

## 2. PAC Solutions

# 2.1 EzProg + MPAC Motion Control Solutions



## Introduction

The MP-8000 is a motion programmable automation controller (MPAC) combining the functionality and openness of a PC with the reliability and simplicity of a programmable logic controller (PLC). The price-performance of the MPAC is unbeatable when compared with a PC, PLC, and DCS. The MP-8000 is designed for time-critical and deterministic operations. Its field of application is unlimited, including factory automation, building automation, machine automation, laboratory automation, chemical industry and environmental monitoring, M2M, etc.

The MP-8000 is part of the new generation of programmable automation controllers from ICP DAS. It is equipped with an AMD LX 800 CPU (500 MHz) or Atom Z510, a Windows Embedded CE6 Operating System, a variety of ports (VGA, USB, Ethernet, RS-232/RS-485) and either 3 or 7 slots for connecting high performance parallel-type I/O modules. Compared with the first generation of WinCON-8000, not only the CPU performance is improved, but also many additional reliability features are included, such as dual LAN, redundant power input, dual battery backup SRAM, etc.

### MP-8000 $\approx$ IPC+I/O Cards



Windows Embedded CE is a componentized, real-time, high performance, and highly reliable operating system. Windows CE 6 R3 delivers a rich user experience and a unique connection to Windows PCs, servers, services, and devices. The MP-8000 also supports the EzProg-I software development package offered by ICP DAS.

## Main MPAC Components

### 1 Main Control Unit (MCU)

The MCU is the powerhouse of the MP-8000. Each MCU comprises a Central Processor Module (CPM), a power supply, and either a 3- or 7-slot backplane for I/O modules. The CPM is a powerful integrated processing engine comprising a CPU, RAM and ROM, and communication interfaces for Ethernet, RS-485, RS-232 and FRnet.

### 2 Embedded OS - Windows CE6

Windows CE 6 is the next generation of real-time OS offered by Microsoft. Windows CE 6 provides the software engineer with familiar tools and innovative technologies designed to reduce the development time of application software. The high performance and high reliability of the MP-8000 together with the Windows CE, makes the MP-8000 an ideal controller in an environment where time-critical performance is required. The Windows CE6 operating system kernel architecture supports up to 32,000 simultaneous processes, each of which runs in a 2GB virtual memory address space. This allows developers to incorporate a larger number of complex applications into the MP-8000.

### 3 I/O Modules

There are two types of I/O module: parallel and serial. The parallel modules (I-8K high profile series and motion series) are high-speed modules and have to be installed in the slots of the MP-8000. The serial I/O modules (I-87K high profile series) can either be installed in the slots (MP-8000) or expansion units (RU-87Pn).

### 4 Remote I/O Expansion

The MP-8000 has built-in RS-485 and Ethernet ports to connect to remote I/O units (RU-87Pn/ET-87Pn) or I/O modules (I-7000/M-7000/ET-7000). By installing CAN or FRnet communication modules, the MP-8000 can exchange data with CAN bus devices, remote I/O units or FRnet I/O modules for deterministic control systems.

## Development Software - EzProg



### The EzProg-I PAC Automation Solution

EzProg-I is a total software solution for manufacturers or control system designers that simplifies system configuration, logic programming and HMI design. By using EzProg-I, engineers who are familiar with PLC systems can easily transfer their programming experience to ICP DAS's programmable automation control (PAC) solutions. The EzProg-I software makes it much easier for customers to integrate PLCs and IT technologies into a PAC environment.

The EzProg-I package contains a side range of development tools and libraries, such as EzConfig, EzGo, EzHMI, EzLib and EzCore. Based on these development resources, customers can directly configure and test the PAC channels and motion control modules without requiring additional programming. In addition, the EzProg-I simplifies the I/O instructions and provides a PLC-like I/O mapping table that assists the system designers in developing and testing the control system application.

### Development Structure

The EzProg-I structure is divided into three main parts:

#### 1. Upper layer: EzHMI

EzHMI provides a number of ActiveX controls which allow the programmer to create a graphical interface on a WinCE system. The EzHMI object can be directly linked to an I/O mapping table that makes the reading and writing of digital and analog I/O values very easy. The EzCore engine that operates in the background is responsible for updating the I/O table in real time.

