Modicon Quantum automation platform
Processors
Concept - ProWORX 32

Presentation

Quantum CPUs, which are compatible with Concept and ProWORX software, are single-slot programmable controllers with built-in executive memory, application memory and communication ports. With all memory components on-board, you do not need extra chips or cartridges for configuration.

Flash-based executive memory

Quantum CPUs use flash memory technology to support the CPU's executive memory and instruction set. Flash is a state-of-the-art, non-volatile memory technology that enables field upgrades by downloading files over the Modbus or Modbus Plus port as new features and maintenance updates become available.

Memory backup and protection

The CPUs store the application program in battery-backed RAM. The battery is located on the front of the module and can be serviced while the CPU is running. To protect the application program from inadvertent changes during operation, the CPUs feature a memory-protect slide switch. An LED goes on when this switch is activated.

Math coprocessor

For math-intensive applications, a math coprocessor is available on select CPU models. The coprocessor significantly improves execution times for the 984 Process Control Function Library (PCFL) and Equation Editor, as well as math operations in the IEC languages. Improved floating point execution times mean more power for processing process algorithms and math calculations.

Write protection

Controller write protection minimizes the possibility of a programmer inadvertently writing from a source controller to a memory area in a destination controller. Whatever data is not enabled is prevented from writing, both locally and over the network. This data protection option provides security against data transfer errors.

Communication ports

All CPUs support Modbus and Modbus Plus networking strategies. Simple rotary switches on the back of the modules are used to define the network address of the Modbus Plus port(s). Each device on a Modbus Plus network must have a unique address in the range 1...64. Modbus port settings include: baud rate, parity, number of data bits, number of stop bits, protocol and Slave address. By default, these settings are 9600 bps, even parity, 8 data bits, 1 stop bit, RTU mode and address 1.

A switch on the front of the CPUs can be used to configure the Modbus port as a modem communication interface (2400 bps, even parity, 7 data bits, 1 stop bit, ASCII mode and address 1).

The **140 CPU 434 12 A** and **140 CPU 534 14B** processors have 2 serial Modbus ports:
- Modbus port 1, with full modem interfacing ability.
- Modbus port 2, with RTS/CTS flow control (does not support modem connection).

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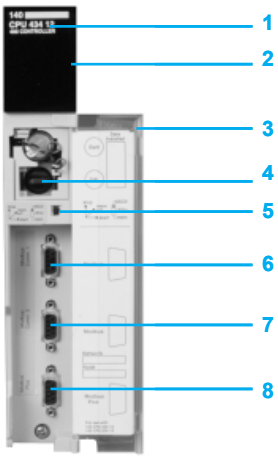
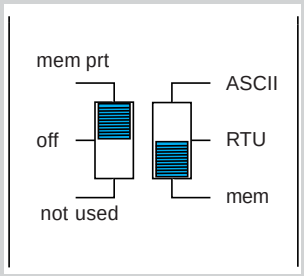


Description

The **140 CPU ●●●** processor front panel comprises:
1 Model number and color code
2 LED array
3 Removable, hinged door and customer identification label
4 Battery slot
5 Two slide switches
6 One Modbus port
7 One Modbus Plus port A
8 One Modbus Plus port B

Note : *The* **140 CPU 113 0●** *CPUs have one Modbus and one Modbus Plus communication port.*



Slide switches

Each of the two slide switches has three-position functionality:

The left slide switch activates the memory write-protect. In the upper position, write protection is enabled; in the middle position, write protection is disabled.

The right slide switch determines the startup communication parameters for the Modbus port. The middle position, RTU, is the factory-set default. The upper position, ASCII, is for modem communications *(1)*. If you need to set special startup parameters for the Modbus port – for example, if your Modbus address is not 1 – you can set application-specific parameters in memory and set the slide switch in the bottom position.

