Moore Automated

www.mooreautomated.com

# 20 Years Automation Experience

## Specializing In:

- Control Systems (DCS, PLC, CNC)
- Panel Controllers
- HMI and Display Panels
- Drives
- Encoders and Resolvers
- Power Supplies

## Moore Automated: Your Trusted Automation Solution Expert

Moore Automated is a global automation parts reseller focused on hard-to-find and obsolete industrial automation products. Today we already have 20 years experience in automation area.In past time we insist to offer best service to worldwide client,In future we will also offer good quality and satisfied service again.

GE
Intelligent Platforms

GFK-1503E

# VersaMax* PLC
# User Manual

September 2015



*For public disclosure*

# 1 Introduction

**Guide to the VersaMax® Document Set**

This manual contains general information about CPU operation and program content. It also provides detailed descriptions of specific programming requirements.

*Chapter 1* is a general introduction to the VersaMax family of products.

**CPU Modules** are described in detail in *chapter 2* and *chapter 3*.

**Installation procedures** are described in *Chapter 4*.

**PLC Configuration** is described in *chapter 5*. Configuration determines certain characteristics of module operation and also establishes the program references used by each module in the system.

**Ethernet Configuration** for CPU model IC200CPUE05 is described in *chapter 6*.

**CPU Operation** is described in *chapter 7*.

**Serial Communications** are described in *chapter 12*.

**Ethernet Communications** for CPU model IC200CPUE05 is described in *chapter 13*.

The rest of the manual describes many programming features.

- Elements of an Application Program: *chapter 8*
- Program Data: *chapter 9*
- Instruction Set Reference: *chapter 10*
- The Service Request Function: *chapter 11*
- The PID Function: *chapter 14*
- Instruction Timing: *Appendix A*

## 1.1 The VersaMax Family of Products

The VersaMax family of products provides universally-distributed I/O that spans PLC and PC-based architectures. Designed for industrial and commercial automation, VersaMax I/O provides a common, flexible I/O structure for local and remote control applications. The VersaMax PLC provides big-PLC power with a full range of I/O and option modules. VersaMax I/O Stations with Network Interface Modules make it possible to add the flexibility of VersaMax I/O to other types of networks. VersaMax meets UL, CUL, CE, Class1 Zone 2 and Class I Division 2 requirements.

As a scaleable automation solution, VersaMax I/O combines compactness and modularity for greater ease of use. The 70 mm depth and small footprint of VersaMax I/O enables easy, convenient mounting as well as spacesaving benefits. Modules can accommodate up to 32 points of I/O each.

The compact, modular VersaMax products feature DIN-rail mounting with up to eight I/O and option modules per *rack* and up to 8 racks per VersaMax PLC or VersaMax I/O Station system. Expansion racks can be located up to 750 meters from the main VersaMax PLC or VersaMax I/O Station rack. Expansion racks can include any VersaMax I/O, option, or communications module.

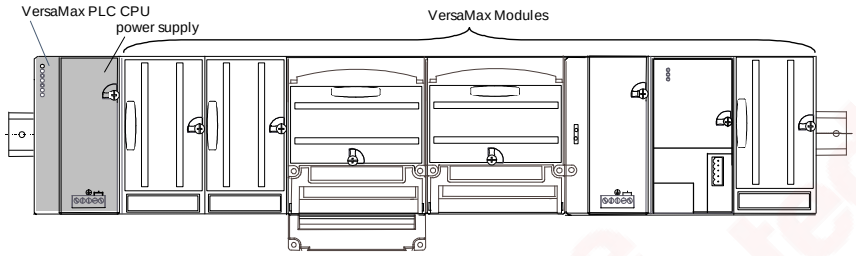
VersaMax provides automatic addressing that can eliminate traditional configuration and the need for hand-held devices. Multiple field wiring termination options provide support for two, three, and four-wire devices.

For faster equipment repair and shorter Mean-Time-To-Repair, the hot insertion feature enables addition and replacement of I/O modules while a machine or process is running and without affecting field wiring.

VersaMax I/O may be remotely located. Remote I/O interfaces for Genius, DeviceNet, Profibus, and Ethernet are available.

## 1.2 CPU Modules for VersaMax PLCs

A VersaMax PLC consists of a group of VersaMax modules with a VersaMax CPU and attached power supply in the first position.




All VersaMax CPUs provide powerful PLC functionality. They are designed to serve as the system controller for up to 64 modules with up to 2048 I/O points. Two serial ports provide RS-232 and RS-485 interfaces for SNP slave and RTU slave communications. CPU model IC200CPUE05 provides a built-in Ethernet port.