## 2. Intermediate layer: API

The EzProg-I provides common APIs for accessing different I/O modules types. In the past, each module type could only be accessed via its own APIs, meaning that different APIs had to be called in order to communicate with different modules. The EzProg-I now solves this problem and unifies all APIs, so that no matter which I/O module you need to exchange data with, only one API needs to be called. EzProg-I enables PLC-like programming by providing APIs for accessing EzCore registers that consist of the I/O mapping table and non-hardware related tables.



## 3. Lower layer: Logic control design

The control software provides three different design methods:

- 8 User thread procedures:  
The user thread only executes once. User threads have a lower priority than other routines.
- 8 Executive routines with a fixed interval time:  
Similar to a PLC scan method, a thread will be created after the system starts that executes the user-defined routine in a fixed time interval (minimum 2 ms).
- Hardware interrupt routine:  
EzProg-I processes DI signal interrupts and Motion interrupts to execute the code added to the interrupt service routine.

### Other features of EzProg-I:

|                                     |   |
|-------------------------------------|---|
| <b>Public System Variable Type:</b> | D (long), DW (Double WORD), W (Word), F (Float), B (Byte), M (Flag), S (Step), MSG (Message). |
| <b>Retain Variable:</b>             | Most variable types have half-retain variable blocks.   |
| <b>Timer Function:</b>              | Millisecond-based timer.  |
| <b>Multi-language Messages:</b>     | A MLn file is provided to allow editing of UNICODE 1000 messages.                             |

### Tools Support Guide: EzConfig, EzGo

| Module/Tool          | EzConfig     | EzGo |
|----------------------|--------------|------|
| I-8092F-G            | Yes (Note 1) | Yes  |
| I-8094-G             | -            | Yes  |
| I-8094F-G            | Yes (Note 1) | Yes  |
| I-8094A-G            | -            | Yes  |
| I-8094H-G            | -            | Yes  |
| I-8K Serial Modules  | Yes          | -    |
| FRnet Remote Modules | Yes          | -    |

**Note 1:** Only for FRnet

## EzProg-I Tools



### EzConfig

EzConfig is an I/O configuration tool that can be used to configure and test digital I/O, analog I/O, FRnet remote I/O and virtual I/O (M/D/F/DB/C/T/MSG etc.) for I-8000 series modules and the virtual I/O used in the EzProg-I.

#### Functions of EzConfig:

- Auto scan of I/O modules
- Load and save configuration data
- Retain data management
- Set initial virtual value
- Edit notes
- Read/Write XML files
- Generate AES code



### EzGo

ICP DAS provides a motion testing tool called EzGo for I-8094, I-8094F, I-8094A, I-8094H and I-8092F modules used within PACs for machine automation.

### EzHMI

EzProg-I also provides many useful HMI ActiveX components for manufacturers and control system designers. It allows the programmer to create a graphical interface on a WinCE system without requiring any additional programming, greatly improving application programming productivity.

- EzHMI for applications
- Easy property settings
- Easy GUI color settings
- UNICODE Multi-Language editing
- Auto alarm flashing
- Dynamic BMP images
- Direct I/O register value settings
- Support Windows text fonts
- Displays I/O register data



### EzLib

EzLib is a collection of reusable software components that is designed to assist software developers when writing application programs for the Windows CE platform.

- Data format transformation
- Date/Time functions
- File I/O functions
- BMP file drawing library
- FTP connection library
- TCP/IP library
- Trend graph library

# MPAC (Motion PAC) Series

**MP-8343 / MP-8743 / MP-8353 / MP-8753**

# 2

1

PAC Solutions



**NEW MP-8343**



**NEW** **MP-8743**



**Available soon** **MP-8353**



**Available soon** **MP-8753**

## Features:

- AMD LX800 500 MHz CPU or Atom Z510 1.1 GHz CPU
- Windows CE 6.0
- SQL Compact Edition 3.5
- EzProg-I development tools
- VGA Port Output
- Redundant Power Input
- Operating Temperature: -25 ~ +75°C

