximum I/O Words Unity Concept/ProWORX Maximum Number of I/O Racks	 64 in and 64 out/module 64 in and 64 out/drop 2 (requires expander)			
Remote I/O Maximum I/O Words per Drop Maximum Number of Remote Drops Number of Networks	 64 in and 64 out 31 1			
Distributed I/O Maximum Networks per System Maximum Words per Network Maximum Words per Node	 3 500 in and 500 out 30 in and 32 out			
Maximum Number of Network Module Interfaces	2	6	6	6
Watchdog Timer	250 ms (software adjustable)			
Logic Solve Time	0.1 ... 0.5 ms/k	0.1 ... 0.5 ms/k	0.9 ... 0.45 ms/k	0.9 ... 0.45 ms/k

Specifications				
Model	**140CPU31110**	**140CPU43412A**	**140CPU53414A**	**140CPU53414B**
Battery				
Type	3 V Lithium	3 V Lithium	3 V Lithium	3 V Lithium
Service Life	1200 mAH	1200 mAH	1200 mAH	1200 mAH
Shelf Life	10 years	10 years	10 years	10 years
Load Current, Typical	7 mA	7 mA	14 mA	14 mA
Load Current, Max	210 mA	210 mA	210 mA	210 mA
Communication Ports				
Modbus (RS-232)	2	2	2	2
Modbus Plus	1	1	1	1
Programming Software Capability	Unity, version 1.0 minimum	Modsoft, version 2.6 or higher Concept, version 2.1 or higher ProWORX NxT, version 2.0 or higher ProWORX Plus, version 1.05 or higher ProWORX 32, version 1.0 or higher Unity, version 1.0 or higher		
Bus Current Required	1250 mA	1250 mA	1250 mA	1250 mA
Key Switch	No	Yes	Yes	Yes
TOD Clock Accuracy	+/- 8.0 seconds/day 0 ... 60° C			
Operating Temperature	0 ... 60° C			

[1]CPUs 140 CPU 434 12 A/140 CPU 434 14A are shipped with Concept/ProWORX operating systems (exec) preloaded. If you need Unity support, you need to load the Unity exec, available on the Web, into the CPU.

Front Panel Topology

Overview

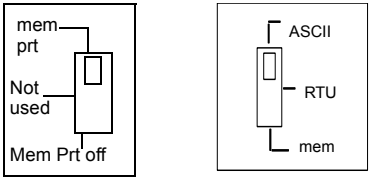
The following provides information on the front panel topology of the Quantum CPU modules. There are two switches (a three-position slide switch and a three-position key switch) located on the front of the 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B modules. The 140 CPU 311 10 module has two slide switches but does not have a key switch.

Front Panel Slide Switches

The 140 CPU 311 10 module has two, three-position slide switches. The left switch is used for memory protection when in the top position and no memory protection in the bottom position. The three-position slide switch on the right is used to select the communication parameter settings for the Modbus ports.

The 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B modules have a single slide switch that is used to select the comm parameter settings for the Modbus (RS-232) ports.

The following illustration shows the slide switches for these two modules. The 140 CPU 311 10 uses both slide switches. The 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B modules use only the slide switch on the right.



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 communication 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

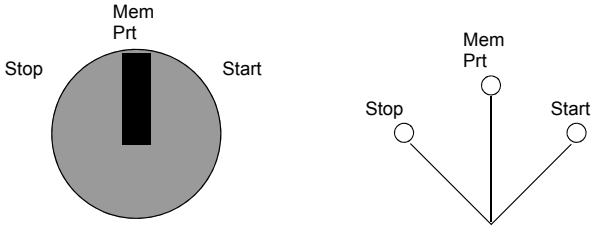
Setting the slide switch to the middle position assigns remote terminal unit (RTU) functionality to the port; the following comm parameters are set and cannot be changed.

RTU Comm Port Parameters	
Baud	9,600
Parity	Even
Data Bits	8
Stop Bits	1
Device Address	Rear panel rotary switch settings

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 Com Port Parameters	
Baud	50 ... 19,200
Data Bits	7/8
Stop Bits	1/2
Parity	Enable/Disable Odd/Even
Device Address	1 ... 247

The key switch is used to protect memory from programming changes while the controller is in operation. The following illustration shows the key switch that is used with the 140CPU43412A, 140 CPU 534 14A, and 140 CPU 534 14B modules.



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.

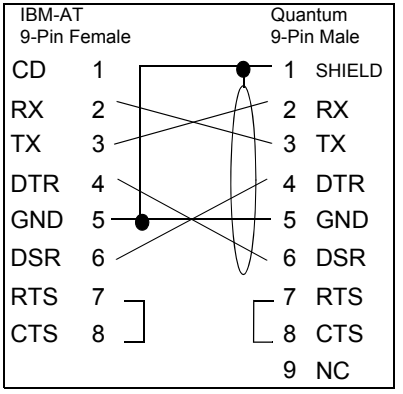
Note: The 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B processors feature the key switch illustrated above, while the 140 CPU 311 10 has a slide switch.

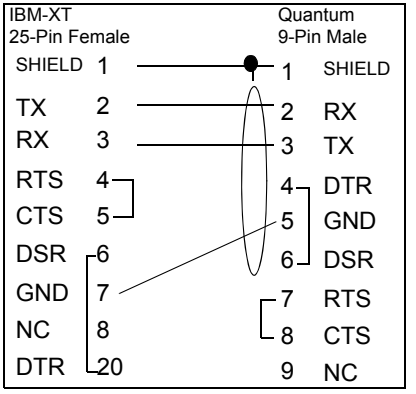
The following table provides key/slider switch information for all three low end CPUs.

