Programmable Automation Controller








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Industrial Automation Technolgy Innovator and Enhancer.

About Us

ICP DAS focused onresearch and innovation.

We are committed to providing you with complete solutions for Industrial Automation, IIoT, Industrial 4.0, Energy Management, Smart Factory, Smart Manufacturing, Smart Building, and Smart City…etc.The development and manufacturing of our automation products is mainly focused on data acquisition and data monitoring.

We can provide you with complete industrial automation solutions, applicable industry services, and the best after-sales service.

ICP DAS, established in 1993,

focuses on innovation and improving the industrial automation technology.



▲Hukou Headquarters: 7,500 m2



▲Hukou Factory 2: 11,824 m2



▲Wuhan: 3,300 m2



►Taichung: 760 m2

■ Date of Establishment	■ 1993
■ Headquarters / Factory Location	■ Hsinchu, Taiwan
■ Initial Public Offerings	■ Jan. 06, 2009 [Stock Symbol: 3577]
■ Registered Capital	■ NTD 581 Million (US$ 18.2 Million)
■ Registered Capital	■ ISO 9001 2015 / TÜV Rheinland 0000056241
■ Services	■ Design, R&D, Manufacturing, Application Development, Marketing, and After Sales Service

History

1993



ICP DAS Established.

2004

"Shanghai Golden ICP DAS International Trade Co., Ltd." established.
The marketing, selling, and customized
Services were then provided.

2007



ICP DAS conducted the "voyage data recorder" project for ships in Taiwan.

2010

Investment Board, Ministry of Economic Affairs, approved our indirect investment in China.
ICP DAS (Wuhan) established.

2013

InduSoft

Indusoft exclusive distributor

2014



Our PMC-5141 product won the "Innovation Award" at the "China Association of Automation" in 2014.

2015

The 23rd Taiwan Excellence Award

- The DL-302 Industrial AirBox, which can detect CO/CO2, temperature, and humidity, was selected for the 23rd Taiwan Excellence Award.
- The WF-2000 smart wireless data acquisition module series was selected for the 23rd Taiwan Excellence Award.

2016



The WISE-5200 IIoT Intelligent controllerwas selected for the 24th Taiwan ExcellenceAward.

2018

ICP DAS-BMP
Biomedical Polymers

A new biomedical division was established toproduce medical polymer materials.

2020



Product Launch – Medical Grade Aliphatic Polyether-based TPU (ALP) and Medical Grade Aliphatic Polyether-based TPU loaded with 20% Barium Sulfate (ALP-B20).

Core Technologies



The five significant aspects of our core technologies are collection, computing, control, connection, and communication. We can send the collected data to the cloud to create a one-station management approach. This provides our customers with convenience and flexibility in numerous application fields.
Management personnel can ensure the collection is focused on research and innovation of big data following analysis and processing, meaning they can optimize work processes, strengthen personnel management and improve production efficiency.



Team Profile



The ICP DAS team is professional and well-organized, with great reputation in the field. Our products are completely made in Taiwan, and are developed following an in-depth process of R&D, manufacturing, inspection and packaging, before they are delivered to our customers.

ICP DAS employs over 128 R&D personnel working as experts in the process of production and R&D. Over the years, we've invested a huge amount of money into R&D, devoting ourselves to being competitive based on market demands, with continuously innovative products, and providing customers with multiple solutions to each application scenario. Our sales team, both online and offline, are always enthusiastic towards providing service based on marketing and technological support. They also conduct annual training courses for our customers to cultivate capable professional quality.

Number of Employees: 395 (Taiwan)



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CH1
PAC Family Introduction

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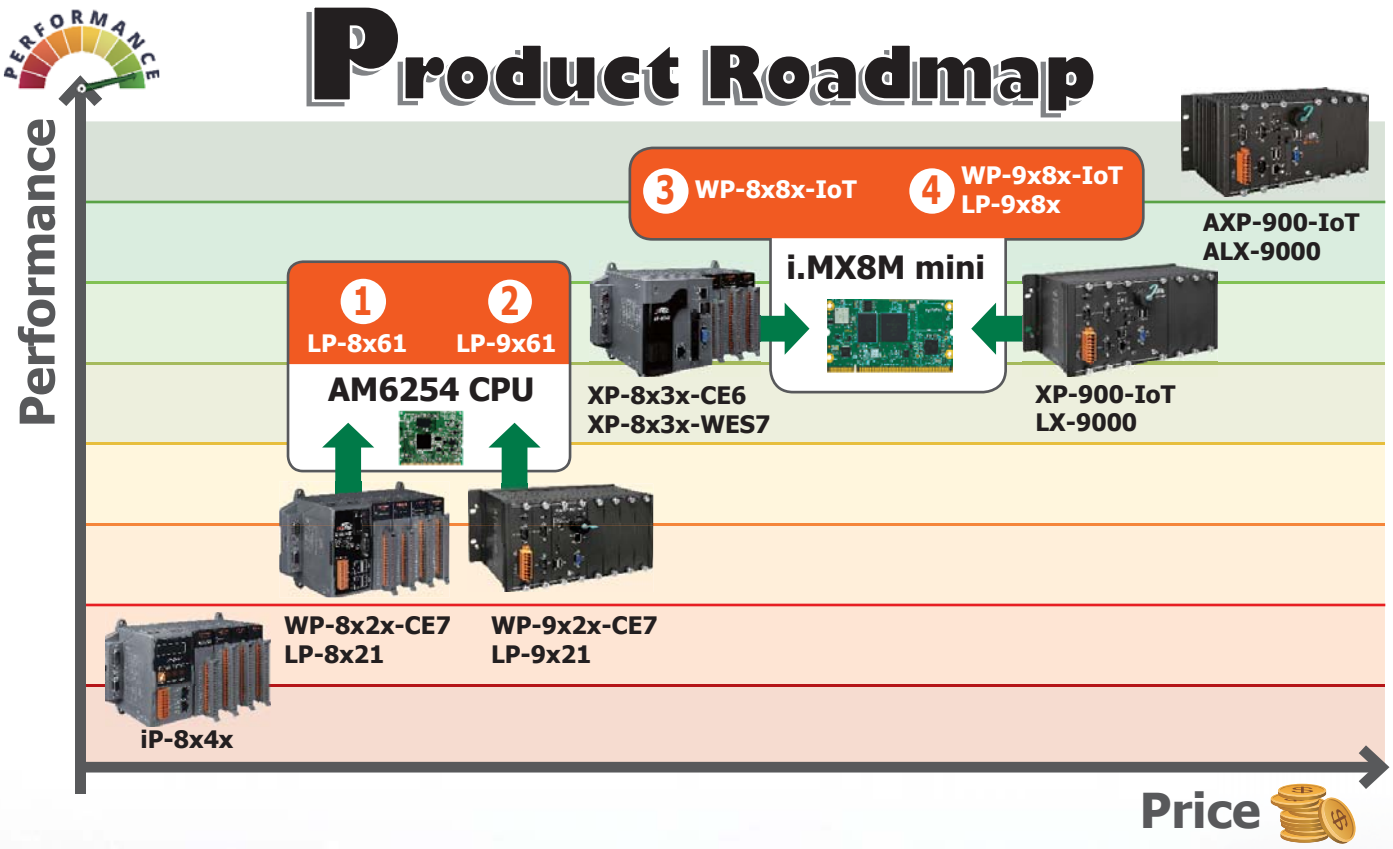
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Product Roadmap



1

Windows CE.net
WinCE 7.0
Kernel 3.2.xx

AM3354
ARM, 32-bit
1 GHz, single-core

Kernel 5.4.xx

AM6254
ARM, 64-bit
1.4 GHz, quad-core

▲ WP-8x2x-CE7, LP-8x21

▲ LP-8x6x
Under Developing

WinCE 7.0: Visual Studio **2008** Professional.
Linux: The kernel **3.2xx** is out of date.

2

Windows CE.net
WinCE 7.0
Kernel 3.2.xx

AM3354
ARM, 32-bit
1 GHz, single-core

Kernel 5.4.xx

AM6254
ARM, 64-bit
1.4 GHz, quad-core

▲ WP-9x2x-CE7, LP-9x21

▲ LP-8x6x
Under Developing

WinCE 7.0: Visual Studio **2008** Professional.
Linux: The kernel **3.2xx** is out of date.

3

Windows Embedded Standard 7

R3600
x86, 32-bit
1 GHz, dual-core

Windows 10 IoT Enterprise

i.MX8M mini
ARM, 64-bit
Cortex-A53,
1.6 GHz, Quad-core

▲ XP-8x3x-WES7

▲ WP-8x8x-IoT
Under Developing

R3600 does not support SSE2, so it can not be upgraded to Win10 IoT.

The ESUs (Extended Security Update) reached their end of life on Jan. 10, 2023, no further security updates will be provided for Windows 7.

4

$$$$

Windows 10 IoT Enterprise

(E3845, E3950)

$$$

Windows 10 IoT Enterprise

i.MX8M mini

▲ XP-9x8x-IoT, AXP-9x9x-IoT
▲ LP-9x81, ALP-9x91

▲ WP-9x8x-IoT, LP-9x81
Under Developing

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1.2 PAC family

Compact PAC	**AXP-9000-IoT** **ALX-9000** **ALP-9000**	**XP-9x81-IoT** **LX-9x71** **LX-9x81**	**WP-9x81-IoT** **LP-9x81**	**WP-9x2x-CE7** **LP-9x21**
Outlook				
Windows OS	Windows 10 IoT Enterprise	Windows 10 IoT Enterprise	Windows 10 IoT	WinCE 7.0
Linux OS	Linux Kernel 5.4	Linux Kernel 4.14		Linux Kernel 3.2
Software Development Tool	Dll for VC, Dll for VS .NET			VS .NET 2008, Win-GRAF, AVEVA Edge
	Standard LinPAC SDK for Linux by GNU C language			
CPU	i5-8365UE (1.6~4.1 GHz, 4C8T), E3950 (1.6~2.0 GHz, 4C4T), i.MX8M Mini (1.6 GHz, quad core)	E3827 (1.75 GHz, dual core) or E3845 (1.91 GHz, quad core)	i.MX8M Mini (1.6 GHz, quad core)	Coretex-A8 (AM3354) (1 GHz)
I/O Expansion	I/O Slots for e-9K, I-9K, I-97K modules	I/O Slots for I-9K, I-97K modules		

Compact PAC	**XP-8x3x-WES7** **XP-8x3x-CE6** **LX-8x31**	**WP-8x2x-CE7** **LP-8x21**	**iP-8000**
Outlook			
OS	Windows Embedded Standard 7	WinCE 7.0	MiniOS7
	WinCE 6.0		
	Linux Kernel 3.2		
Software Development Tool	VS .NET 2008, VC6, VB6, Delphi, BCB	VS .NET 2008 Win-GRAF, InduSoft	C language, ISaGRAF
	VS .NET 2008, Win-GRAF, InduSoft		
	Standard LinPAC SDK for Linux by GNU C language		
CPU	x86 CPU (R3600) (1 GHz, dual-core)	Coretex-A8 (AM3354) (1 GHz)	80186 (80 MHz)
I/O Expansion	I/O Slots (for I-8K and I-87K modules), RS-232/485, Ethernet		

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PAC family

uPAC	WP-2841M-IoT LP-2841M	WP-2241M-CE7 LP-2241M	WP-5231 LP-5231	LP-7231M
Outlook				
OS	Windows 10 IoT	WinCE 7.0		Linux Kernel 3.2.14
	Linux Kernel 5.4.70	Linux Kernel 3.2		
Software Development Tool	Dll for VC, Dll for VS .NET	VS .NET 2008 Win-GRAF, InduSoft		C language for Linux platform
	C language for Linux platform			
CPU	i.MX8M Mini (1.6 GHz, quad core)	Coretex-A8 (AM3354) (1 GHz)		Coretex-A8 (AM3354) (1 GHz)
I/O Expansion	XV-board			-

uPAC	WP-5141	uPAC-5000	I-7188E uPAC-7186E	I-7188XA/B/C
Outlook				
OS	WinCE 5.0	MiniOS7	MiniOS7	MiniOS7
Software Development Tool	VS .NET 2008	C language, ISaGRAF	C language, ISaGRAF	C language, ISaGRAF
CPU	PXA270 (520 MHz)	80186 (80 MHz)	80186 (80 MHz) 80188 (40 MHz)	80188 (40 MHz)
I/O Expansion	XW-board	XW-board	X-board	

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1.3 Features

❶ Powerful embedded OS

Microsoft Windows Embedded
Standard
WES7/WES 2009

Microsoft Windows CE.net
WinCE 5.0/6.0/7.0

Linux Kernel 2.6/5.4

MiniOS7

❷ Powerful Hardware Design

The PAC family of ICP DAS with powerful hardware design can operate in harsh, electrically noisy environments and provide faster & more professional performance. This has been achieved through attention to the following:

❸ Built-in Dual Watchdog Timers

The integrated watchdog circuit will reset the CPU module if there is a failure in either the hardware or software.

❹ Wide Operating Temperature

The PAC product is designed to operate under a very wide temperature range from -25°C ~ +75°C.



❺ Easy-to-Install

The PAC family is easy-to-installed by either DIN-Rail mounting or Rack mounting. Input signals can be connected to the unit with easy using plug in signal connectors.



DIN-Rail Mounting

❻ Input Protection circuitry

The protection circuitry on both the network and power supply protects the system from external signals such as main spikes and ambient electrical noise. In addition the central processing modules are isolated three ways from external signals. This is through I/O isolation of 3 kV, network isolation to 3 kV and power isolation to 1000 V.

❼ I/O Expansion Slots

The compact PAC family provide a number of slots. Over 100 I/O, communication and motion control modules are available.







❽ Cost-effective Display Solution

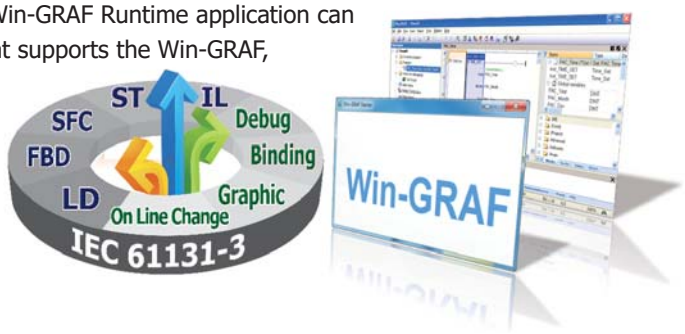
The user chooses LCD monitor instead of the HMI

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1.4 Software

1. Win-GRAF (PAC / Soft PLC Development Kit)

Win-GRAF is a powerful SoftLogic development software and PLC-like SoftLogic package that supports IEC 61131-3 Standard Open PLC Languages running on Windows 7 and Windows 8. The Win-GRAF Runtime application can run on any ICP DAS PAC (Programmable Automation Controller) that supports the Win-GRAF, such as the WinPAC series WP-5238-CE7, WP-8x28-CE7 and WP-9x28-CE7, or the touch panel ViewPAC series VP-x2x8-CE7, or the advanced CPU XPAC-CE6 series XP-8x38-CE6.



Using the Win-GRAF software with ICP DAS Win-GRAF PACs, the control/monitor systems can easily implement industrial level of data acquisition and logic control in various industry fields.