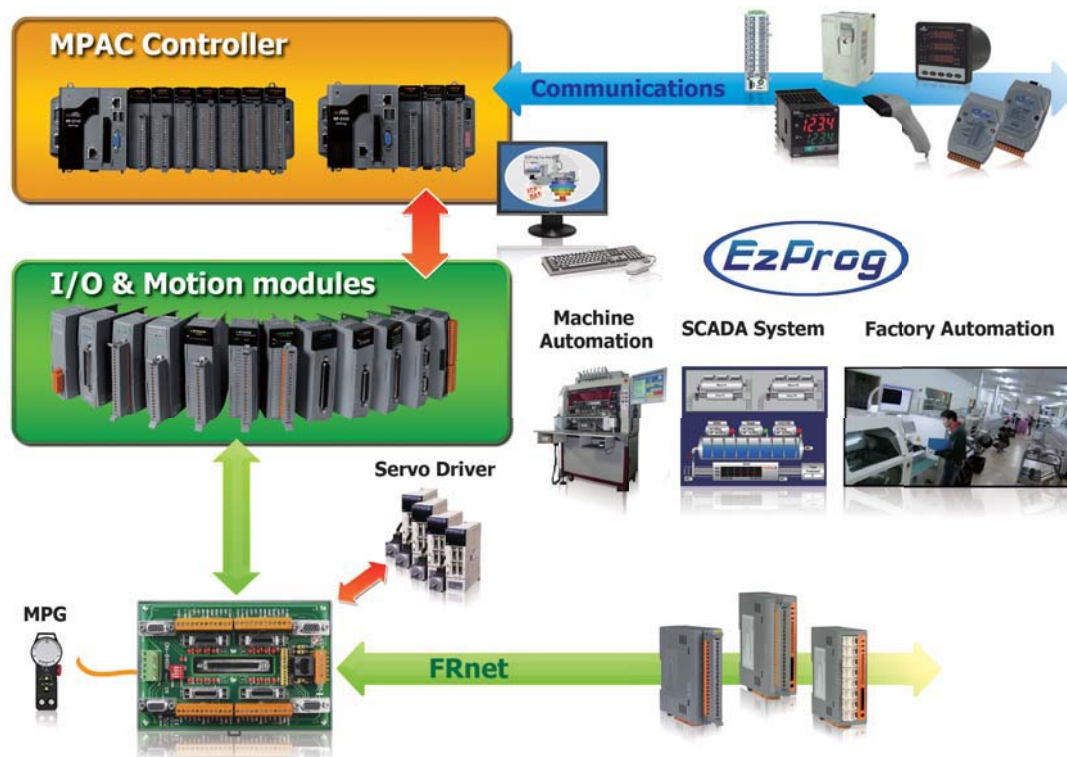


## Introduction:

The **MP-8xx3** is part of the new generation of programmable automation controllers from ICP DAS. It is equipped with a Windows Embedded CE 6.0 operating system running on an AMD LX 800 CPU (500 MHz) or an Intel Atom Z510 CPU (1.1 GHz), and includes a wide range of interface ports (VGA, USB, Ethernet, RS-232/RS-485) and either 3 or 7 slots for connecting high performance parallel I/O modules (high profile I-8K series).

The Windows Embedded CE 6.0 OS has many advantages, including hard real-time capability, small core size, interrupt handling at a deeper level, achievable deterministic control and low cost. Compared with CE5.0, Windows Embedded CE6.0 automatically updates its virtual memory architecture to increase system robustness and security.

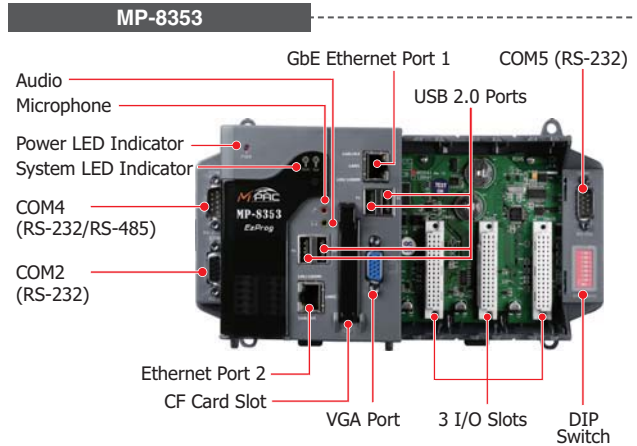
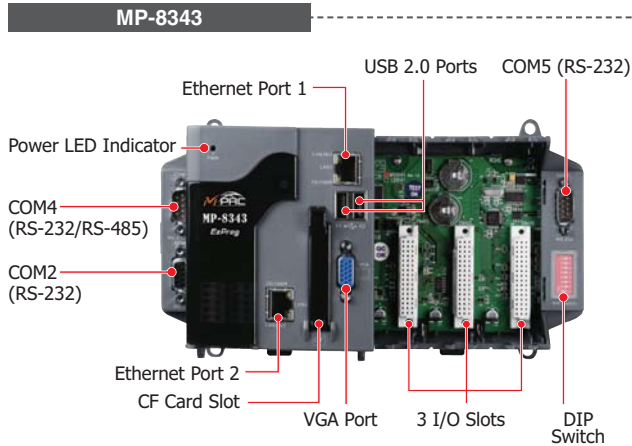
## Application: Rich I/O Expansion Ability