### 1.2.1 Basic CPU Features

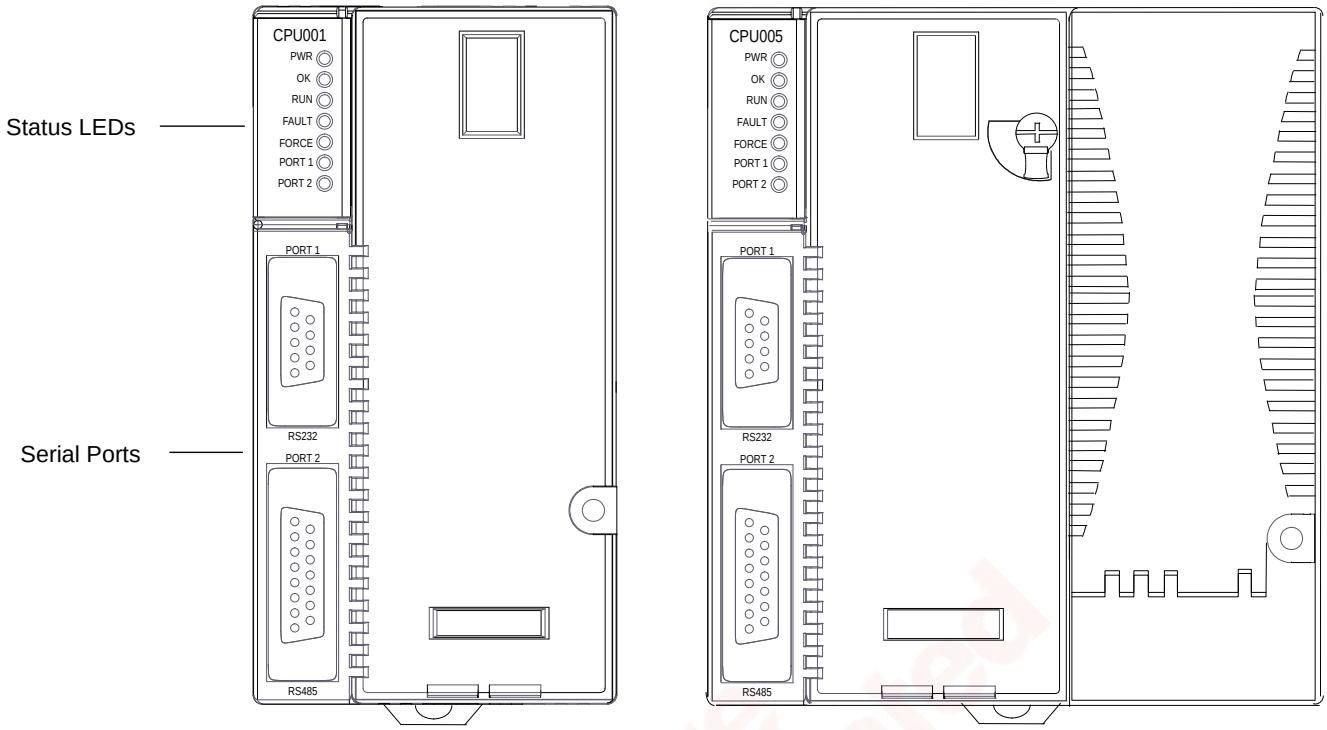
- Programming in Ladder Diagram, Sequential Function Chart, and Instruction List
- Floating point (real) data functions
- Non-volatile flash memory for program storage
- Run/Stop switch
- Embedded RS-232 and RS-485 communications
- Compatible with EZ Program Store device

### 1.2.2 Available VersaMax CPUs

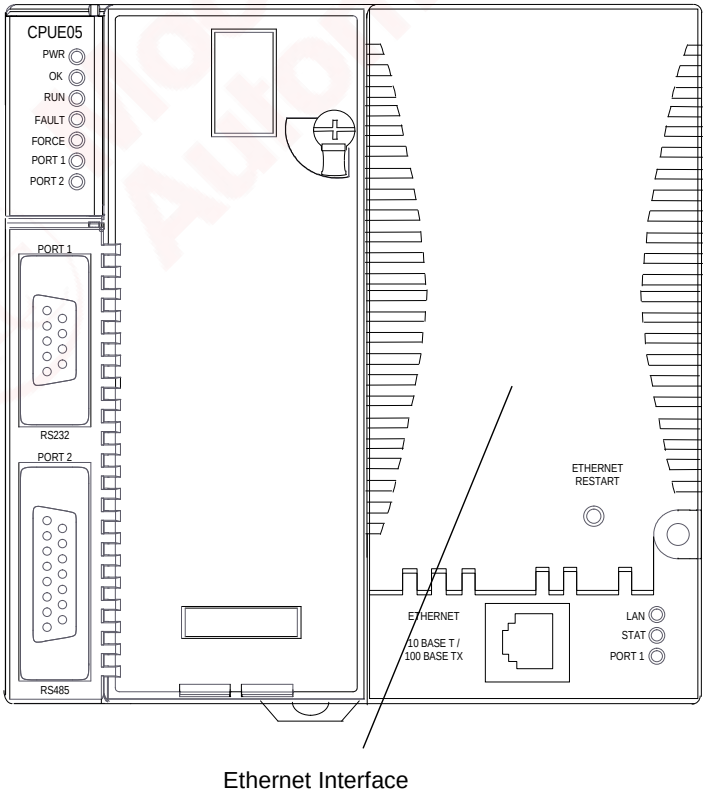
| | |
|---|---|
| CPU with Two Serial Ports, 34kB of Configurable Memory | IC200CPU001 |
| CPU with Two Serial Ports, 42kB of Configurable Memory | IC200CPU002 |
| CPU with Two Serial Ports, 128kB of Configurable Memory | IC200CPU005 |
| CPU with Two Serial Ports and Embedded Ethernet Interface, 128kB of Configurable Memory | IC200CPUE05 |