Language choices

Advanced IEC 61131-3 languages

Quantum's 5 IEC 61131-3 languages are:
■ Sequential Functional Chart: provides overall structure and coordination for process or machine control applications.
■ Function Block Diagram: particularly well suited to process control applications.
■ Ladder Diagram: excellent for combinational and interlocking logic.
■ Structured Text: higher level language which is a terrific solution for complex algorithms and data manipulation.
■ Instruction List: low level language for optimizing the size of the program code generated.

984 Ladder Logic

A high performance, low level language whose application source code resides in the controller.
A full set of over 80 instructions is included with every Quantum CPU.
The 984 instruction set ensures compatibility and easy integration paths for installed Modicon applications, including:
■ Immediate I/O access and interrupt servicing
■ Equation editor

(1) 2400 bps, even parity, 7 data bits, 1 stop bit, ASCII mode and address 1.

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Characteristics

Module type			140 CPU 113 02	140 CPU 113 03	140 CPU 434 12A	140 CPU 534 14B
Processors			80186		80486	
Math coprocessor			No		Yes	
Clock speed		**MHz**	20		66	100
User logic	Max. IEC program		109 Kb	368 Kb	896 Kb	2.5 Mb
	Max. LL 984 program		8 Kwords	16 Kwords	64 Kwords	
Capacity	Bits	**bps**	8192 in/8192 out		64 K any mix	
	Registers	**words**	9999 max.		57 K max.	
	Extended memory	**words**	–		96 K	
Logic solve time (984 LL instructions)		**ms/K**	0.3…1.4		0.1…0.5	
Watchdog timer		**ms**	250 (software-adjustable)			
TOD clock accuracy		**s/day**	± 8 @ 0…60°C			
Local I/O	Maximum I/O words		64 I/64 Q			
Remote I/O (RIO)	I/O words/drop		64 I/64 Q			
	Number of drops		31			
	Number of networks		2			
Distributed I/O (DIO)	I/O words/drop		30 I/32 Q			
	I/O words/network		500 I/500 Q			
	Drops/network		63			
	Number of networks		3			
Battery	Type		Lithium			
	Service life	**mAh**	1200			
	Lifetime	**yrs**	10			
	Load current, typical	**µA**	5	7		14
	Load current, max.	**µA**	110	210		420
Communication ports	Modbus (RS 232)		1		2	
	Modbus Plus		1			
Maximum number of NOM, NOE, CRP or MMS modules			2		6	
Key switch			No		Yes	
Bus current required		**mA**	780	790	1250	
Approvals			UL 508, CSA 22,2-142, C UL, FM Class 1 Div. 2, CE			

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Migration of Quantum CPUs

As both the **140 CPU 434 12A** and **140 CPU 534 14B** Quantum CPUs are compatible with Concept or ProWORX software, they can be upgraded to be compatible with the Unity Pro software without any hardware modification. This process of migrating from Concept to Unity Pro is achieved by updating the CPU operating system.
This update is performed with the aid of the OS-Loader tool included with Unity Pro (see page 43120/23).

The upgraded processor **140 CPU 434 12A** is then equivalent to the corresponding Unity processors **140 CPU 434 12U**.

Note : *The migration of* **140 CPU 534 14B** *processor requires the version of Unity Pro software ≥ 3.0.*

CPUs

Memory (total)	**Coprocessors**	**Reference**	**Weight kg**
256 Kbytes	No	**140 CPU 113 02**	0.300
512 Kbytes	No	**140 CPU 113 03**	0.300
2 Mbytes	Integrated	**140 CPU 434 12A**	0.850
4 Mbytes	Integrated	**140 CPU 534 14B**	0.850

Accessories

Description	**Length**	**Reference** *(1)*	**Weight kg**
Programming cable for Modbus interface	3.7 m	**990 NAA 263 20**	0.300
	15 m	**990 NAA 263 50**	1.820
Backup battery	–	**990 XCP 980 00**	–
Quantum automation series hardware reference guide	–	**840 USE 100 0●**	–

(1) Add one of the following digits at the end of the reference: **0***: English,* **1***: French,* **2***: German,* **3***: Spanish.*