## Hardware:

### 1. Appearance

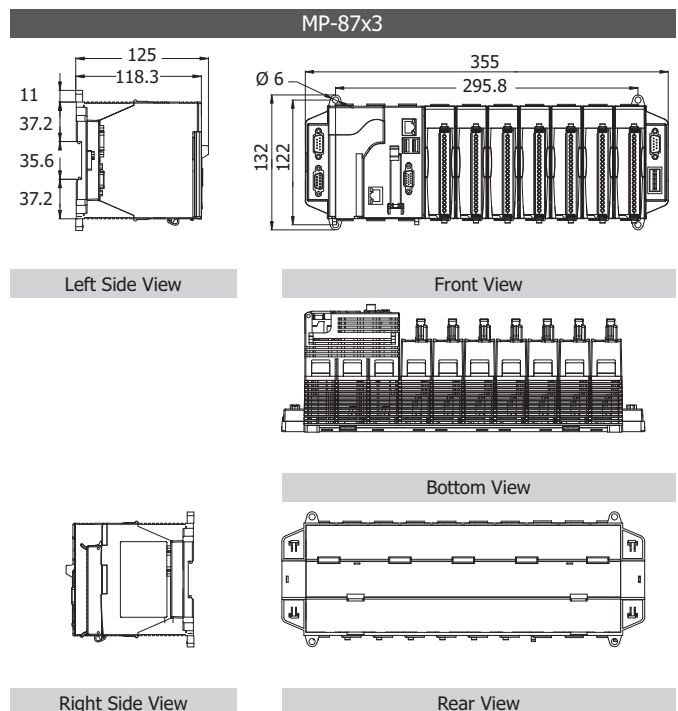
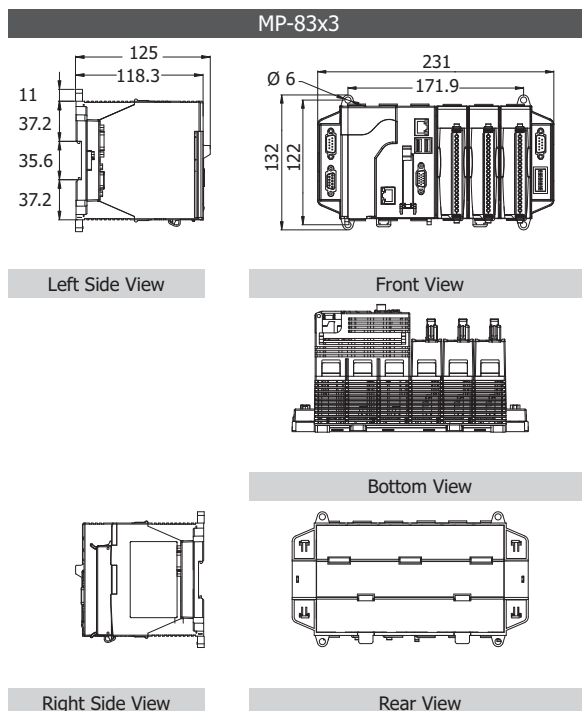