**CPU001**
**CPU002**

**CPU005**

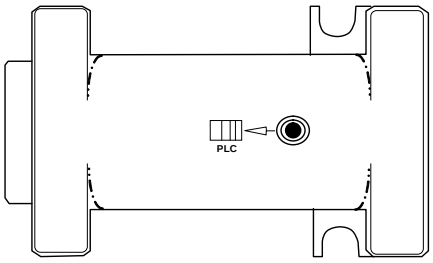



**CPUE05**



### 1.2.3 EZ Program Store

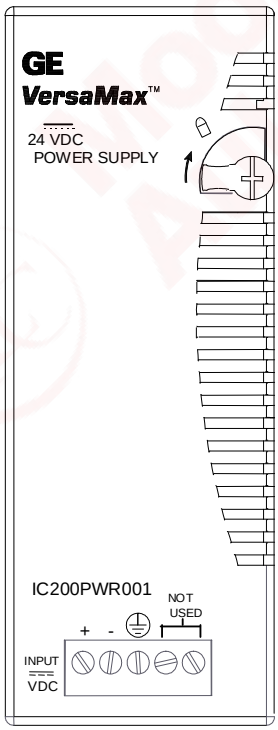
The EZ Program Store device (IC200ACC003) can be used to store and update the configuration, application program, and reference table data of a VersaMax PLC. A programmer and PLC CPU are used to initially write data to the device.




## 1.3 Power Supplies

An AC or DC Power Supply provides +5V and +3.3V power to the modules in the rack. Additional power supplies can be installed on special booster carriers if needed for systems where the number of modules creates the need for a booster. The AC or DC Power Supply on the CPU or NIU and the Power Supply that resides on the Booster Carrier must share the same external power source.

CPU models IC200CPU005 and IC200CPUE05 require the use of an *expanded* 3.3V power supply. Refer to the following table.



### 1.3.1 Available Power Supplies and Carrier

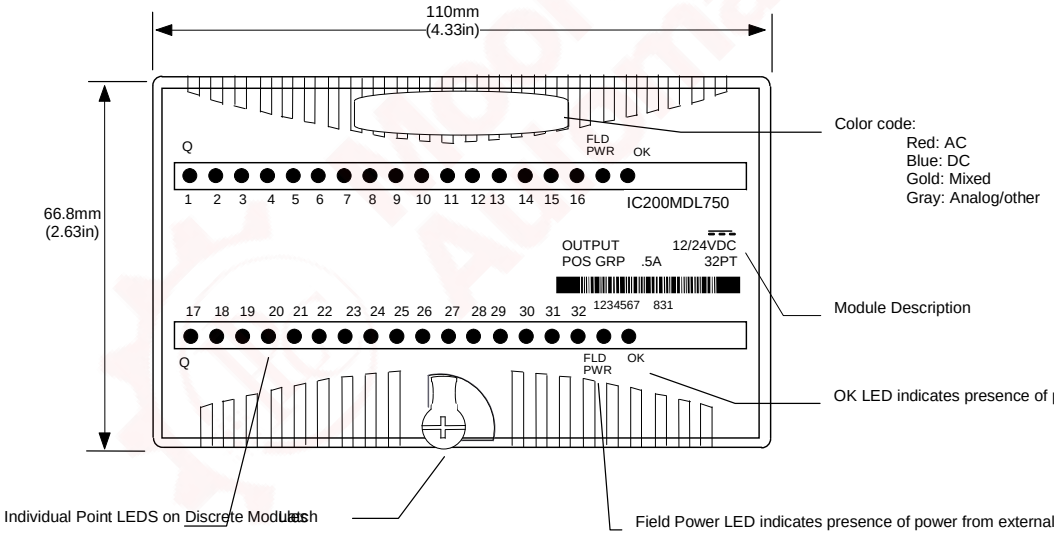
The following VersaMax power supplies and carrier are available:

| | |
|---|---|
| 24VDC Power Supply | IC200PWR001 |
| 24VDC Expanded 3.3V Power Supply | IC200PWR002 |
| 120/240VAC Power Supply | IC200PWR101 |
| 120/240VAC Expanded 3.3V Power Supply | IC200PWR102 |
| 12VDC Power Supply | IC200PWR201 |
| 12VDC Expanded 3.3V Power Supply | IC200PWR202 |
| Power Supply Booster Carrier | IC200PWB001 |

Power supplies are described in the *VersaMax Modules, Power Supplies, and Carriers User Manual* (GFK-1504).