Applications:

- Data Acquisition System
- Factory Automation
- Building Automation
- Remote I/O system
- Wireless Monitor/Control System
- Motion Control System and so on

• Win-GRAF Workbench Features:

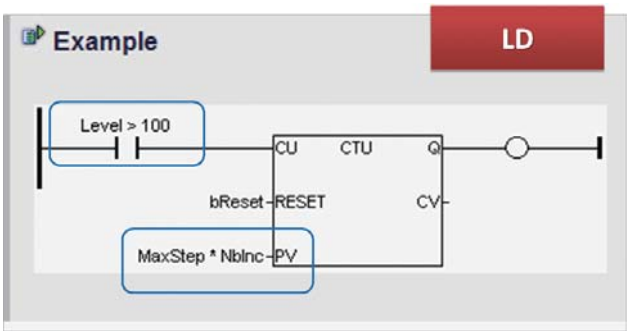
▶ Support IEC 61131-3 Standard Open PLC Languages:

1. Ladder Diagram (LD)
2. Function Block Diagram (FBD)
3. Sequential Function Chart (SFC)
4. Structured Text (ST)
5. Instruction List (IL)

▶ Support File Access & Data Log

▶ Schedule-Control

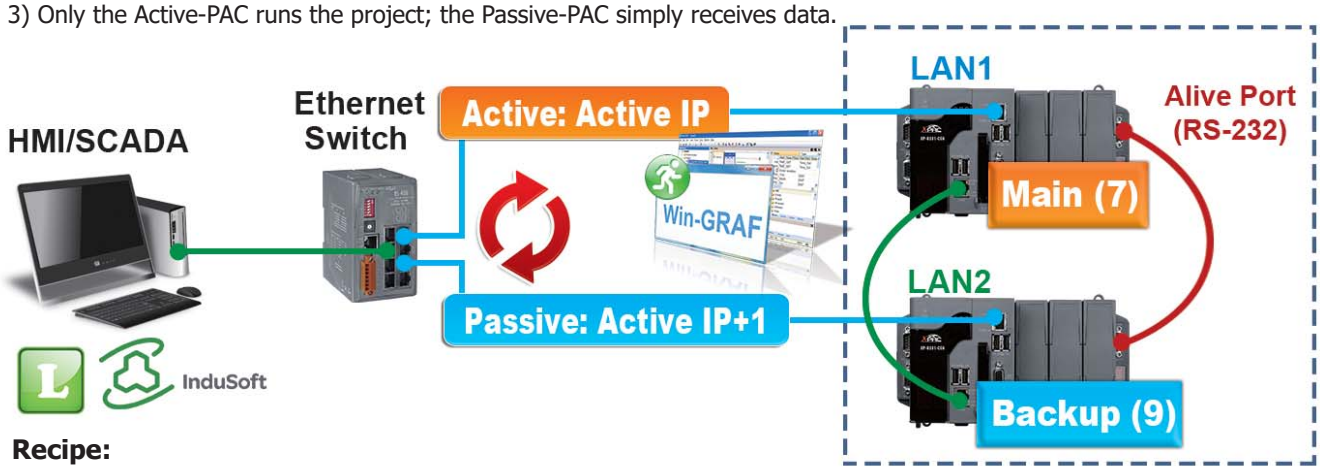
▶ Using ST Syntax in the FBD or LD Program



▶ Redundant Solution

XP-8xx8-CE6 have supported Win-GRAF redundant system to satisfy the security requirements of industrial applications.

1) Win-GRAF redundant system provides a unique public IP address (i.e., Active_IP) for SCADA/HMI accessing.
2) The Passive-PAC detects events and takes the control authority. If the running PAC is unavailable, the backup one will take over and change its IP to Active_IP.
3) Only the Active-PAC runs the project; the Passive-PAC simply receives data.



▶ Recipe:

Apply multi-recipes pre-defined in PC/Win-GRAF to PAC.

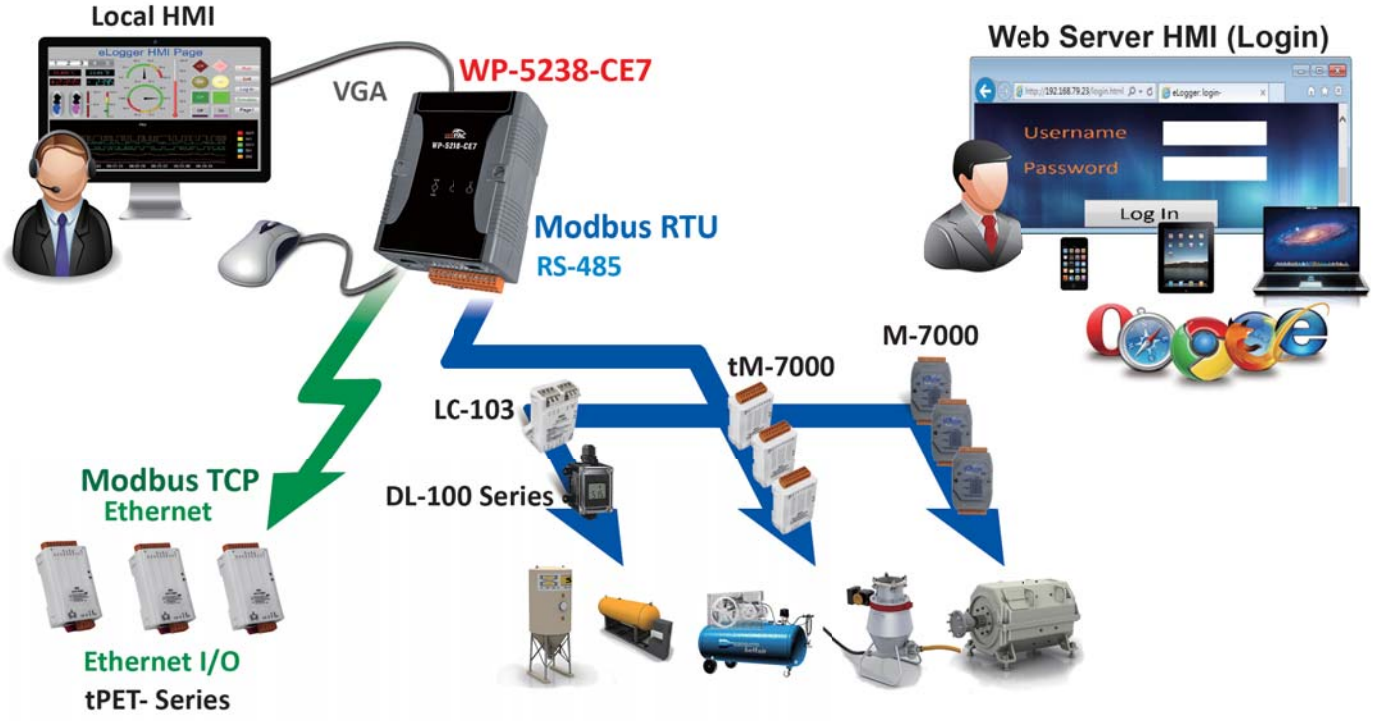
▶ Spy List:

Show several selected variables in one Spy List window.

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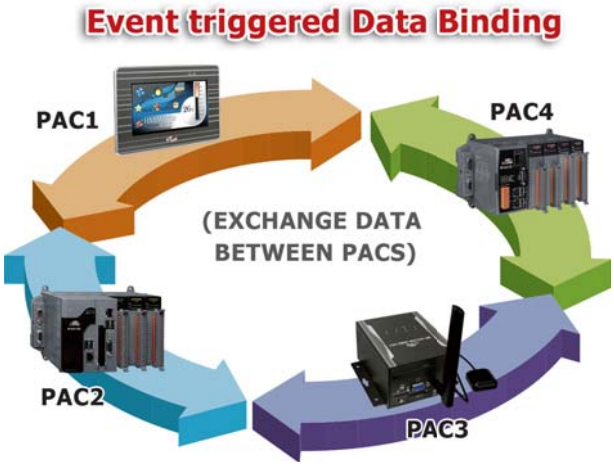
▶ Support eLogger HMI

1) eLogger is a free and easy HMI development platform designed by ICPDAS.
2) eLogger can not only be used to design local and Web Server HMI, but can also achieve remote PAC control via Web browser on PC or smart phone.
3) With Win-GRAF, it is easy to create a professional monitoring application without any advanced programming background.



▶ Event Triggered Data Binding:

A max. of 32 PACs can be used for data binding.



▶ Online Change:

Replace the current running project to a new modified one without stopping the project.



▶ Upload Source Code from a PAC to a PC





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▶ Modbus Master Protocol:

➔ Multi-port Modbus RTU, ASCII Master, RS-232/485/422
➔ Modbus TCP Master (Multiple connections)
➔ Connect other Modbus PLC, Modbus Master,
➔ Modbus I/O and Modbus devices

▶ Modbus Slave Protocol:

➔ Multi-port Modbus RTU Slave, RS-232/485/422
➔ Modbus TCP Slave (Multiple connections)
➔ Connect PC/SCADA/HMI

▶ Protect Application by Own Algorithm

1) Win-GRAF PAC is equipped with a unique 64-bit hardware serial number. It can be used to generate a license key to protect the software against illegal copy.
2) Protect the Win-GRAF application by user-defined algorithm. Even others copy the application to the same model PAC, as long as he cannot get the source code, can not run the application correctly.



▶ Support Temperature/Humidity Modules

DL-100T485 and DL-100TM485.

▶ Support a Variety of I/O Boards

Support I-8xxxW and I-87xxxW I/O boards, such as:
DI, DO, AI, AO, Relay, AC-IN, Thermistor, Thermocouple, RTD, Strain Gauge, Encoder, PWM output, Counter, Frequency, etc.

▶ Support DCON I/O

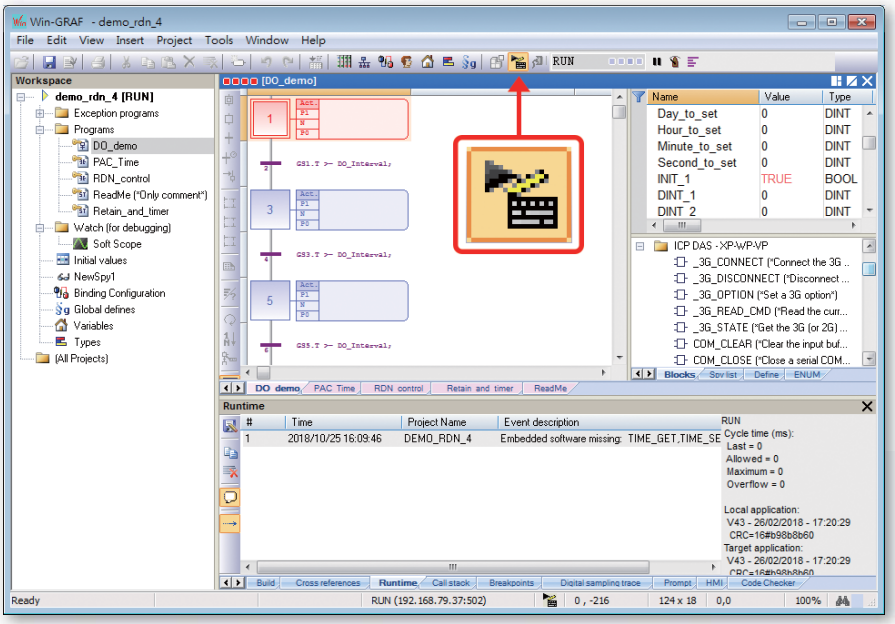
Support RS-485 Port to connect the ICP DAS I-7000 I/O modules, and I-87K4/5/8/9 Expansion Unit plus I-87xxxW I/O boards, and RU-87P4/8 Expansion Unit plus I-87xxxW I/O boards.

▶ Support VS 2008/VS 2010 Development:

The Win-GRAF PACs support to use VS 2008 or VS 2010 (VB.net, C#) to develop user own HMI and data management programs, and can exchange variables with the Win-GRAF control programs.



▶ Offline Simulation or Online Debugging/Control/Monitoring on the PC



• Ordering Information:

Win-GRAF Development Software	
Win-GRAF Workbench	Win-GRAF Workbench Software (Large I/O Tags) with one USB Dongle

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2. ISaGRAF (SoftPLC Solution)

ISaGRAF is a powerful SoftLogic package on the industrial market. **ISaGRAF Workbench** is a PLC-like development software running on Windows 95/98/NT/2000/XP/Vista/7 and its **ISaGRAF Runtime** application programs can run on any **ISaGRAF PAC**s. Through ISaGRAF PACs, a control/monitor system can easily implement real time data acquisition and device control via wired or wireless network in various industrial fields.

Application field: data acquisition system, distributed control system, factory and building automation, motor control, remote I/O system, wireless control system...

★For those users who want to implement new applications, we recommend choosing the latest Win-GRAF solution.

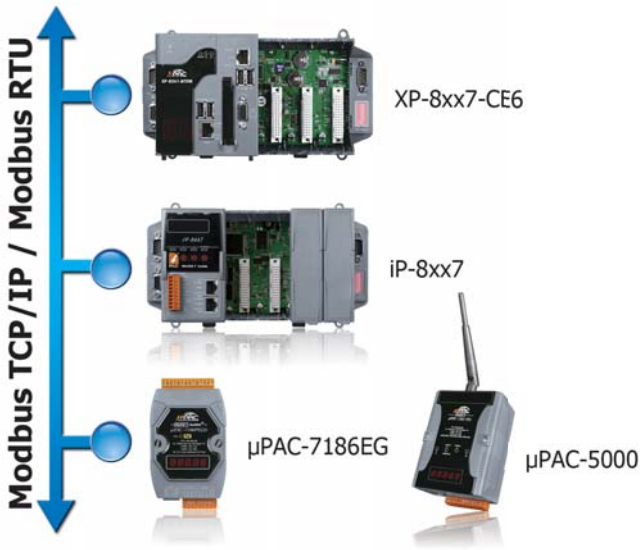
• ISaGRAF Workbench Features:





- ▶ Support IEC 61131-3 Standard Open PLC Languages
  + Flow Chart (FC) :
  1. Quick Ladder (LD)
  2. Function Block Diagram (FBD)
  3. Sequential Function Chart (SFC)
  4. Structured Text (ST)
  5. Instruction List (IL)
  6. Flow Chart (FC)
- ▶ Online debugging/control/monitoring
- ▶ Offline simulation
- ▶ Online change (For WP-8xx7, VP-2xW7, XP-8xx7-CE6 only)
- ▶ Auto-Scan I/O
- ▶ Uploading the program in the PAC

• ISaGRAF Solution Features:



- ▶ Modbus Master Protocol
  - ➔ Modbus RTU, ASCII, RS-232/485/422 Master
  - ➔ Modbus TCP Master
  - ➔ For connecting other Modbus PLCs, meters, I/Os and devices
- ▶ Modbus Slave Protocol
  - ➔ Modbus RTU (RS-232/485/422) Slave
  - ➔ Modbus TCP/IP Slave
  - ➔ For connecting other PC/HMI/SCADA (Ex. InduSoft) and touch HMI
- ▶ Data-Recorder & Data-Logger
- ▶ Data Exchange
  - ➔ Ebus: Through Ethernet
  - ➔ Fbus: Through RS-485
  - ➔ PAC to PAC
- ▶ CAN/CANopen
  - ➔ Via I-7530 to connect CAN/CANopen devices
  - ➔ For connecting other CAN/CANopen meters, I/Os, devices
- ▶ Motion Control
  - ➔ For controlling server motors (P-command)
- ▶ PAC can send e-mail to the internet
- ▶ SMS: Short Message Service: GSM modem
  - ➔ For reporting data and alarms to the operators
- ▶ Wireless Communication: GPS, ZigBee & Radio
- ▶ Auto-report Acquisition/Control Data
- ▶ Redundant Solution : Hot-swap/Ethernet
- ▶ Construction Stress Monitoring: VW sensor and Carlson strain gauge inputs solutions (Bridge/dam/building…)

Software Development: ISaGRAF V.S. C++ and VS.net 2008

Item	ISaGRAF Ver. 3.xx	C++	VS.net 2008
Programming	Easy	Hard	Middle hard
Debug	Easy	Hard	Middle hard
SoftLogic	Yes	No	No
Program I/O	Just connect and play	Hard coding	Hard coding
Communication	Already built-in Modbus TCP, Modbus RTU, Modbus ASCII, DCON, SMS, e-mail, TCP, UDP, …	Hard coding	Hard coding

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3 AVEVA Edge

AVEVA™ Edge | SCADA, HMI and IoT Edge Solution for OEMs, System Integrators and End Users

AVEVA Edge is a comprehensive platform that includes all the tools you'll need to make SCADA and HMI applications that have real power behind them. The development environment allows you to develop once and deploy anywhere. AVEVA Edge supports all Windows runtime platforms (including 32 and 64 bit), ranging from Windows Embedded Compact, Windows Embedded Standard, Windows 8.1/10 and Windows Server Editions, along with built-in support for local or remote (web) based visualization.

- **AVEVA™ Edge** Studio is a development system of AVEVA Edge on Windows. It provides a complete development environment, allowing designing once and deploying anywhere.
- **AVEVA™ Edge** SCADA – The full Windows based runtime offers all the tools you need for advanced SCADA applications.
- **AVEVA™ Edge** HMI – AVEVA Edge for embedded systems such as Windows Embedded operating systems. The small footprint makes AVEVA Edge HMI ideal for embedded and edge machines.
- **AVEVA™ Edge** Compact HMI – Compact HMI is designed especially for Windows CE operating systems.


Collaboration


Remote Work


Standardization


Line-of-Sight Visibility

AVEVA Edge Creates Advantages For You

1. Combining message and automation to increase productivity
2. Studio Moblie Access implements IoT
3. Complete integration of embedded platforms
4. Real-time and rapid technical supports

AVEVA Edge Features

★ SCADA/HMI and templates
★ Easy communication and integration
★ Protection of development cost
★ Design once - Deploy anywhere
★ FDA traceability
★ Redundant mechanism
★ Database
★ Recipes and reports
★ Trend chart
★ Drivers and OPC
★ Solid security
★ Perfect development tool
★ Graphic design tools shorten the development time
★ Advanced alarm system controls the on-site status in real-time.