CPU Type	Switch Position	Behavior	Protected?	Accepts Stop or Start?	Key Switch Transition
Quantum 140 CPU 311 10	Mem Prt On	The application in Flash memory is not transferred to internal RAM; a warm restart of the application is triggered.	Y	N	From Mem Prt Off: does not modify last controller state and rejects programmer changes.
	Not used	Do not use this position, because it may lead to undefined operation	Y	N	n/a
	Mem Prt Off	The application in Flash memory is automatically transferred to internal RAM when the PLC is powered up. A cold restart of the application is triggered.	N	Y	From Mem Prt On : enables programmer changes and starts controller if stopped.
Quantum 140 CPU 434 12A 140 CPU 534 14A	Stop	The application in Flash memory is not transferred to internal RAM; a warm restart of the application is triggered.	Y	N	From Start or Mem Prt: stops controller, if running, and voids programmer changes.
	Mem Prt	The application in Flash memory is not transferred to internal RAM. A warm restart of the application is triggered.	Y	N	From Stop or Start: prevents program changes, controller run status is unchanged.
	Start	The application in Flash memory is automatically transferred to internal RAM when the PLC is powered up. A cold restart of the application is triggered.	N	Y	From Stop: enables programmer changes, starts controller. From Mem Prt: accepts programmer changes, starts controller if stopped.

Front Panel Modbus Connector

The Quantum 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B are equipped with two nine-pin RS-232 connectors that support Modicon's proprietary Modbus communication protocol. The 140 CPU 311 10 module has one nine-pin RS-232 connector. The following is the Modbus port pinout connections for nine-pin connections.





The following abbreviations are used in the figures above.

TX: Transmitted Data	**DTR: Data Terminal Ready**
RX: Received Data	**CLS**: Clear to Send
RTS: Request to Send	**N/C**: No Connections
DSR: Data Set Ready	**CD**: Carrier Detect
GND: Ground	

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

LED Indicators and Descriptions

The following illustration shows the LED indicators for the 140CPU31110, 140CPU43412A, 140 CPU 534 14A, and 140 CPU 534 14B modules.

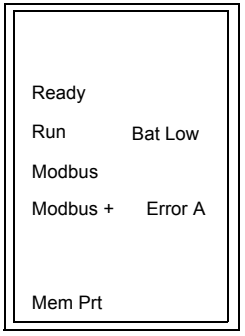


Table with three columns.

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 Table with three columns.

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 receive comm state
	620	bad receive comm state
	l621	bad transmit comm state
	l622	bad comm state trn_asc
	623	bad comm state trn_rtu
	624	bad comm state rcv_rtu
	l625	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

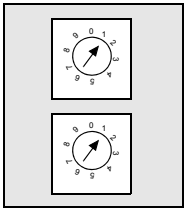
Rear Panel Topology

Overview

The address switch, which is comprised of two rotary switches, is located on the rear panel of the Quantum CPUs. The address switch is used for setting Modbus Plus node and Modbus port addresses.

Note: The highest address that may be set with the address switch 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 (TENS)

SW2 (ONES)

Table with three columns.

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

Overview

The 140 CPU 434 12A, 140 CPU 534 14A, and 140 CPU 534 14B each support 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 DIO support. The 140 CPU 311 10 supports up to two network modules.

Quantum Communications and Network Modules

The following table shows the network modules that are supported.

Model Number	Description	Module Interface Technique	Loadable Required (not in Unity)	Backplane Support			Bus Power mA
				Local	RIO	DIO	
140CRP81100	Profibus	Direct CPU Driver	N	Y	N	N	1200
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 (not in Unity)	Hot Standby Processor Kit	Direct CPU Driver	Y	Y	N	N	700
140NOA61110 (not in Unity)	Interbus Master (G3)	Direct CPU Driver	Y	Y	N	N	700
140NOA62200	Interbus Master (G4)	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
140NOE31100	Ethernet SY/MAX Twisted Pair	Option module	N	Y	N	N	1000

Model Number	Description	Module Interface Technique	Loadable Required (not in Unity)	Backplane Support			Bus Power mA
				Local	RIO	DIO	
140NOE35100	Ethernet SY/MAX Fiber Optic	Option Module	N	Y	N	N	1000
140NOE77101	Ethernet	Option Module	N	Y	N	N	1000
140NOE77111	Ethernet Web Server	Option Module	N	Y	N	N	1000
140MMS42500	Multi-Axis Motion Controller w/ SERCOS	Option Module	N	Y	N	N	2500
140NOL91110 (not in Unity)	LonWorks Interface, twisted pair TPT/XF-78	I/O Map (16/16)	Y	Y	Y	N	950

Quantum Modbus and Modbus Plus Services

This table describes the types of services provided by Modbus and Modbus Plus.

Type	Service Description	Native CPU Ports		NOM 1-2 Ports		NOM 3-6 Ports[1]	
		Modbus	**Modbus Plus**	**Modbus**	**Modbus Plus**	**Modbus**	**Modbus 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	-

Type	Service Description	Native CPU Ports		NOM 1-2 Ports		NOM 3-6 Ports[1]	
		Modbus	**Modbus Plus**	**Modbus**	**Modbus Plus**	**Modbus**	**Modbus Plus**
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	-	Y

1. Only supported on the 140 CPU 434 12A and 140 CPU 534 14A 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.