## 1.4 I/O Modules

VersaMax I/O and option modules are approximately 110mm (4.33in) by 66.8mm (2.63in) in size. Modules can be mounted either horizontally or vertically on several types of available I/O Carriers. Modules are 50mm (1.956 in) in depth, not including the height of the carrier or the mating connectors.




VersaMax I/O modules are described in the *VersaMax Modules, Power Supplies, and Carriers User's Manual* (GFK-1504).

# 1.5 Carriers

Carriers provide mounting, backplane communications, and field wiring connections for all types of VersaMax modules. I/O modules can be installed on carriers or removed without disturbing field wiring.

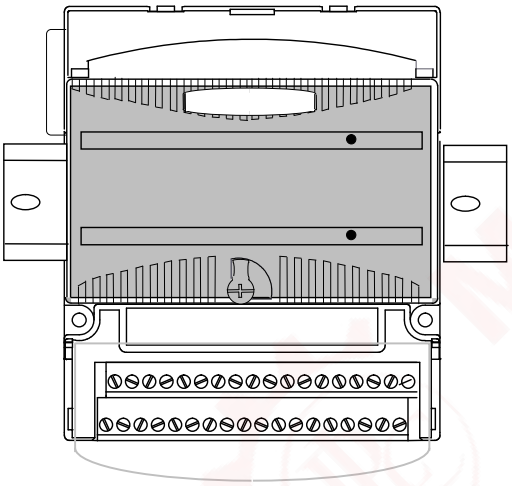
There are three basic I/O Carrier types:

- Terminal-style I/O carriers. Modules mount parallel to the DIN rail.
- Compact Terminal-style I/O Carriers. Modules mount perpendicular to the DIN rail.
- Connector-style I/O Carriers. Modules mount perpendicular to the DIN rail. These carriers are normally used with Interposing I/O Terminals as illustrated below.

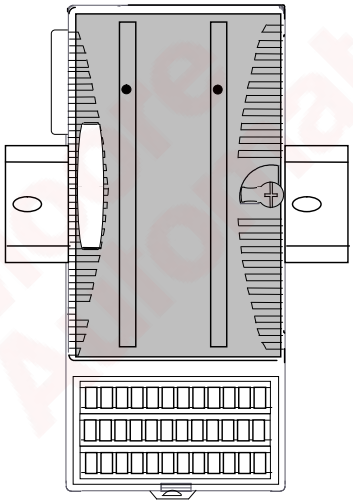
Refer to the *VersaMax Modules, Power Supplies, and Carriers User Manual* (GFK-1504) for information about VersaMax I/O Carriers.

Terminal-style I/O carriers have 36 individual terminals for direct connection of field wiring. Auxiliary I/O Terminal Strips are available for applications requiring additional wiring terminals.