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AVEVA™ Edge

Easy Step to Meet Your Satisfaction



ViewPAC



WinPAC



XPAC

AVEVA Edge builds powerful graphical displays and takes advantage of the 250+ available communication drivers for all major PLC products. AVEVA Edge includes OPC UA and OPC Classic (HDA and DA), trends, alarms, reports, recipes and built-in SQL database support as standard features.

AVEVA Edge Controllers

AVEVA™ Edge Compact HMI and **AVEVA™ Edge HMI** can integrate with ICP DAS's professional PACs, including WinPAC, ViewPAC, and XPAC-IoT.

	Product Features
AE-WinPAC	A Stable and cost-effective compact SCADA system. Builds a graphic monitoring system of I/O rapidly and easily.
AEV-PAC	Provides HMI/ SCADA system solution with an all-in-one touch panel. Suitable for machine control systems with a narrow space.
AE-XPAC-IoT	XPAC-IoT is a PAC based on Windows 10 IoT Enterprise. It integrates operation, I/O, and operator interface, providing a perfect solution for combining HMI, data acquisition and control into one PAC.

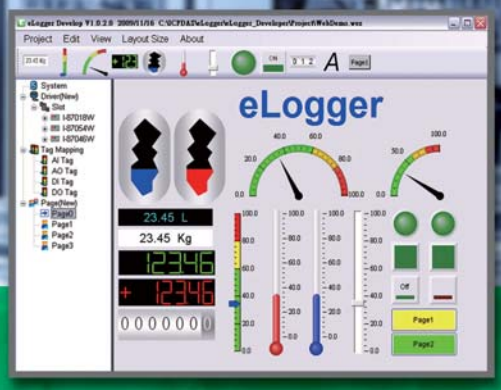
Features of PAC equipped with AVEVA Edge

- Graphic interface as an operation tool
- Supports various ICP DAS's I/O modules with slots
- Saves physical spaces for implementing a system
- Real-time and history alarm/ incidents and trend charts
- Various communication protocols (DCON, Modbus, OPC, TCP/IP...)
- Remote Web monitoring and security
- Redundant system application
- Others (VBScript, E-mail, FTP...)



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4 eLogger





Easy to use software for HMI, Web HMI, data logger

eLogger is an easy-to-use software to implement HMI, web HMI and data logger on our Windows CE 5.0/6.0/7.0 and Windows Embedded Standard 2009/7 based PACs (WinPAC, ViewPAC, XPAC and iPPC) for simple I/O monitor and system control. eLogger is free of charge for 200 tags. It can save your money and shorten time to market.

Application:



Features:

1. PAC Support:

Developer	
Windows	2K, XP, Vista, 7 and 10
Runtime Target	
Windows CE 6.0 platform	XP-8000-CE6
Windows CE 7.0 platform	WP-5000-CE7, WP-8x2x-CE7, ViewPAC-CE7, WP-9000-CE7
WES7 platform *Win10 IoT platform*	XP-8000-WES7, iPPC series, XP-9000-IoT series
Windows 7/10 platform	*regular PC*

2. Driver Support:

- Module on slot
  - ▷ I-8K series: I-8017HW, I-8024W, and all I-8K DIO module
  - ▷ I-87K series: I-87K series: DI, DO, AI, AO, counter, frequency, DI with latch function
- Modbus serial master
  - ▷ M-7000
  - ▷ Modbus RTU/ASCII devices
- Modbus TCP master
  - ▷ ET-7000/PET-7000 series
  - ▷ Modbus TCP devices
- MQTT Client
  - ▷ MQ-7000 series

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3. HMI

- Support elements: Button, Text Box, Linear Gauge, Angular Gauge, LED, Switch, Tank, Label, Plot, Seven Segment, Thermometer, Slider, Odometer
- Pages: Maximum of 32 pages



4. HMI on Webpage

- Support elements: Text Box, Seven Segment, Label, Button, Picture Toggle, Chart, Linear Gauge and Radial Gauge
- Support administrator login
- Support browsers: Google Chrome, Internet Explorer, Firefox, Safari, and Opera



5. Real Time Data Trend

- Maximum of 5 trend line in one plot

6. Value Scaling

- Set gain and offset can scale analog values from volt or amp unit to another physical unit. For example: rpm for rotation, kg for weight

7. Account Management

- 3 levels operating management: Admin, Power User, User

	Admin	Power User	User
Open project	●	○	○
Start/Stop project	●	●	○
Set AO/DO values	●	●	○
Switching group pages	●	●	●

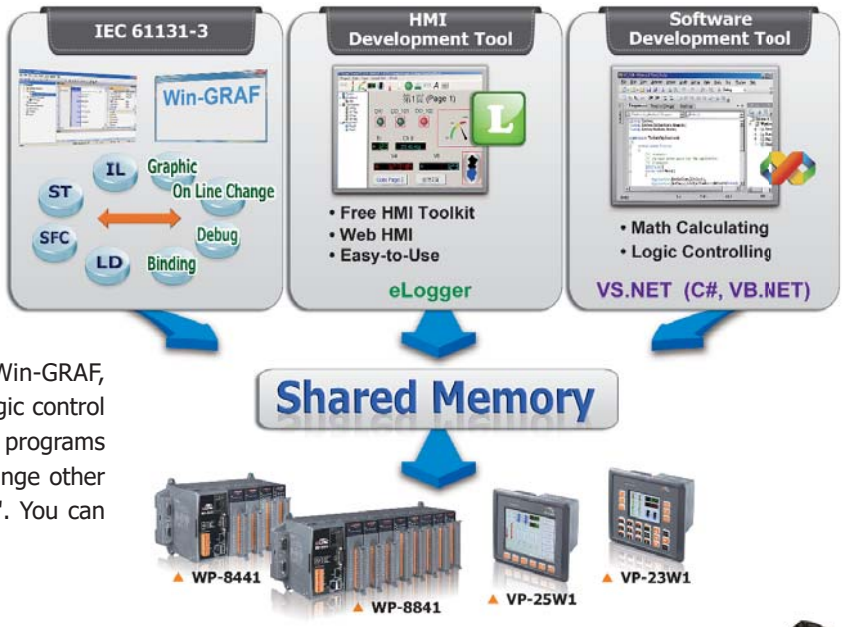
●: allowed ○: not allowed

8. Remote Maintenance

- eLogger Developer's remote control function can be used to upload projects and webpages, run and stop the project via the Ethernet

9. Data Log

- Local Data Log: Supports csv format file.
- Remote database:
  - ▷Microsoft SQL Server 2005 or later on Windows platform.
  - ▷MySQL Server.



10. Logic Control Programming

Via the "Shared Memory", you can choose Win-GRAF, ISaGRAF or Visual Studio .Net to develop a logic control program and cooperate with the elogger. Your programs can access the data of I/O module and exchange other temporary data through the "Shared Memory". You can focus on the logic control programming.

11. Support ISAPI

You can read/write the shared memory by calling ISAPI URL. It helps you to design a HMI web page with JavaScript. With "MIT App Inventor" which is the Android App develop site, you can build a Android app by calling ISAPI quickly, no coding required.

- Learn more about how to use the web dll, please refer to the Web application manual.
- Android App demo for App Inventor.
- Android App demo for Eclipse.
- Web page demo.

12. Support Modbus TCP Server

13. Support Runtime Executing in Background Mode

eLogger Runtime can run in background without designing HMI layout.

Ordering Information:



License for PC version (with USB hardkey)	
License	**Tag Number**
Trail Version (24 hours limit)	30
eLogger-NT300R	300
eLogger-NT1500R	1500
eLogger-NT4000R	4000

License for WinCE 6/7 version (with software key)	
License	**Tag Number**
Free Version	50
eLogger-CE300R	300
eLogger-CE1500R	1500
eLogger-CE4000R	4000

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CH2
9000 Series PAC

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2.7 I-9K Series Module

- ▶ Analog Input Modules 35
- ▶ Analog Output Modules 36
- ▶ Communication Modules 35
- ▶ Digital Modules 37
- ▶ Motion Control Modules 38



2.1 AXP/ALX-9000 Introduction

ICP DAS releases the latest flagship controller, with a rugged compact design (3U), using the all-metal shell to achieve a stronger anti-interference capability. The new AXP/ALX-9000 series offers a variant CPU, OS, and software development tools to meet different needs of customers.

The AXP/ALX-9000 series has an excellent cost-performance. It can be widely used in most harsh environments, for example, factory automation, building automation, equipment automation, laboratory automation, chemical industry, environmental monitoring, M2M, IIoT, Industry 4.0, etc.

Open System



AXP/ALX-9000 ≒ IPC + PLC



OS selection

Windows 10 IoT Enterprise

Microsoft Windows CE.net

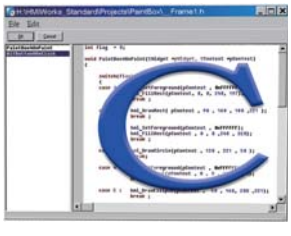
Linux Kernel 5.4

CPU selection

X86 CPU	Speed	Core/Thread
i5-8365UE	1.6~4.1 GHz	4C/8T
E3950	1.6~2.0 GHz	4C/4T
E3845	1.91 GHz	4C/4T
E3827	1.75 GHz	2C/2T

Software Development Toolkit

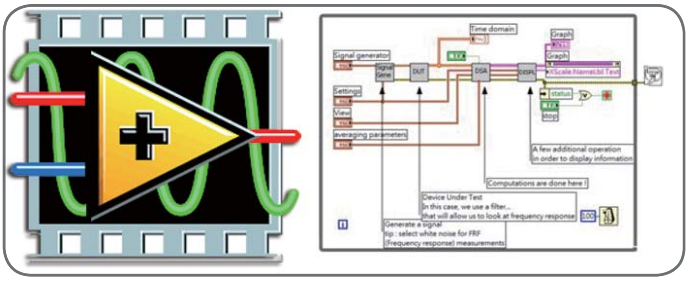
▼ C Language



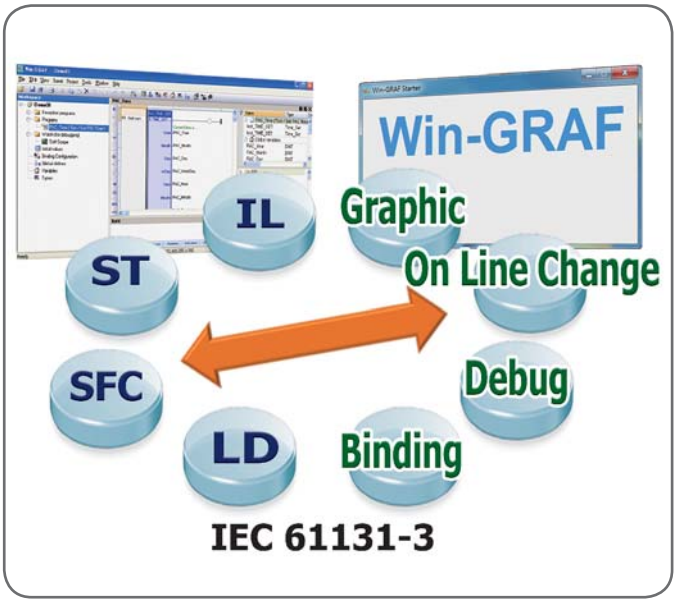
▼ AVEVA Edge (SCADA)



▼ LabView



▼ Win-GRAF (Soft PLC)



2.2 AXP/ALX/ALP-9000 Selection Guide

AXP-9 X X X - OS

I/O Slot
0/2/6
1/3/7

CPU Type
5: i5-8365UE
9: E3950

Software
2: eLogger
8: Win-GRAF
9: Win-GRAF + eLogger

IoT
Win10 IoT Enterprise

AXP-9000-IoT has a built-in Windows 10 IoT Enterprise operating system, which can support both the Universal Windows App and traditional Windows applications simultaneously. For software development tools, it can maintain maximum sharing with Windows 10, and applications can be quickly ported to AXP-9000 and deployed in a variety of harsh environments.

Windows 10 IoT Enterprise

Model Name	CPU	RAM	Flash	Memory Card	USB	I/O Slot	Page
AXP-9051-IoT	i5-8365UE (1.6~4.1 GHz, 4C8T)	16 GB (Note1)	64 GB (mSATA)	32 GB CFast	2 × USB 2.0 2 × USB 3.0	0	21
AXP-9251-IoT						2	21
AXP-9651-IoT						6	21
AXP-9191-IoT	E3950 (1.6~2.0 GHz, 4C4T)	8 GB (Note2)				1	22
AXP-9391-IoT						3	22
AXP-9791-IoT						7	22

ALX-9
ALP-9

X X X

I/O Slot
0/2/6
1/3/7

CPU Type
5: i5-8365UE
8: i.MX8M mini
9: E3950

Software
1: Standard

LinPAC ALX-9000 series products are equipped with Linux x86_64 operating system, multicore x86 CPU, large-capacity disk storage, and various communication interfaces such as I/O slot, Serial Port, Ethernet, USB, HDMI and so on.

The ALX-9000 series are equipped with ARM CPU, providing another low power consumption option.



Linux Kernel 5.4

Model Name	CPU	RAM	Flash	Memory Card	USB	I/O Slot	Page
ALX-9051	i5-8365UE (1.6~4.1 GHz, 4C8T)	16 GB (Note1)	64 GB (mSATA)	32 GB CFast	2 × USB 2.0 2 × USB 3.0	0	21
ALX-9251						2	21
ALX-9651						6	21
ALX-9191	E3950 (1.6~2.0 GHz, 4C4T)	8 GB (Note2)				1	22
ALX-9391						3	22
ALX-9791						7	22
ALP-9181	i.MX8M mini (1.6 GHz, Quadcore)	2 GB (Note2)	8 GB			1	23
ALP-9381						3	23
ALP-9781						7	23

Note 1: Two SODIMM slots, one is installed a 16 GB DDR4 at the factory.
Note 2: On-board, not expandable.