### 2. Installation



DIN-Rail Mounting

### 3. Mechanical



## Specifications:

| Models                        | MP-8343   | MP-8743                  | MP-8353                        | MP-8753                  |
|-------------------------------|---|--------------------------|--------------------------------|--------------------------|
| System Software               |   |                          |                                |                          |
| OS                            | Windows CE 6.0 core version   |                          |                                |                          |
| .Net Compact Framework        | 3.5   |                          |                                |                          |
| Embedded Services             | FTP Server, ASP (Java Script, VB Script), SQL Compact Edition 3.5                                     |                          |                                |                          |
| SDK Provided                  | DII for Visual Studio .Net 2005/2008  |                          |                                |                          |
| Multilanguage Support         | English, German, French, Spanish, Russian, Italian, Japanese, Simplified Chinese, Traditional Chinese |                          |                                |                          |
| CPU Module                    |   |                          |                                |                          |
| CPU                           | LX800, 500 MHz  |                          | Atom Z510, 1.1 GHz             |                          |
| System Memory                 | 512 MB DDR SDRAM  |                          |                                |                          |
| Dual Battery Backup SRAM      | 512 KB; data valid up to 5 years  |                          |                                |                          |
| Flash                         | 4 GB  |                          | 8 GB                           |                          |
| EEPROM                        | 16 KB   |                          |                                |                          |
| CF Card                       | Minimum 1 GB (support up to 32 GB)  |                          |                                |                          |
| 64-bit Hardware Serial Number | Yes, for Software Copy Protection   |                          |                                |                          |
| Dual Watchdog Timers          | Yes   |                          |                                |                          |
| Rotary Switch                 | Yes (0 ~ 9)   |                          |                                |                          |
| DIP Switch                    | Yes (8 bits)  |                          |                                |                          |
| Audio                         | -   |                          | Microphone-In and Earphone-Out |                          |
| VGA & Communication Ports     |   |                          |                                |                          |
| VGA                           | Yes (resolution: 1024 x 768, 800 x 600, 640 x480)   |                          |                                |                          |
| Ethernet (Giga bit)           | RJ-45 x 2, 10/100 Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)                          |                          |                                |                          |
| USB 2.0                       | 2   |                          | 4                              |                          |
| COM 1                         | Internal communication with I-87K modules in slots  |                          |                                |                          |
| COM 2                         | RS-232 (Rx/D, Tx/D and GND); non-isolated   |                          |                                |                          |
| COM 3                         | RS-485 (Data+, Data-) with internal self-tuner ASIC; 3000 VDC isolated                                |                          |                                |                          |
| COM 4                         | RS-232/RS-485 (Rx/D, Tx/D, CTS, RTS and GND for RS-232, Data+ and Data- for RS-485); non-isolated     |                          |                                |                          |
| COM 5                         | RS-232 (Rx/D, Tx/D, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolated                                 |                          |                                |                          |
| I/O Expansion Slots           |   |                          |                                |                          |
| Number of Slots               | 3   | 7                        | 3                              | 7                        |
| Type of Modules Supported     | High profile modules only   |                          |                                |                          |
| Mechanical                    |   |                          |                                |                          |
| Dimensions (W x L x H)        | 231 mm x 132 mm x 125 mm  | 355 mm x 132 mm x 125 mm | 231 mm x 132 mm x 125 mm       | 355 mm x 132 mm x 111 mm |
| Installation                  | DIN-Rail or Wall Mounting   |                          |                                |                          |
| Environmental                 |   |                          |                                |                          |
| Operating Temperature         | -25 ~ +75°C   |                          |                                |                          |
| Storage Temperature           | -30 ~ +80°C   |                          |                                |                          |
| Ambient Relative Humidity     | 10 ~ 90% RH, Non-condensing   |                          |                                |                          |
| Power                         |   |                          |                                |                          |
| Input Range                   | +10 ~ +30 VDC   |                          |                                |                          |
| Isolation                     | 1 kV  |                          |                                |                          |
| Redundant Power Inputs        | Yes, with one power relay (1 A @ 24 VDC) for alarm  |                          |                                |                          |
| Capacity                      | 35 W  |                          |                                |                          |
| Consumption                   | 14.4 W  | 16.8 W                   | 14.4 W                         | 16.8 W                   |

## Ordering Information:

|            |   |
|------------|---|
| MP-8343 CR | Standard MP-8343 PAC with 3 I/O Slots (Multilingual OS) (RoHS)      |
| MP-8743 CR | Standard MP-8743 PAC with 7 I/O Slots (Multilingual OS) (RoHS)      |
| MP-8353 CR | Standard MP-8353-Atom PAC with 3 I/O Slots (Multilingual OS) (RoHS) |
| MP-8753 CR | Standard MP-8753-Atom PAC with 7 I/O Slots (Multilingual OS) (RoHS) |

## Accessories:

|              |  |
|--------------|--|
| USB-2020 CR  | USB Audio Device (RoHS)  |
| USB-2560 CR  | 4-port Industrial USB 2.0 Hub (RoHS)                                       |
| NS-208 CR    | 8-port Unmanaged Industrial 10/100 Base-TX Ethernet Switch (RoHS)          |
| MDR-20-24 CR | 24 V <sub>DC</sub> /1.0 A, 24 W Power Supply with DIN-Rail Mounting (RoHS) |
| MDR-60-24 CR | 24 V <sub>DC</sub> /2.5 A, 60 W Power Supply with DIN-Rail Mounting (RoHS) |