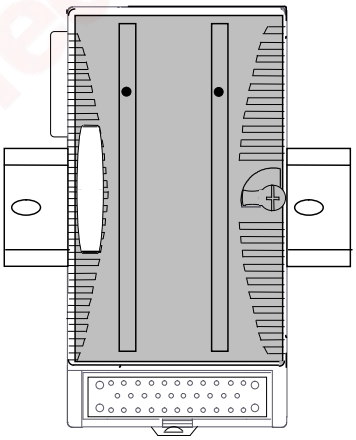
**Terminal-style I/O Carrier**



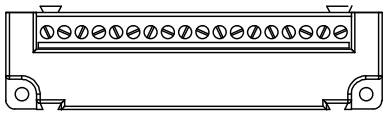
**Compact Terminal-style I/O Carrier**

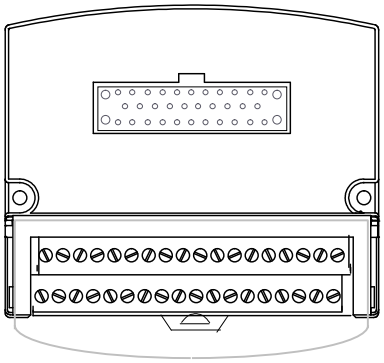


**Connector-style I/O Carrier and Interposing Terminals**



**Auxiliary I/O Terminal Strip**

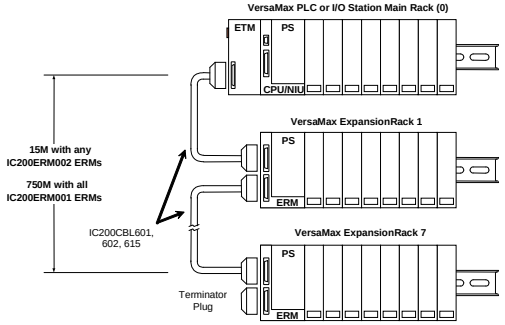




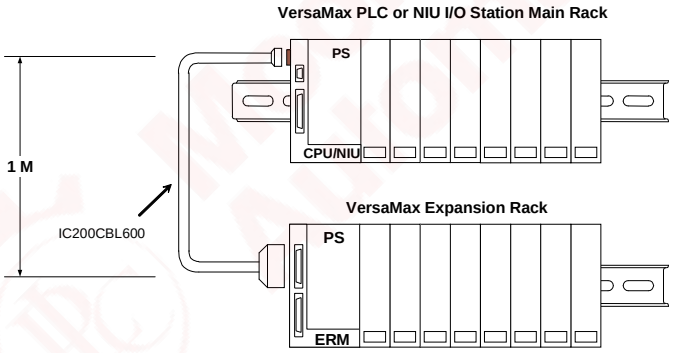
# 1.6 Expansion Modules

There are two basic types of VersaMax I/O expansion systems, Multi-Rack and Single-ended:

- **Multi-Rack**: A VersaMax PLC or NIU I/O Station with an Expansion Transmitter Module (IC200ETM001) and one to seven expansion “racks”, each with an Expansion Receiver Module (IC200ERM001 or IC200ERM002). If all the Expansion Receivers are the Isolated type (IC200ERM001), the maximum overall cable length is 750 meters. If the expansion bus includes any non-isolated Expansion Receivers (IC200ERM002), the maximum overall cable length is 15 meters.




- **Single-ended**: A CPU or NIU I/O Station connected directly to one expansion rack with non-isolated Expansion Receiver Module (IC200ERM002). Maximum cable length is 1 meter.




## 1.6.1 VersaMax Modules for Expansion Racks

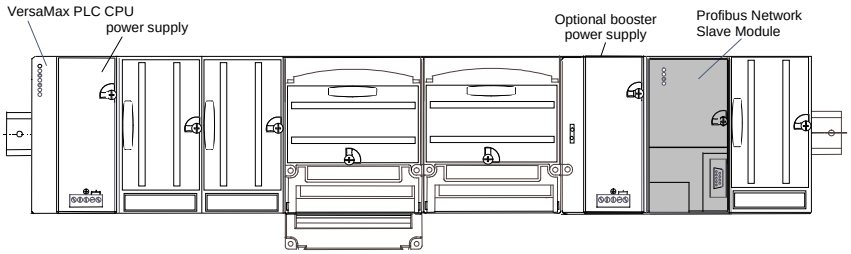
All types of VersaMax I/O and communications modules can be used in expansion racks. Some VersaMax analog modules require specific module revisions as listed below:

| Module | Module Revision |
|---|---|
| IC200ALG320 | B or later |
| IC200ALG321 | B or later |
| IC200ALG322 | B or later |
| IC200ALG430 | C or later |
| IC200ALG431 | C or later |
| IC200ALG432 | B or later |

# 1.7 Communications Modules

Communications modules provide additional flexibility for VersaMax systems.

These communications modules install on a VersaMax Communications Carrier. Power for the communications module comes from the main system power supply or from a booster supply as shown below.




## 1.7.1 Available VersaMax PLC Communications Modules

The following VersaMax PLC communications modules are available:

| Communications Modules | |
|---|---|
| Profibus-DP Network Slave Module | IC200BEM002 |
| DeviceNet Network Control Module | IC200BEM103 |
| Asi Network Master Module | IC200BEM104 |
| Serial Communications Module | IC200CMM020 |
| Communications Carrier | IC200CHS006 |

For information about the Communications Carrier, refer to the *VersaMax Modules, Power Supplies, and Carriers User Manual* (GFK- 1504).

## 1.7.2 Profibus-DP Network Slave Module

The Profibus-DP Network Slave Module (IC200BEM002) is a communications module that exchanges PLC reference table data on the Profibus network. The VersaMax PLC CPU can read and write this data as though it were conventional bit- and word-type I/O data.

Multiple Profibus-DP Network Slave Modules may be used in the same VersaMax PLC. Each one can read up to 244 bytes of data from the network, and send up to 244 bytes of output data. The total amount of combined inputs and outputs is 384 bytes.

For information about the Profibus-DP Network Slave Module, refer to the *VersaMax System Profibus Network Modules User Manual* (GFK-1534, revision A or later).