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AXP-9051-IoT

ALX-9051 (0 Slot)

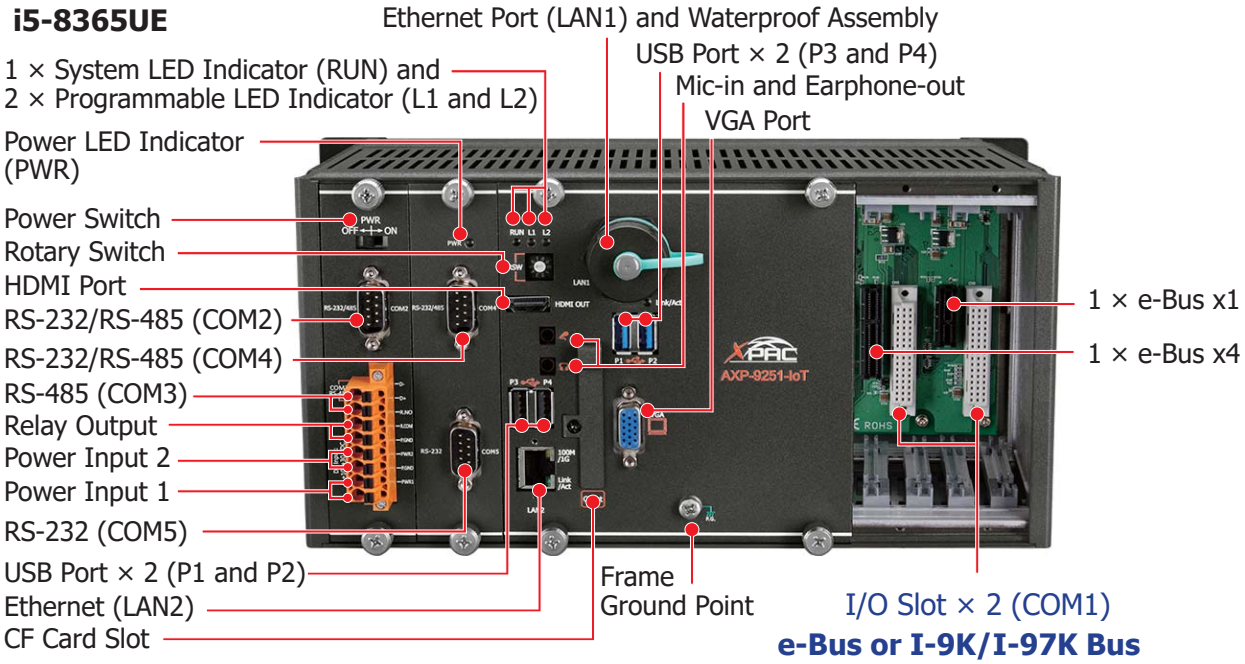
CPU Module
i5-8365UE



AXP-9251-IoT

ALX-9251 (2 Slot)

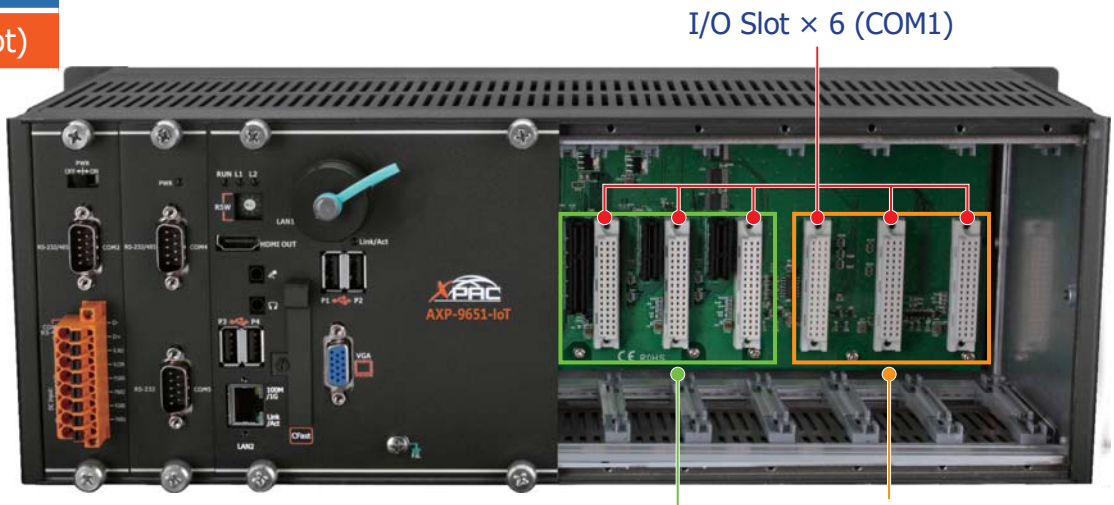
CPU Module
i5-8365UE



AXP-9651-IoT

ALX-9651 (6 Slot)

CPU Module
i5-8365UE



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AXP-9191-IoT

ALX-9191 (1 Slot)

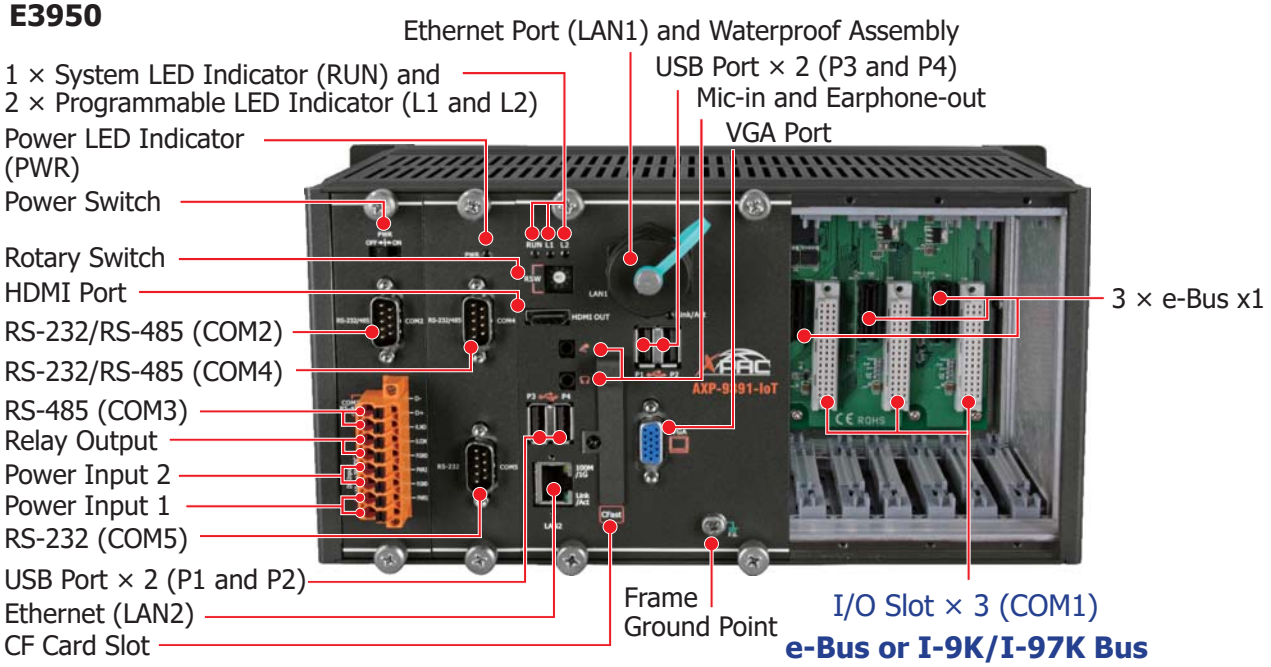
CPU Module
E3950



AXP-9391-IoT

ALX-9391 (3 Slot)

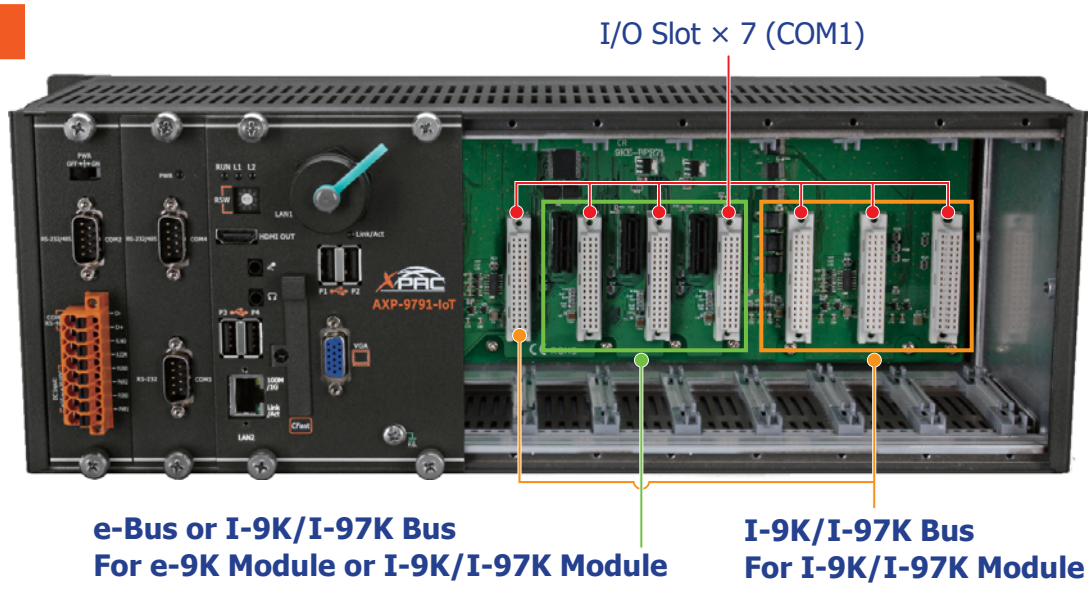
CPU Module
E3950



AXP-9791-IoT

ALX-9791 (7 Slot)

CPU Module
E3950



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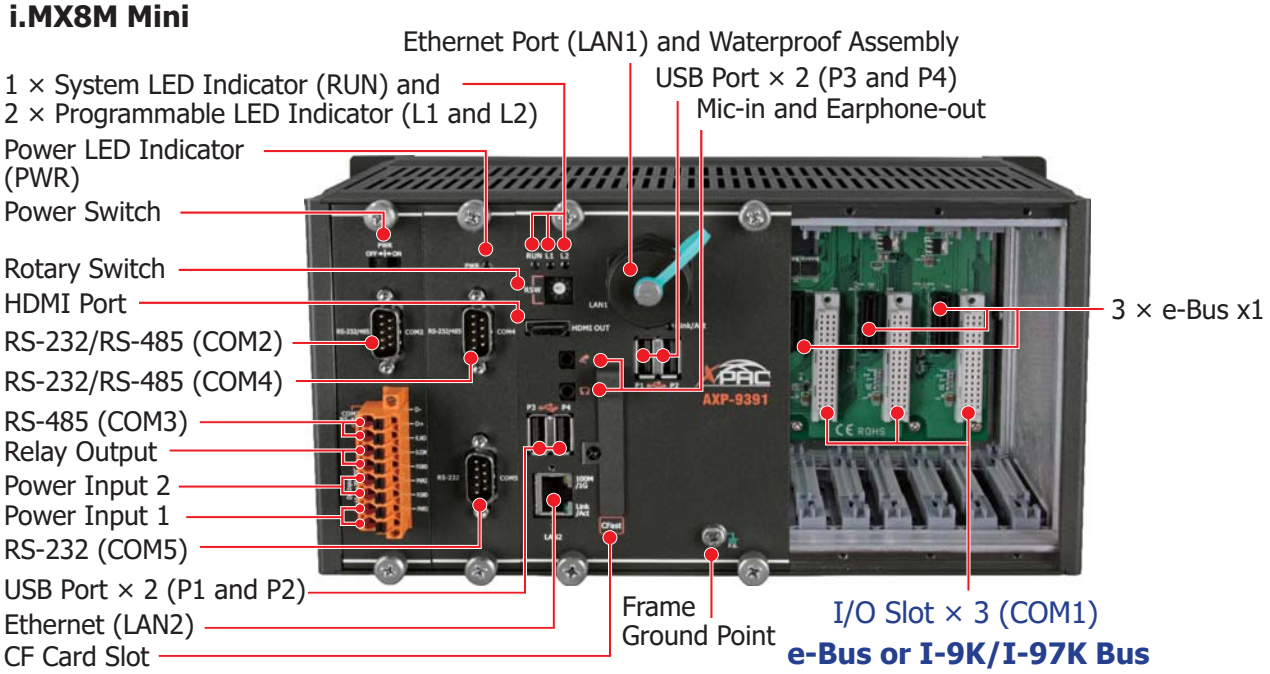
ALP-9181

CPU Module
i.MX8M Mini



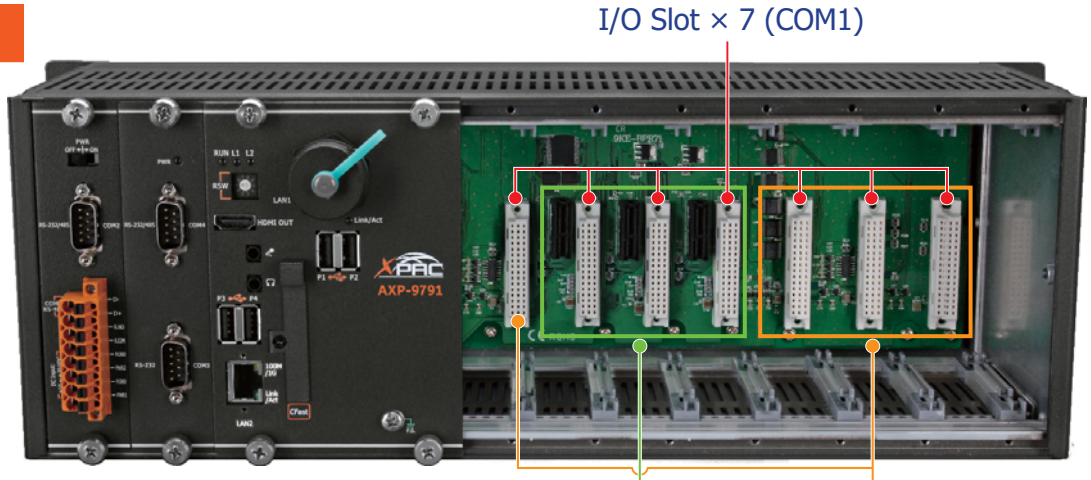
ALP-9381

CPU Module
i.MX8M Mini



ALP-9781

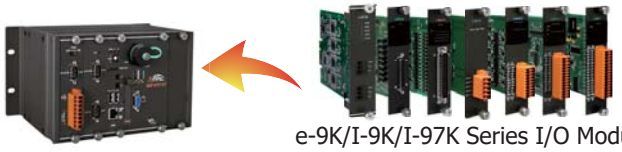
CPU Module
i.MX8M Mini



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Local I/O Expansion

I/O Slots



e-9K/I-9K/I-97K Series I/O Module

I-9K, I-97K

PACSDK

Specific I/O SDK

FRnetSDK

CAN Bus SDK

Motion SDK

HART

MotionNet

Vibration Monitoring

General I/O Module



I-9K/I-97K Series I/O Module

Serial Device Expansion



I-9114i, I-9144i
RS-232/485 Communication

Serial Devices

Specific I/O Module



I-9012, I-9014, I-9017 (AI)
I-9024U, I-9028U (AO)
I-9084 (Counter/Frequency)

FRnet I/O Expansion



I-9174
FRnet Communication



FR-2000 Series

Private Protocol



I-9120 CANbus
Communication



CAN-2000 Series



CAN-8000 Series

Motion Control



I-9093, I-9094F



I-9710 Gateway



e-MN200
Communication



e-AR300T/400



MN-3000 series



MN-Servo-xxx series

e-Bus

SDK

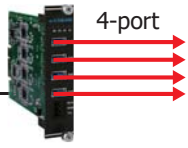
USB 3.0

PoE

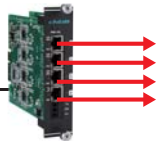
High-Speed I/O Module



e-9K Series I/O Module



e-USB400



e-PoE400

Note 1: The e-Bus is for high-speed DAQ and Communication.
Note 2: Only AXP-9000, ALX-9000, ALP-9000 and EMP-9000 support the e-Bus.

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Remote I/O Expansion

Ethernet
Modbus TCP


tET


ET-7200


ET-2000


I/O Expansion Unit

iP-8441-MTCP
iP-8841-MTCP
ET-8KP4-MTCP
ET-8KP8-MTCP

RS-485
Modbus RTU

max. 32 Nodes for each port


M-7000 Series


tM Series


I/O Expansion Unit

iP-8411-MRTU
iP-8811-MRTU

RS-485
DCON

max. 32 Nodes for each port


I-7000 Series


tM Series


I/O Expansion Unit

RU-87P1
RU-87P2
RU-87P4
RU-87P8

EtherCAT®
(For EMP-9000)


CiA 402 Servo Driver


ECAT-2094 Series
Stepper Motor Controller


ECAT-2000 I/O Module


EC2 Series I/O Module


(EP-801)


(EP-805)

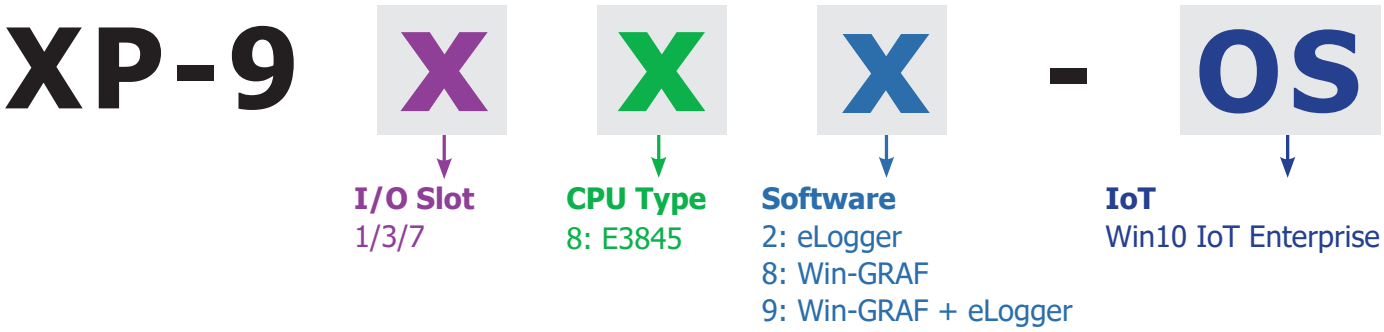

(EP-809)

I/O Expansion EP-800 Series

EP-801
EP-802
EP-803
EP-805
EP-809
EP-811

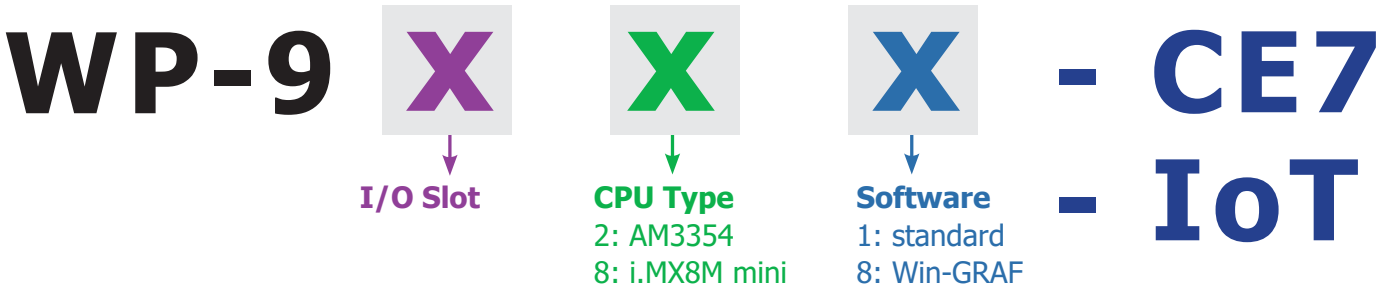
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2.3 XP/WP/LX/LP-9000 Selection Guide



XP-9000-IoT has a built-in Windows 10 IoT Enterprise operating system, which can support both the Universal Windows App and traditional Windows applications simultaneously. For software development tools, it can maintain maximum sharing with Windows 10, quickly port applications to XP-9000-IoT, and apply them to various harsh environments.

Model Name	CPU	RAM	Flash	Memory Card	USB	I/O Slot	Page
XP-9181-IoT	E3845 (1.91 GHz, 4C4T)	4 GB (on-board)	64 GB (mSATA)	32 GB CF	4 × USB 2.0	1	28
XP-9381-IoT						3	28
XP-9781-IoT						7	28



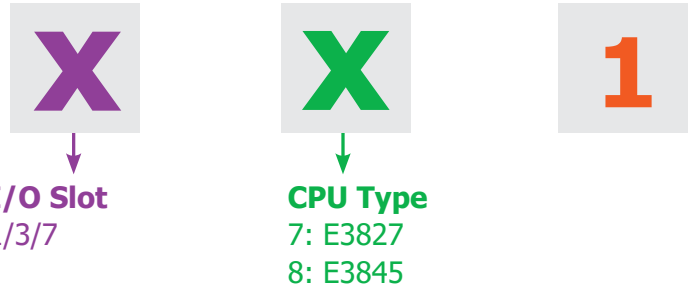
The WP-9000-CE7 series has a built-in Windows CE 7.0 operating system and supports a variety of software development tools: VB.Net 2005/2008, Visual C#.NET 2005/2008, Win-GRAF. In addition to the small operating core of Windows CE 7.0, it provides a Hard Real-Time, and deeper interrupt processing capabilities that is very suitable for stable and critical control.

The WP-9000-IoT series has a built-in Windows 10 IoT operating system without compromising on Windows application compatibility or graphics capabilities.

Model Name	CPU	RAM	Flash	Memory Card	USB	I/O Slot	Page
WP-9221-CE7	AM3354 (1 GHz, single-core)	512 MB	256 MB	4 GB microSD	2 × USB 2.0	2	29
WP-9421-CE7						4	29
WP-9821-CE7						8	29
WP-9181-IoT	i.MX8M Mini (1.6 GHz, quad-core)	2 GB	8 GB			1	30
WP-9381-IoT						3	30
WP-9781-IoT						7	30

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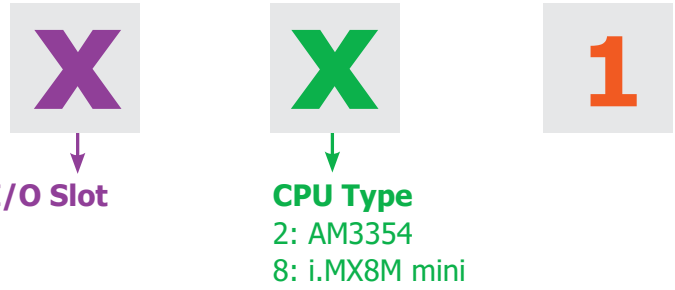
LX-9



The LX-9000 series are equipped with Linux x86_64 operating system, fanless multi-core x86 CPU, large-capacity hard disk storage, and diverse hardware communication interfaces, such as I/O slot, Serial Port, Ethernet, USB, HDMI, etc.

Model Name	CPU	RAM	Flash	Memory Card	USB	I/O Slot	Page
LX-9171	E3827 (1.75 GHz, 2C2T)	2 GB (on-board)	32 GB (mSATA)	16 GB CF	4 × USB 2.0	1	28
LX-9371						3	28
LX-9771						7	28
LX-9181	E3845 (1.91 GHz, 4C4T)	4 GB (on-board)	32 GB (mSATA)			1	30
LX-9381						3	30
LX-9781						7	30

LP-9



The LP-9000 series are equipped with 32/64-bit Linux OS, low power consumption ARM-based CPU, and diverse hardware communication interfaces, such as I/O slot, Serial Port, Ethernet, USB, etc.

Model Name	CPU	RAM	Flash	Memory Card	USB	I/O Slot	Page
LP-9221	AM3354 (1.0 GHz, single-core)	512 MB	512 MB	4 GB microSD	2 × USB 2.0	2	29
LP-9421						4	29
LP-9821						8	29
LP-9181	i.MX8M mini (1.6 GHz, quad-core)	2 GB	8 GB			1	30
LP-9381						3	30
LP-9781						7	30

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XP-91xx-IoT (1 Slot)

LX-91xx (1 Slot)

CPU Module
E3827
E3845

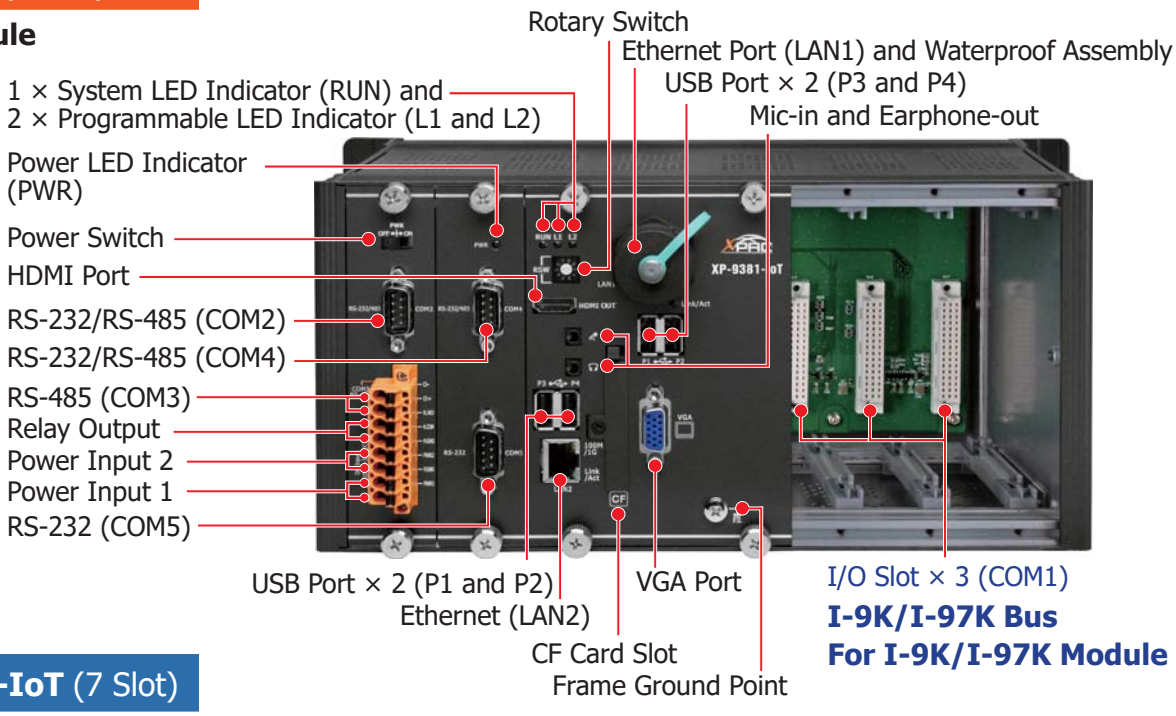


I/O Slot (COM1)
I-9K/I-97K Bus
For I-9K/I-97K Module

XP-93xx-IoT (3 Slot)

LX-93xx (3 Slot)

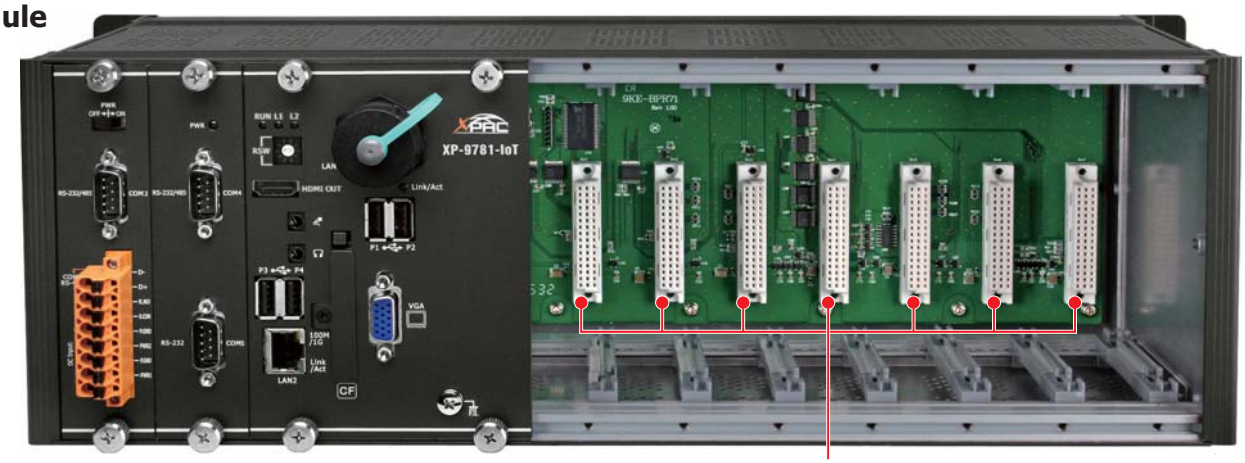
CPU Module
E3827
E3845



XP-97xx-IoT (7 Slot)

LX-97xx (7 Slot)

CPU Module
E3827
E3845



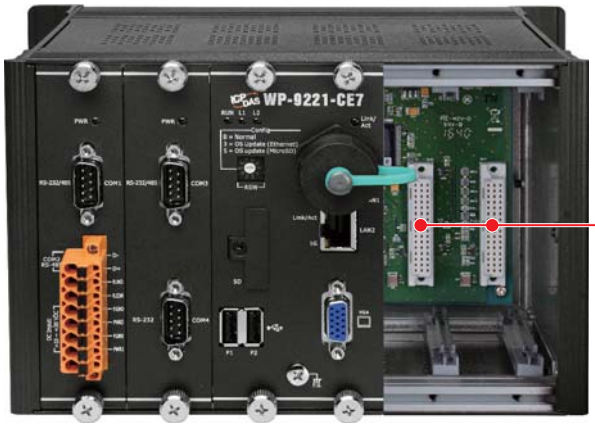
I/O Slot × 7 (COM1)
I-9K/I-97K Bus
For I-9K/I-97K Module

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WP-922x-CE7 (2 Slot)

LP-922x (2 Slot)

CPU Module
AM3354



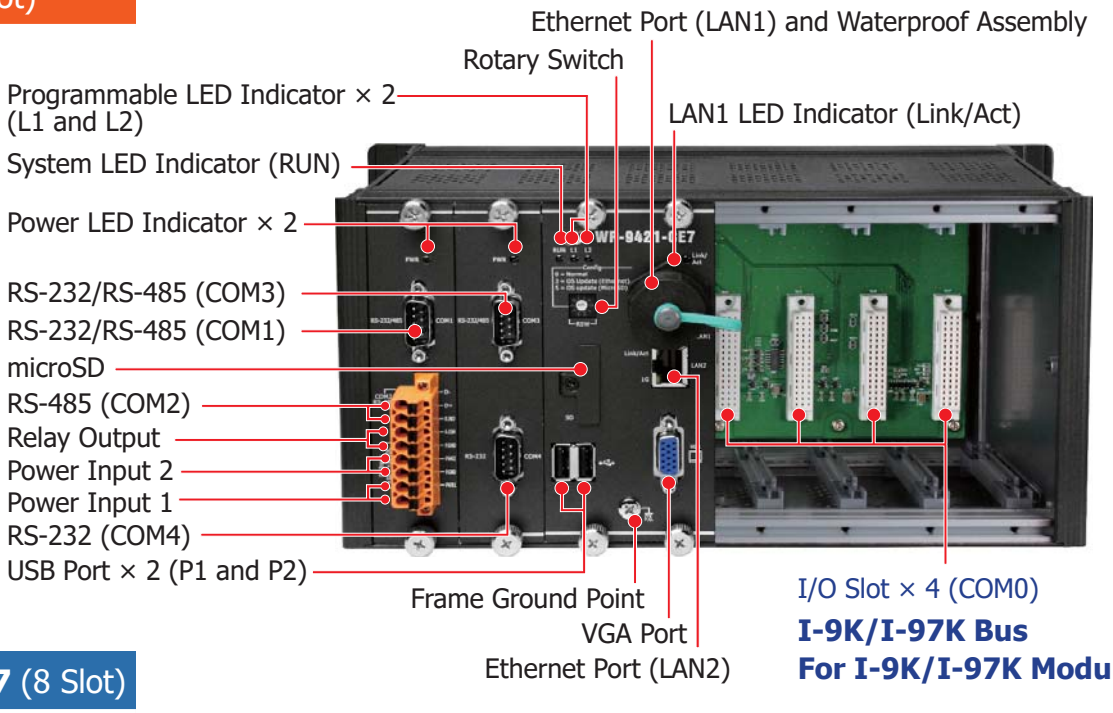
I/O Slot × 2 (COM0)

I-9K/I-97K Bus
For I-9K/I-97K Module

WP-942x-CE7 (4 Slot)

LP-942x (4 Slot)

CPU Module
AM3354



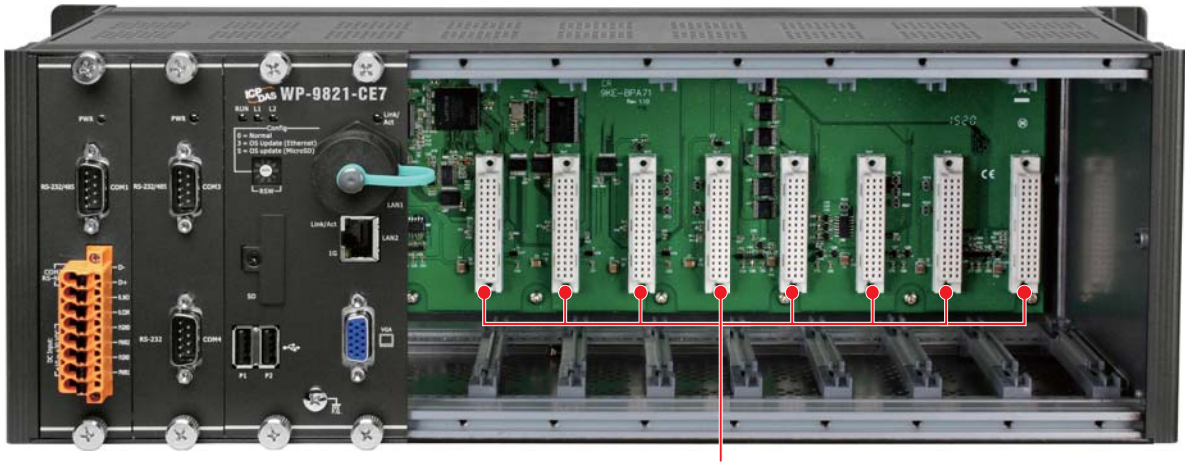
I/O Slot × 4 (COM0)

I-9K/I-97K Bus
For I-9K/I-97K Module

WP-982x-CE7 (8 Slot)

LP-982x (8 Slot)

CPU Module
AM3354



I/O Slot × 8 (COM0)

I-9K/I-97K Bus
For I-9K/I-97K Module

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WP-918x-IoT (1 Slot)

LP-918x (1 Slot)