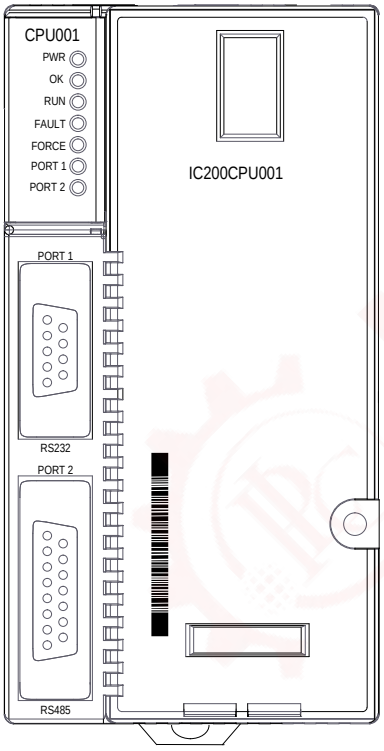
# 2 CPU Module Datasheets: CPU001, CPU002, CPU005

This chapter describes the appearance, features, and functionality of the following VersaMax PLC CPU modules:

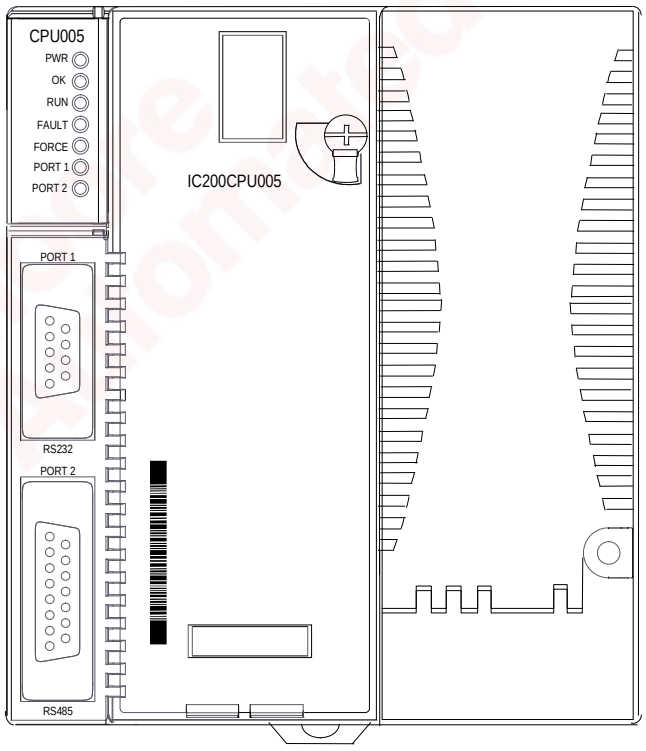
- IC200CPU001 CPU with 34kB configurable memory
- IC200CPU002 CPU with 42kB configurable memory
- IC200CPU005 CPU with 128kB configurable memory

VersaMax PLC CPUs IC200CPU001, CPU002, and CPU005 provide powerful PLC functionality in a small, versatile system. They are designed to serve as the system controller for up to 64 modules with up to 2048 I/O points. Two serial ports provide RS-232 and RS-485 interfaces for SNP slave and RTU slave communications.

**CPU001, CPU002**




**CPU005**



## 2.1 Features

- Non-volatile flash memory for program storage
- Programming in Ladder Diagram, Sequential Function Chart, and Instruction List
- Battery backup for program, data, and time of day clock
- Run/Stop switch
- Floating point (real) data functions
- Embedded RS-232 and RS-485 communications
- 70mm height when mounted on DIN rail with power supply
- Compatible with EZ Program Store device

## 2.2 Module Specifications

| | | | |
|---|---|---|---|
| Size | CPU001/002: 2.63” (66.8mm) x 5.04” (128mm) CPU005: 4.20” (106.7mm) x 5.04” (128mm) | | |
| Program storage | System flash, battery-backed RAM | | |
| Battery backup for program, data, and time-of-day clock | Super capacitor provides power to memory for 1 hour.<br>Over 1 hour, backup battery protects memory contents up to 6 months.<br>Backup battery has shelf life of 5 years when not in use. | | |
| Backplane current consumption:<br>IC200CPU001,<br>IC200CPU002 | no serial port converter or EZ Program Store device | 5V output:<br>40mA | 3.3V output:<br>100mA |
| | with serial port converter or EZ Program Store device | 5V output:<br>140mA | |
| Backplane current consumption:<br>IC200CPU005 | no serial port converter or EZ Program Store device | 5V output:<br>35mA | 3.3V output:<br>300mA† |
| | with serial port converter or EZ Program Store device | 5V output:<br>135mA | |
| Floating point | yes | | |
| Embedded communications | RS-232, RS-485 | | |
| Boolean execution speed | CPU001, CPU002: 1.8ms/K (typical)<br>CPU005: 0.5ms/K (typical) | | |
| Realtime clock accuracy (for timer functions) | 100ppm (0.01%) or +/- 9sec/day | | |
| Time of day clock accuracy | 23ppm (0.0023%) or +/- 2sec/day @ 30C<br>100 ppm (0.01%) or +/- 9sec/day @ full temperature range | | |
| † CPU005 requires a power supply with expanded 3.3V. | | | |