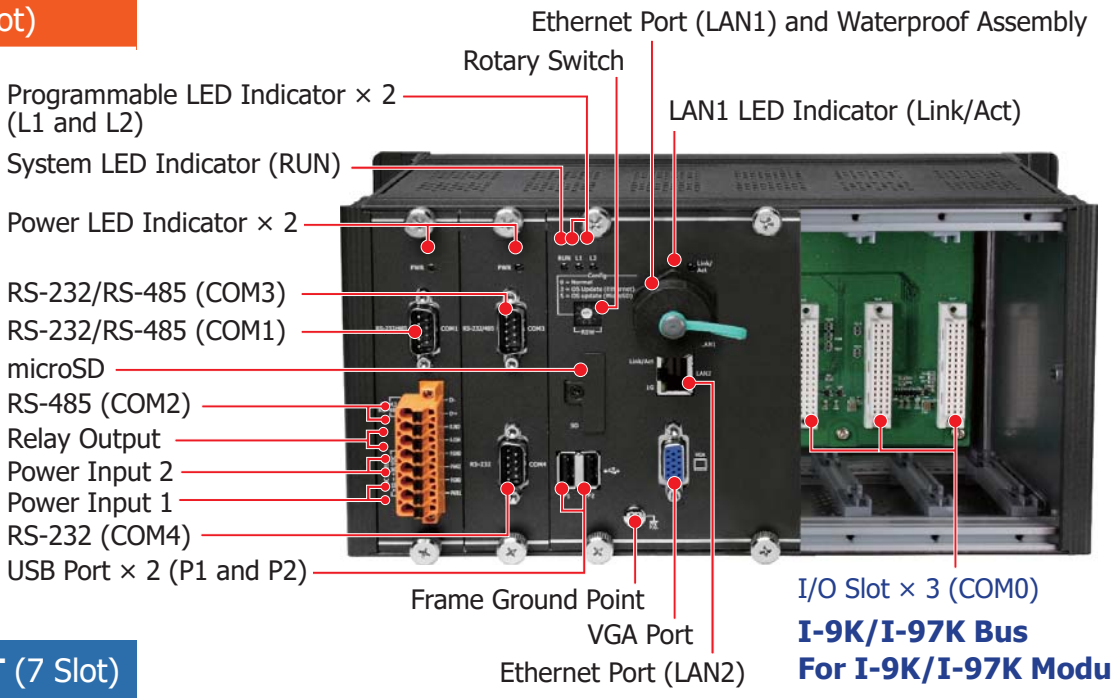
CPU Module
i.MX8M Mini



WP-938x-IoT (3 Slot)

LP-938x (3 Slot)

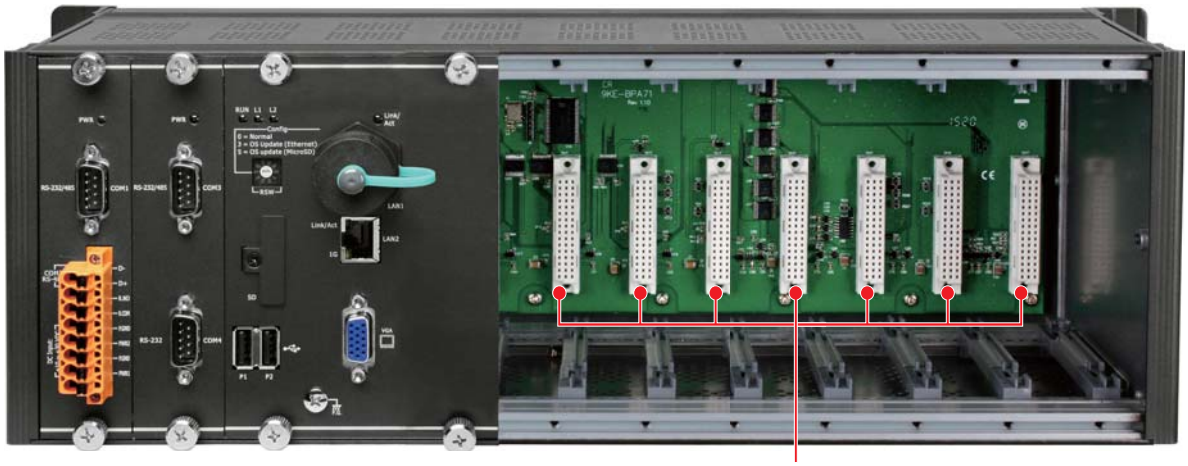
CPU Module
i.MX8M Mini



WP-978x-IoT (7 Slot)

LP-978x (7 Slot)

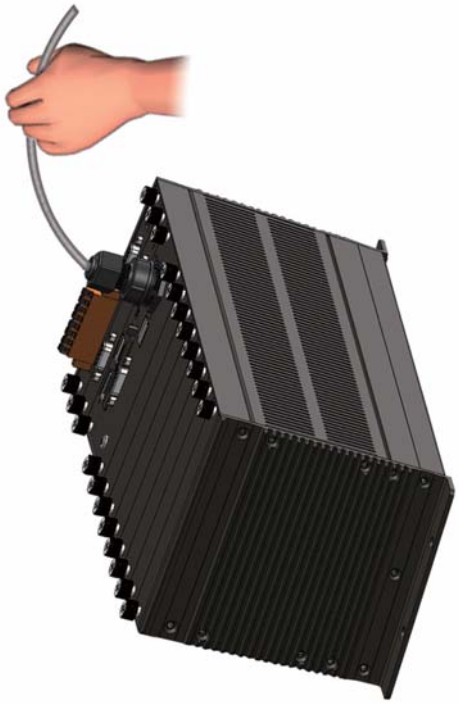
CPU Module
i.MX8M Mini



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2.4 Securing the Ethernet Cable

ICP DAS provides two types of RJ-45 network port designs, which can secure the Ethernet cable, avoid poor communication caused by vibration and pulling, and increase the reliability of RJ-45 cable connector.



- **Secured RJ45 connector**

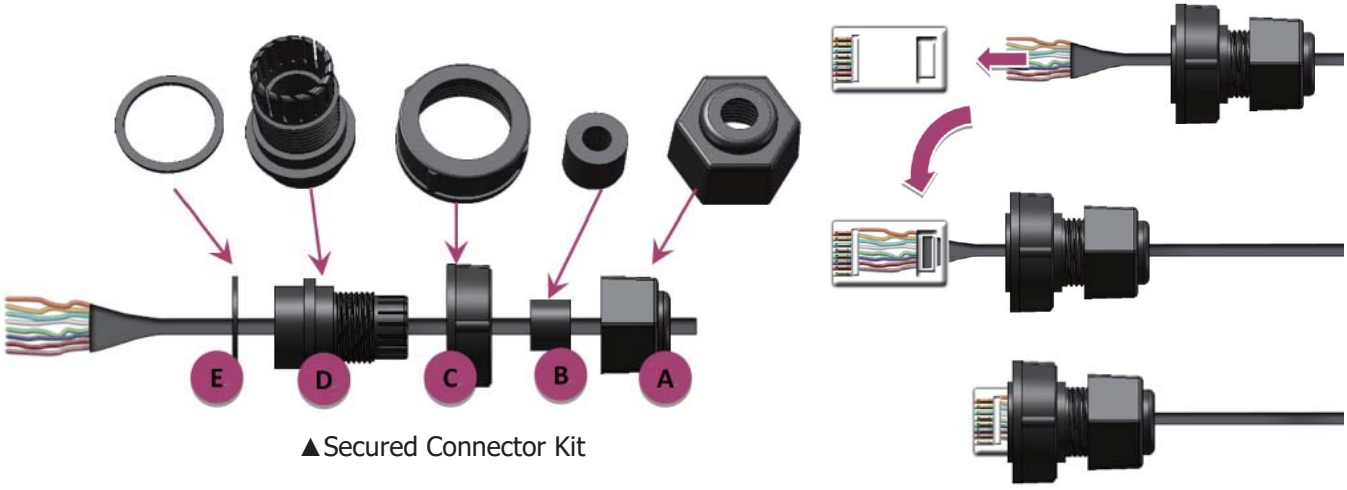
  This RJ45 connector not only can be used with the regular network cable, but also can add a secured connector. Besides, the package allows the regular network connector to get the most reliable locking force.



▲Ragular Ethernet Cable



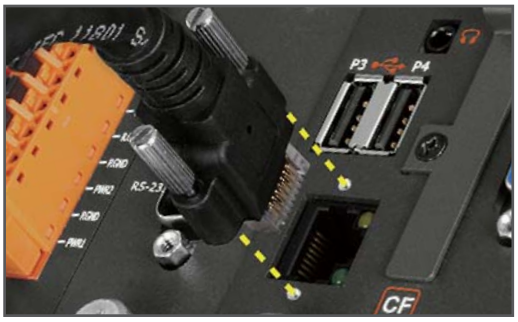
▲Secured RJ45 Connector Kit



▲Secured Connector Kit

- **Screw-lockable RJ45 connector (The new design for AXP-9000 and ALX-9000 series)**

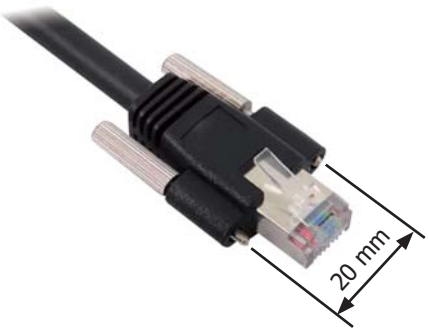
  There are screw holes (spacing 20mm) on both sides of the RJ45 connector, you can lock the RJ45 cable connector with them, to reduce the risk of the Ethernet cable falling off due to vibration occurring. Meanwhile, you can also choose a regular RJ45 cable connector for your needs.



▲Screw-lockable RJ45 Connector



▲Regular Ethernet Cable



▲Ethernet Cable with Screw Lock

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2.5 Advanced CPU Heat Sink Design

- **i5 CPU Advanced Heat Sink Design (The new design for AXP-9x51-IoT and ALX-9x51 series)**

The new heat sink design using larger heat sink and fan, the specific metal mechanism design can reduce the temperature of the entire CPU by nearly 10°C; moreover, it can also extend the service life of electronic parts. We specially selected the new long-life type of cooling fan, and the fan can work for 180,000 hours by test. **(180,000 hrs ≒ 20 years)**



▲Long Life CPU Heat Sink Design



▲Long Life Design



▲Regular Design

- **E3950/E3845/E3827 CPU Heat Sink Design**

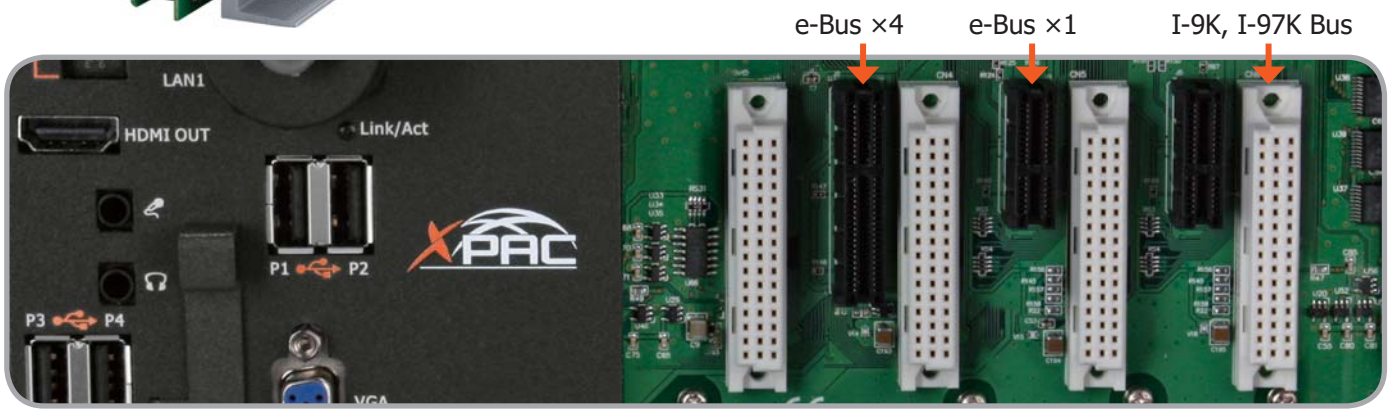
E3950/E3845/E3827 are embedded CPUs, their power consumption is only 12W/10W/8W. That's why the fanless design and large heat sink ensure normal operation of the CPUs.



I/O Module Communication Interface

The PAC of the 9000 series can support I/O and communication expansion modules of the e-9K, I-9K, and I-97K series.

- e-9K uses e-Bus communication, supports x1 or x4 communication interface, and the speed is 500 MB/s or 2 GB/s.
- I-9K uses 8-bit parallel communication, and the speed is about 200 ~ 500 KB/s according to different CPU levels.
- I-97K uses uart communication with a speed of 115 kbit/s.



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2.6 e-9K Series , DAQ/Communication Modules (e Bus)

Model	e-Bus	Description
e-LCell4	**e-Bus x1**	High-speed LoadCell (24-bit, 15KHz) module, 4-channel, Terminal Block
e-A16SH	**e-Bus x1**	High-speed AI module, 16-channel, 16-bit, 200KHz, Sample & Hold, Terminal Block
e-D96S	**e-Bus x1**	High-speed bidirectional DIO module, 96-channel, SCSI II 96-pin connector
e-MN200	**e-Bus x1**	e-Bus x1 Dual-line Motionnet Motion Control Module (For Distributed Motion & I/O Control)
e-AR300T	**e-Bus x1**	Accelerometers input, 3-port IEPE interface, 1 channel thermistor input
e-AR400	**e-Bus x1**	Accelerometers input, 4-port IEPE interface
e-USB400	**e-Bus x1**	4-port USB 3.0 expansion module. 500 MB/s total bandwidth
e-USB404	**e-Bus x4**	4-port USB 3.0 expansion module. 2 GB/s total bandwidth
e-PoE204	**e-Bus x4**	2-port PoE (10/100/1000 Mbps) expansion module
e-PoE404	**e-Bus x4**	4-port PoE (10/100/1000 Mbps) expansion module



e-LCell4

e-Bus, 24-bit High-precision Load Cell Input Card

- e-Bus x1
- 4-channel 24-bit load cell input
- 4-channel 24-bit analog input
- 15 kHz sampling frequency



e-A16SH

e-Bus, 200 kS/s, 16 Channels and 16 bits High-speed Analog Input Card

- e-Bus x1
- Simultaneous sampling
- 16-bit 16-channel single-ended analog input
- 2k WORD FIFO
- 16-channel simultaneous sampling single-ended analog input



e-D96S

e-Bus, 96-channel Digital I/O Card

- e-Bus x1
- 96 channels of Digital I/O
- I/O response time 500kHz
- SCSI-II terminal



CA-SCSI100-15

SCSI-II 100-pin Cable, 1.5M

100-pin

DN-100



100-pin SCSI II Female I/O Connector Block



e-MN200

e-Bus, Dual-line Motionnet Motion Control Module (For Distributed Motion & I/O Control)

- e-Bus x1
- Maximum Communication Speed: 20 Mbp
- Distributed motion control up to 128 axes
- Distributed I/O points up to 4096 points
- Built-in I/O: 8x DI, 4x DO



e-AR300T

e-Bus, 3-channel Accelerometer

- e-Bus x1
- 3 channels with 16-bit simultaneous sampling
- 3 IEPE input ports, drive current is 3 mA
- 1 channel thermistor input
- Up to 125kHz sampling frequency
- Signal dynamic range: ±10V
- There are several trigger modes available, including button trigger, time schedule trigger, threshold trigger, digital input trigger, and remote tool software trigger



e-AR400

e-Bus, 4-channel Accelerometer

- e-Bus x1
- 4 channels 16-bit simultaneous sampling
- 4 IEPE input ports, with 3 mA drive current
- Up to 125kHz sampling frequency
- Signal dynamic range: ±10V
- There are several trigger modes available, including button trigger, time schedule trigger, threshold trigger, digital input trigger, and remote tool software trigger



e-USB400, e-USB404

e-Bus, 4-port USB3.0 Expansion Module

- e-Bus **x1/x4**
- 4-port USB3.0 host module that is backward compatible with USB2.0/1.1/1.0
- 500 MB/s, 2 GB/s total bandwidth
- Each port has a maximum current supply of 900 mA.
- USB Camera Supported





e-PoE204, e-PoE404

e-Bus, 2/4-port PoE Expansion Module

- e-Bus **x4**
- Supports IEEE 802.3at PoE
- 2/4 ports 10/100/1000 Mbps Ethernet
- Supports PoE power management and monitoring
- Supports PoE Camera



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2.7 I-9K Series Module

Analog Input Modules

Model Name	AI (Analog Input)				
	Channels	Resolution	Sampling Rate	Input Range	Sensor
I-9012	8	16-bit	200/40 kHz	±5 V, ±10 V	-
I-9014	8/16		250/45/25 kHz	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (with external 125 Ω resistor)	
I-9014C	8			±20 mA (with built-in 125 Ω resistor)	
I-97015	8		12 Hz	-	Pt100, Pt1000, Ni100, Ni120, Cu50, Cu100, Cu1000
I-97017Z	10/20		50/15 Hz	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Jumper selectable)	-
I-9017	8/16	14-bit	90/16 kHz	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (with external 125 Ω resistor)	
I-9017-15	15/30				
I-9017C-15	15			±20 mA (with built-in 125 Ω resistor)	
I-97018/S	8	16-bit	10 Hz	±2.5 V , ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA, 0~20 mA, 4 ~2 0 mA (Jumper selectable)	Thermocouple: J, K, T, E, R, S, B, N, C, L, M, $L_{DIN43710}$
I-97019/S	8			±15 mV, ±50 mV, ±100 mV, ±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Jumper selectable)	



▲ I-9012



▲ I-9014



▲ I-9014C



▲ I-97015



▲ I-97017Z



▲ I-9017



▲ I-9017-15



▲ I-9017C-15



▲ I-97018/S

=I-97018 Connects CN-1824M Directly



▲ I-97019/S

=I-97019 Connects CN-1824M Directly

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Analog Output Modules

Model Name	Bus	AO (Analog Outputs)			
		Channels	Resolution	Output Range	Wiring Current Output
I-9024	Parallel	4	14-bit	±10 V, 0 ~ 20 mA	Sink
I-9024U	Parallel	4	16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source
I-97024U	Serial	4	16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source
I-9028U	Parallel	8	16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source
I-97028U	Serial	8	16-bit	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source



▲ I-9024



▲ I-9024U



▲ I-97024U



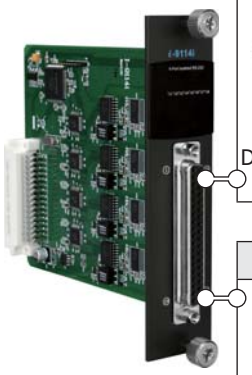
▲ I-9028U



▲ I-97028U

Communication Modules

Model Name	Ports	Type	Isolation
I-9114i	4	RS-232	Yes
I-9144i	4	RS-422/485	Yes
I-9174	4	FRnet	Yes
I-9710	2	HART Gateway	Yes
I-9120	1	CAN bus	Yes



▲ I-9114i

CA-9-3705



DB37 Male/90° to 4 × DB9 Male Cable [RS-232]

CA-9-3715D



DB37 Male to 4 × DB9 Male Cable [RS-232]



▲ I-9144i



▲ I-9174



▲ I-9710



▲ I-9120

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Digital Modules

Model Name	DI (Digital Input)			DO (Digital Output)			
	Channels	Sink/Source	ON Voltage Level	Channels	Type	Sink/Source	Max. Load
I-9037P	-	-	-	16	Open Collector	Source	700 mA/Channel
I-9040P	32	Sink/Source	19 ~ 30 VDC	-	-	-	-
I-9041P	-	-	-	32	Open Collector	Sink	100 mA/Channel
I-9048	8	Sink/Source with **Interrupt**	+4 V ~ +30 V	-	-	-	-
I-9053P	16	Sink/Source	19 ~ 30 VDC	-	-	-	-
I-9054P	8	Sink/Source	19 ~ 30 VDC	8	Open Collector	Sink	500 mA/Channel
I-9057P	-	-	-	16	Open Collector	Sink	100 mA/Channel
I-9064	-	-	-	8	Power Relay	Form A	5 A/Channel
I-9069	-	-	-	8	PhotoMOS Relay	Form A	1 A/Channel



▲ I-9037P



▲ I-9048



▲ I-9053P



▲ I-9054P



▲ I-9057P



▲ I-9064



▲ I-9040P



▲ I-9041P



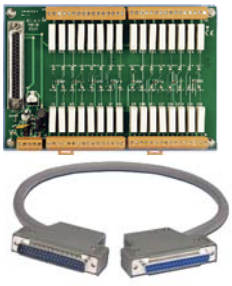
DN-37-381-A

I/O Connector Block with DIN-Rail Mounting and 37-pin D-sub Connector (pitch: 3.81 mm)
Including One CA- 3710A
(37-pin Male-Female D-sub Cable, 1.0M)



DN-37-A

Female DB37 to Screw Terminal Board (Pitch= 5.08 mm) with DIN-rail Mounting (RoHS)
Include: CA-3710A (DB37 Male to Female Cable, 90º, 1 M)



DN-8K32R CR

32-channel Relay Output Board (RoHS)
Include: CA-3705A
(DB37 Male to Female Cable, 90º, 0.5 M)

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Motion Control Modules

Model Name	Encoder Input					Compare Trigger Output	
	Axis	Counter	Counting Rate (cps)	Signal	Hardware Latch/Reset	Channels	Type
I-9093	3	32-bit	6 M (CW/CCW, Pulse/Dir) 2 M (A/B)	CW/CCW, Pulse/Dir, A/B	3	3	Open collector



▲ I-9093

Model Name	Encoder Input				Command Pulse Output			
	Axis	Counter	Counting Rate (cps)	Signal	Axis	Speed (pps)	Counter	Signal
I-9094F	4	32-bit	4 M	CW/CCW, A/B	4	4 M	32-bit	CW/CCW, Pulse/Dir
I-9196F	6		12 M		6			CW/CCW, Pulse/Dir, A/B



▲ I-9094F

CA-SCSI15-H3



SCSI-II 68-pin Cable
for high speed motion application)

DN-8468UB (GB/MB/PB/YB/DB/FB)

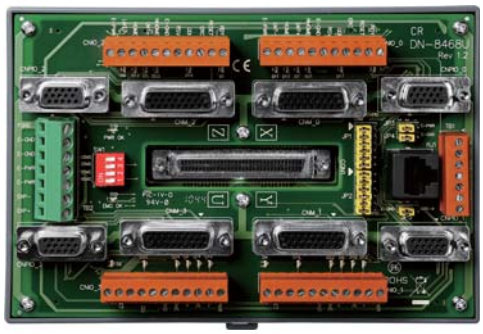


Photo-Isolated Terminal Board for ICP DAS 4-axis Stepper/Servo Motion Controller



DN-8468UB

Photo-isolated Universal Snap-on Wiring Terminal Board



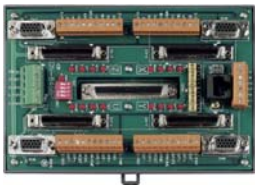
DN-8468GB

Photo-isolated General Purpose Wiring Terminal Board



DN-8468MB

Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier



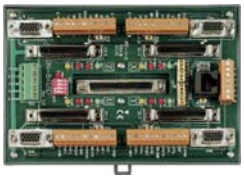
DN-8468PB

Photo-isolated Snap-on Wiring Terminal Board for Panasonic MINAS A4/A5 Servo Amplifier



DN-8468YB

Photo-isolated Snap-on Wiring Terminal Board for Yaskawa Sigma II/III/V Servo Amplifier



DN-8468DB

Photo-isolated Snap-on Wiring Terminal Board for Delta ASDA-A Servo Amplifier



DN-8468FB

Photo-isolated Snap-on Wiring Terminal Board for Fuji FALDIC-W Servo Amplifier

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▲ I-9196F

CA-SCSI20-M1



SCSI-II 20-pin Cable, 1M
(for Mitsubishi J2 Series Servo Amplifier)

DN-20M



Manual-Pulse-Generator (MPG) and FRnet Input Board for PISO-PS600/VS600/PMDK

CA-MINI68-15



×2

68-pin VHDCI to SCSI-II Cable, 1.5M

DN-8368UB (GB/MB)



×2

Photo-isolated Terminal Board for PISO-PS600/VS600/PMDK

	**DN-8368UB** Photo-isolated Universal Snap-on Wiring Terminal Board
	**DN-8368GB** Photo-isolated General Purpose Wiring Terminal Board
	**DN-8368MB** Photo-isolated Snap-on Wiring Terminal Board for Mitsubishi MELSERVO-J2 Servo Amplifier

Counter/Frequency Input Modules

Model Name	Counter/Frequency Input				
	Channels	Counter	Signal	Speed	Frequency Accuracy
I-9084P	4/8	32-bit	Up, CW/CCW, A/B, Pulse/Dir	250 kHz	+/-0.05 %

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CH3
8000 Series PAC



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3.1 XP-8000 Series (Windows)

Open System



Microsoft Windows Embedded Standard

Microsoft Windows CE.net

The XP-8000 combines the functionality and openness of PC, the reliability of a programmable logic controller (PLC), and the intelligence of I/O modules. Moreover, XP-8000 can be widely used in Factory Automation, Building Automation, Machine Automation, Laboratory Automation, chemical industry, environmental monitoring, M2M, IoT, Industrial 4.0, …etc.

XP-8000 ≒ IPC + PLC



Local I/O Expansion



I-8K and I-87K Series



Motion Control

I-8093W, I-8094

Specific I/O Module

Hight Speed
I-8014W, I-8017HW (AI)
I-8024W, I-8028UW (AO)
I-8084W (Counter/Frequency)

I/O Slots

- FRnetSDK
- CAN Bus SDK
- Motion SDK
- Specific I/O SDK
- PACSDK

FRnet I/O Expansion

I-8172W
FRnet Communication

FR-2000 Series

CANopen/DeviceNet I/O Expansion

I-87120, I-87123...
CANbus Communication

CAN-2000 Series

CAN-8000 Series

General I/O Module



I-8K/I-87K Series I/O Module

Serial Device Expansion



I-8112i, I-8144iW ...
RS-232/485 Communication



Serial Devices



Modbus | **DCON**

Ethernet | **RS-485** | **RS-485**

max. 32 Nodes for each port



I-7000 Series | M-7000 Series | tM Series | I/O Expansion Unit

RU-87P4
RU-87P8

Remote I/O Expansion

max. 32 Nodes for each port



tET | ET-7200 | ET-2000 | I/O Expansion Unit

iP-8441-MTCP
iP-8841-MTCP
ET-8KP4-MTCP
ET-8KP8-MTCP



M-7000 Series | I/O Expansion Unit

iP-8411-MRTU
iP-8811-MRTU

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Selection Guide:

XP - 8 X X X - WES7

NO. of I/O Slot

CPU
3: R3600, x86 CPU

Software
1: Standard

Standard XPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet Port	RS-232/RS-485	I/O Slot
XP-8031-WES7	Windows Embedded Standard 7	R3600, x86 CPU, 1 GHz, dual-core	32 GB	2 GB DDR3	1600 × 1200	2	5	0
XP-8131-WES7							4	1
XP-8331-WES7								3
XP-8731-WES7								7

XP - 8 X X X - CE6

NO. of I/O Slot

CPU
3: R3600, x86 CPU

Software
1: Standard
7: ISaGRAF
8: Win-GRAF

Standard XPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet Port	RS-232/RS-485	I/O Slot
XP-8031-CE6	CE 6.0	R3600, x86 CPU, 1 GHz, dual-core	32 GB	2 GB DDR3	1024 × 768	2	5	0
XP-8131-CE6							4	1
XP-8331-CE6								3
XP-8731-CE6								7

Win-GRAF Based XPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet Port	RS-232/RS-485	I/O Slot
XP-8038-CE6	CE 6.0	R3600, x86 CPU, 1 GHz, dual-core	32 GB	2 GB DDR3	1024 × 768	2	5	0
XP-8138-CE6							4	1
XP-8338-CE6								3
XP-8738-CE6								7

ISaGRAF Based XPAC

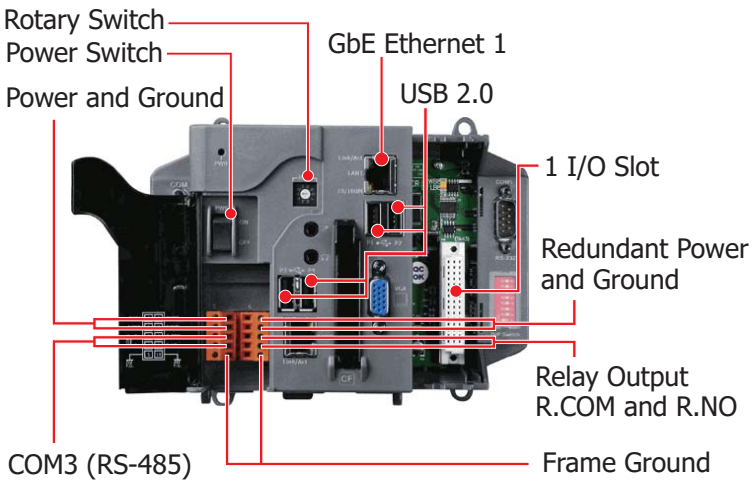


Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet Port	RS-232/RS-485	I/O Slot
XP-8037-CE6	CE 6.0	R3600, x86 CPU, 1 GHz, dual-core	32 GB	2 GB DDR3	1024 × 768	2	5	0
XP-8137-CE6							4	1
XP-8337-CE6								3
XP-8737-CE6								7

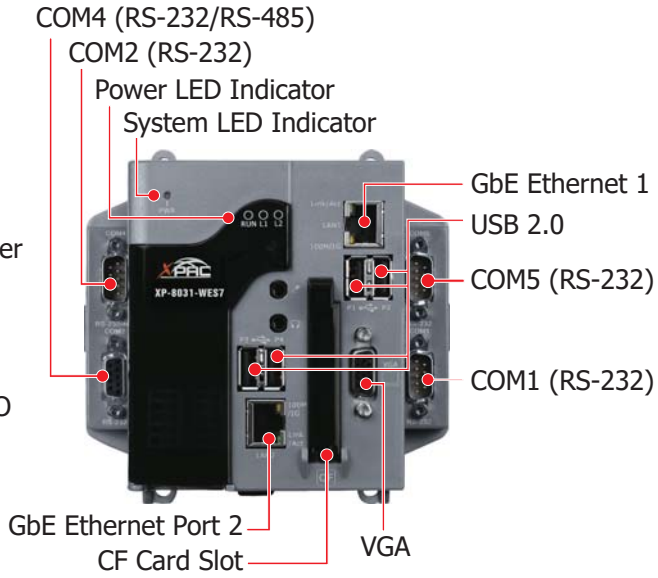
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Appearance:

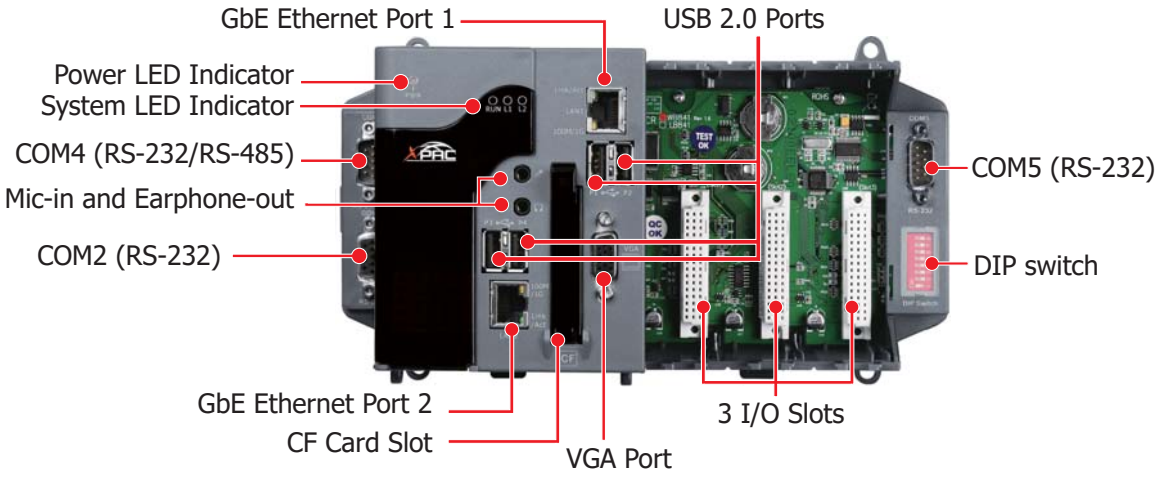
XP-8131-WES7



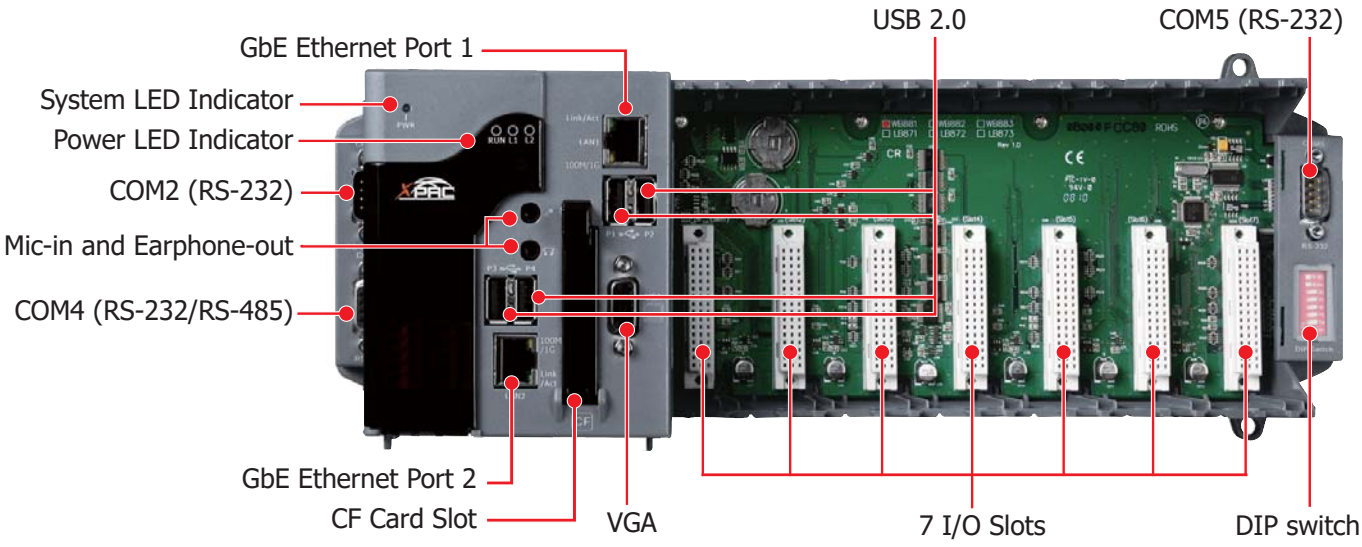
XP-8031-WES7



XP-8331-WES7



XP-8731-WES7



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3.2 WP-8000 Series (WinCE)