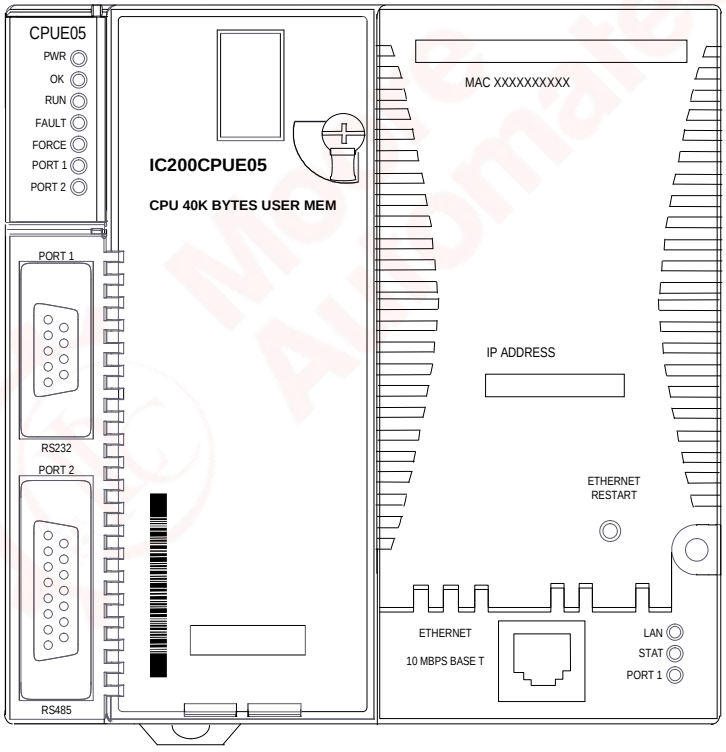
# 3 CPU Module Datasheet: CPUE05

This chapter describes the appearance, features, and functionality of the following VersaMax PLC CPU module:

- IC200CPUE05: CPU with two serial ports, embedded Ethernet interface, and 128K configurable memory

CPU IC200CPUE05 shares the basic features of the other VersaMax PLC CPUs. It provides powerful PLC functionality in a small, versatile system. CPUE05 can serve as the system controller for up to 64 modules with up to 2048 I/O points. Two serial ports provide RS-232 and RS-485 interfaces for serial communications. CPUE05 also provides a built-in Ethernet Interface. The RS-232 serial port can be configured for Local Station manager operation to provide access to diagnostic information about the Ethernet interface. CPUE05 has 128kB of configurable memory.

In addition, CPUE05 is compatible with the EZ Program Store device, which can be used to write, read, update, and verify programs, configuration, and reference tables data without a programmer or programming software.



## 3.2 Module Specifications

| | | | |
|---|---|---|---|
| Size | 4.95” (126mm) x 5.04” (128mm) | | |
| Program storage | System flash, battery-backed RAM | | |
| Battery backup for program, data, and time-of-day clockl | Super capacitor provides power to memory for 1 hour | | |
| | Over 1 hour, backup battery protects memory contents up to 6 months. | | |
| | Backup battery has shelf life of 5 years when not in use. | | |
| Backplane current consumption: | no serial port converter or EZ Program Store device | 5V output: 100mA | 3.3V output: 820mA† |
| IC200CPUE05 | with serial port converter or EZ Program Store device | 5V output: 200mA | |
| Floating point | yes | | |
| Boolean execution speed | 0.5ms/K (typical) | | |
| Realtime clock accuracy (for timer functions) | 100ppm (0.01%) or +/- 9sec/day | | |
| Time of day clock accuracy | 23ppm (0.0023%) or +/- 2sec/day @ 30C. | | |
| | 100 ppm (0.01%) or +/- 9sec/day @ full temperature range | | |
| Embedded communications | RS-232, RS-485, Ethernet interface | | |
| Configurable memory | 128K bytes maximum | | |
| Ethernet Interface Specifications | | | |
| Number of SRTP server connections | 8 | | |
| Ethernet data rate | 10Mbps | | |
| Physical interface | 10BaseT RJ45 Shielded | | |
| WinLoader support | via CPU port | | |
| Number of Ethernet Global Data configuration-based exchanges | 32 | | |
| EGD Exchange limits | 100 data ranges and 1400 bytes of data per exchange; 1200 total data ranges across all exchanges. | | |
| Time Synchronization | NTP - client only (Supported IC200CPUE05-HK or before) | | |
| Selective Consumption of EGD | yes | | |
| Load EGD configuration from PLC to programmer | yes | | |
| Remote Station Manager over UDP | yes | | |
| Local Station Manager (RS-232) | via CPU port | | |
| Configurable Advanced User Parameters | yes | | |
| † CPUE05 requires a power supply with expanded 3.3V. | | | |

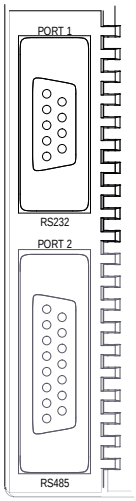
## 3.3 VersaMax General Product Specifications

VersaMax products should be installed and used in conformance with product-specific guidelines as well as the following specifications:

| | | |
|---|---|---|
| **Environmental** | | |
| Vibration | IEC60068-2-6 | 1G @57-150Hz, 0.012in p–p @10-57Hz |
| Shock | IE600C68-2-27 | 15G, 11ms |
| Operating Temp. | | 0°C (32 °F) to +60°C (140 °F) ambient |
| Storage Temp. | | -40°C (-40 °F) to +85°C (185 °F) |
| Humidity | | 5% to 95%, noncondensing |
| Enclosure Protection | IEC60529 | Steel cabinet per IP54: |
| | | protection from dust & splashing water |
| **EMC Emission** | | |
| Radiated, Conducted | CISPR 11/EN 55011 | Industrial Scientific & Medical Equipment |
| | | (Group 1, Class A) |
| | CISPR 22/EN 55022 | Information Technology Equipment (Class A) |
| | FCC 47 CFR 15 | referred to as FCC part 15, |
| | | Radio Devices (Class A) |
| **EMC Immunity** | | |
| Electrostatic Discharge | EN 61000-4-2 | 8KV Air, 4KV Contact |
| RF Susceptibility | EN 61000-4-3 | 10Vrms /m, 80Mhz to 1000Mhz, 80% AM |
| Fast Transient Burst | EN 61000-4-4 | 2KV: power supplies, 1KV: I/O, communication |
| Surge Withstand | ANSI/IEEE C37.90a<br>EN 61000-4-18 | Damped Oscillatory Wave: 2.5KV power supplies,<br>I/O [12V-240V]; 1KV communication |
| | IEC60255-4 | Damped Oscillatory Wave: Class II, |
| | | power supplies, I/O [12V-240V] |
| | EN 61000-4-5 | 2 kV cm(P/S); 1 kV cm (I/O and communication modules) |
| Conducted RF | EN 61000-4-6 | 10Vrms, 0.15 to 80Mhz, 80%AM |
| **Isolation** | | |
| Dielectric Withstand | UL508, UL840,<br>IEC664 | 1.5KV |
| **Power Supply** | | |
| Input Dips, Variations | EN 61000-4-11 | During Operation: Dips to 30% and 100%, Variation for AC +/-10%, Variation for DC +/-20% |

## 3.4 Serial Ports

The two serial ports are software-configurable for SNP slave or RTU master or slave operation. 4-wire and 2-wire RTU are supported. If a port is being used for RTU, it automatically switches to SNP slave mode if necessary. Port 1 can also be configured for Local Station Manager operation to provide access to diagnostic information about the Ethernet interface. Both ports default to SNP slave and both automatically revert to SNP slave when the CPU is in Stop mode, if configured for Serial I/O. Either port can be software-configured to set up communications between the CPU and various serial devices. An external device can obtain power from Port 2 if it requires 100mA or less at 5VDC.




**Port 1**: is an RS-232 port with a 9-pin female D-sub connector. The pinout of Port 1 allows a simple straight-through cable to connect with a standard AT-style RS-232 port.
Port 1 can be configured for either CPU serial communications (SNP, RTU, Serial I/O), or local Station Manager use. If Port 1 has been configured for CPU use, it can be forced to local Station Manager operation using the Restart pushbutton. Once forced, Port 1 remains available for station manager use until the PLC is power cycled, or the Restart pushbutton is pressed. If Port 1 is configured as a local Station Manager, it cannot be used for CPU serial communications or for firmware upgrades using Winloader. The Restart pushbutton will NOT toggle it to the CPU serial protocols.
**Port 2**: is an RS-485 port with a 15-pin female D-sub connector. This can be attached directly to an RS-485 to RS-232 adapter (IC690ACC901). Port 2 can be used for program, configuration, and table updates with the EZ Program Store module.

The following table compares the functions of Port 1 and Port 2.

| | Port 1 | Port 2 |
|---|---|---|
| CPU Protocols (SNP slave, RTU master/slave, Serial I/O) | Defaults to SNP slave | Defaults to SNP slave |
| Local Station Manager | Yes (see above) | No |
| Firmware Upgrade | PLC in Stop/No I/O mode, Port 1 not disabled or in Local Station Manager mode. | No |
| Smart module firmware upgrade | PLC in Stop/No I/O mode, Port 1 configured for CPU protocol | PLC must be in Stop/No IO mode. |
| EZ Program Store device | No | Read, Write, Verify, and Update. PLC must be in Stop/No IO mode. |

# Moore Automated: Your Strategic Partner for Industrial Spares and Solutions

## Moore Automated - Global Supplier Of Industrial Automation Parts

· Expert Consultancy: Technical sales specialists with 10+ years of industry expertise

· 24/7 Responsive Support: AI-powered customer service and engineer hotline

· Quality Commitment: 12-month global warranty on all products

· Supply Chain Assurance: Million-level SKU inventory for industrial spare parts

· Worldwide Delivery: DDP (Delivered Duty Paid) logistics solutions covering 150+ countries

Moore Automated

www.mooreautomated.com

Email：miya@mvme.cn | WhatsApp：86 - 180 2077 6792