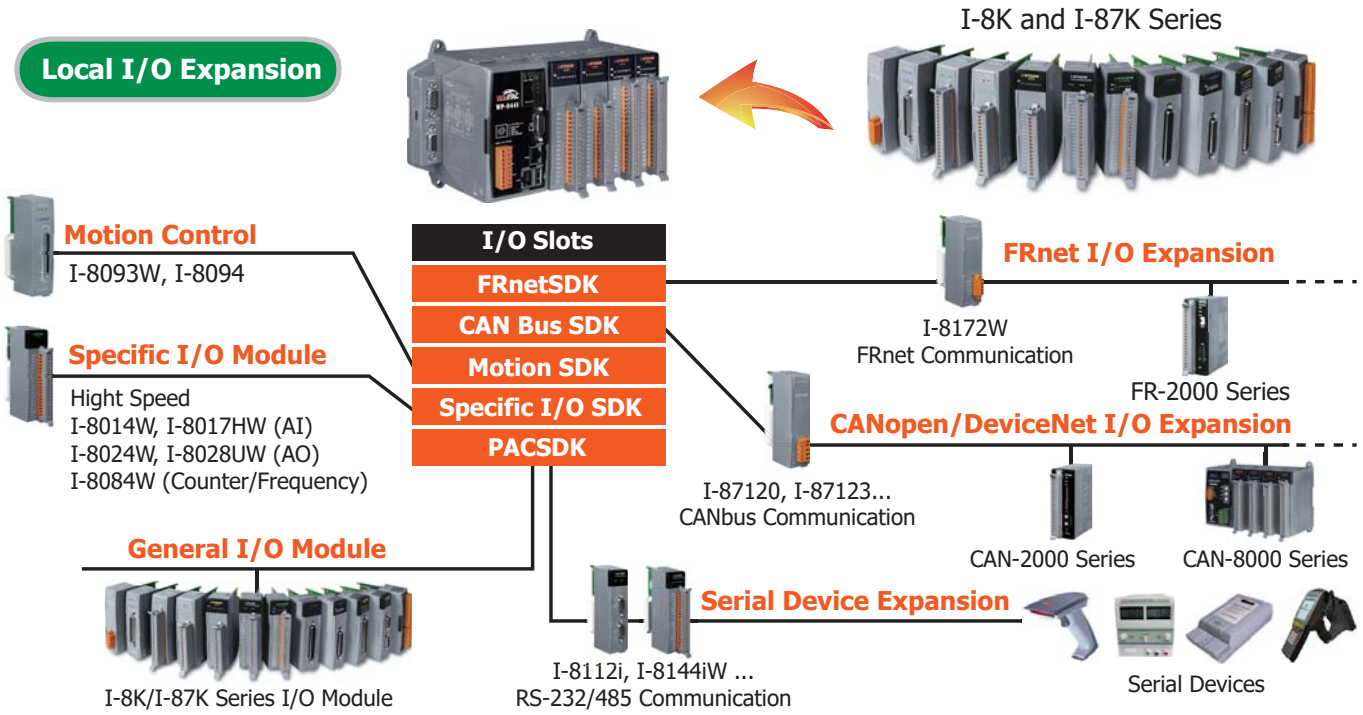
Open System

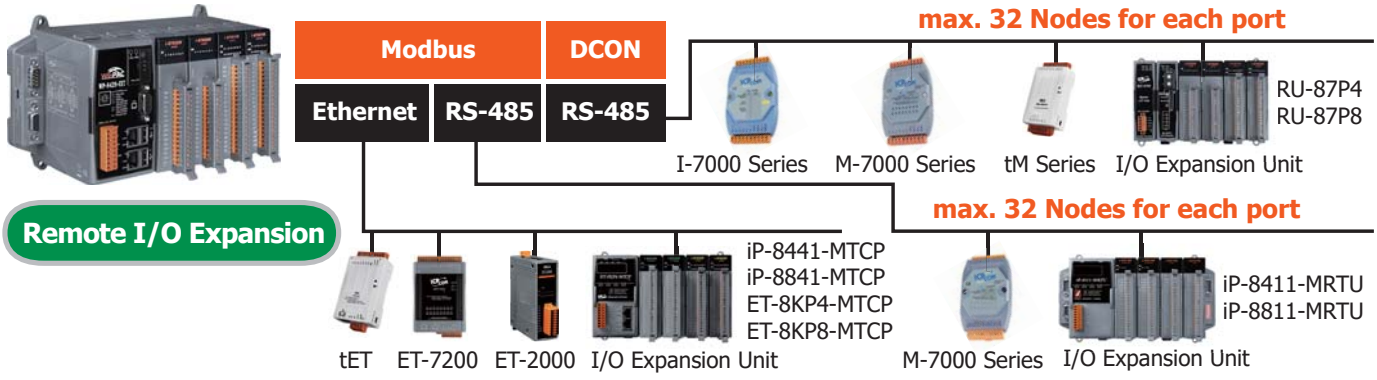


Microsoft Windows CE.net

WinPAC-8000 is equipped a ARM CPU running a Windows CE.NET operating system, various connectivities (VGA, USB, Ethernet, RS-232/485) and 1/4/8 slots for high performance Parallel I/O modules (high profile I-8K series) and serial I/O modules (high profile I-87K I/O modules).

WinPAC operating system, Windows CE, has many advantages, including hard real-time capability, small core size, short boot time, interrupt handling at a deeper level, achievable deterministic control, and low cost. Using Windows CE.Net in the WinPAC-8000 gives it the ability to run PC-based Control software such as Visual Basic.NET, Visual C#, Embedded Visual C++, SCADA software, SoftPLC.





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Selection Guide:

WP - 8 X X X - CE7

- **NO. of I/O Slot**
- **CPU**
  - 2: AM3354, 1 GHz
- **Software**
  - 1: Standard
  - 8: Win-GRAF
  - 9: InduSoft

Standard WinPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	USB	RS-232/ RS-485	I/O Slot	Memory Expansion
WP-8121-CE7	CE 7.0	AM3354, 1 GHz	256 MB	512 MB DDR3	1024 × 768	2	2	1	microSD
WP-8421-CE7							4	4	
WP-8821-CE7								8	

Win-GRAF Based WinPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	USB	RS-232/ RS-485	I/O Slot	Memory Expansion
WP-8128-CE7	CE 7.0	AM3354, 1 GHz	256 MB	512 MB DDR3	1024 × 768	2	2	1	microSD
WP-8428-CE7							4	4	
WP-8828-CE7								8	

InduSoft Based WinPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	USB	RS-232/ RS-485	I/O Slot	Memory Expansion
WP-8129-CE7	CE 7.0	AM3354, 1 GHz	256 MB	512 MB DDR3	1024 × 768	2	2	1	microSD
WP-8429-CE7							4	4	
WP-8829-CE7								8	

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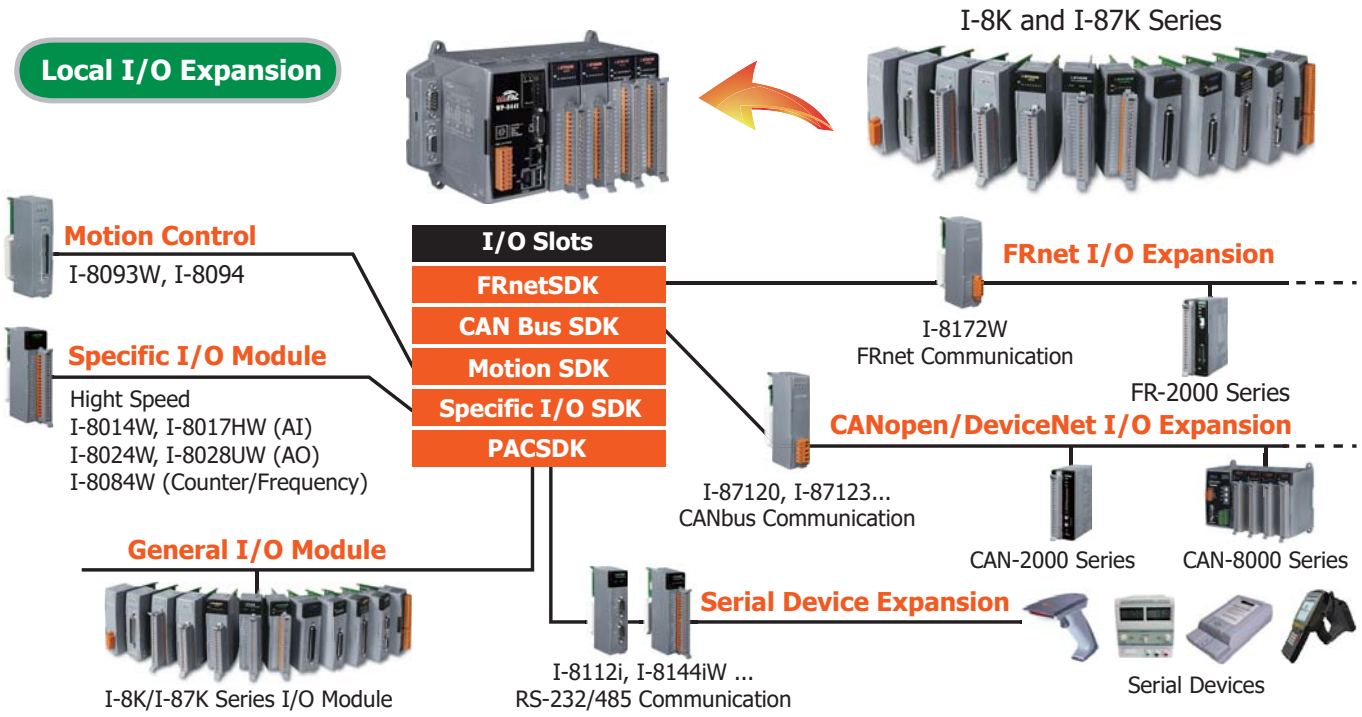
3.3 LP-8000 Series (Linux)

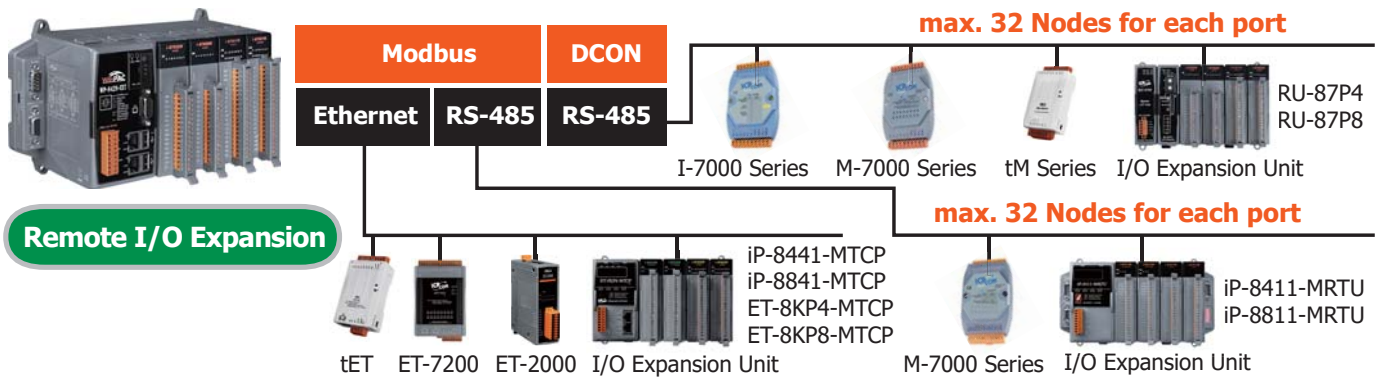
Open System



The LinPAC-8000 is equipped with a ARM CPU or x86 CPU running a Linux kernel 2.6 or above operating system, multiple communication interfaces (VGA, USB, Ethernet and RS-232/485) and 1/4/8-slot or 0/3/7-slot backplane for both high performance Parallel I/O modules (high profile I-8K series) and Serial I/O modules (high profile I-87K series).

The LinPAC-8000 includes a VGA port allowing users to choose a regular LCD monitor for display of HMI application, USB port to connect with Keyboard, Mouse, USB device for storage or touch monitor, microSD/microSDHC memory for storage of program and data.

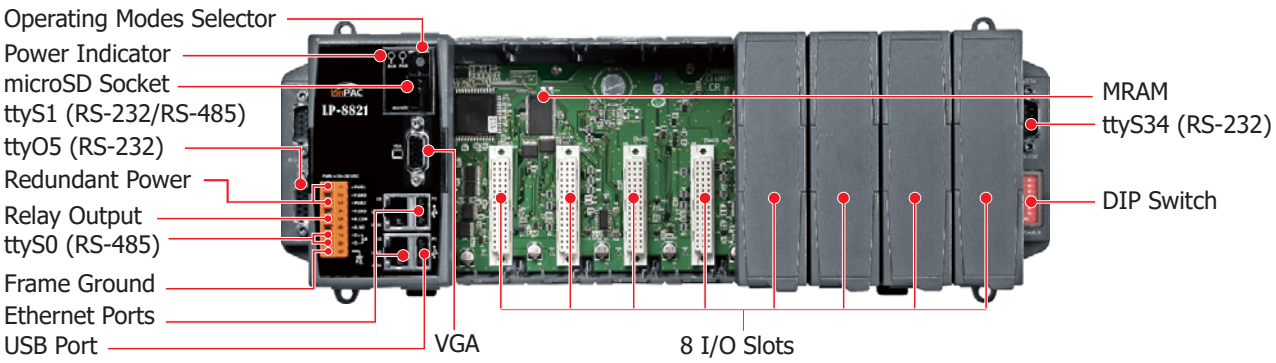




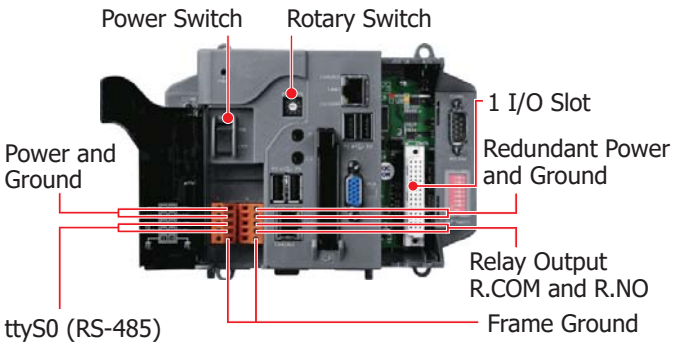
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Appearance:

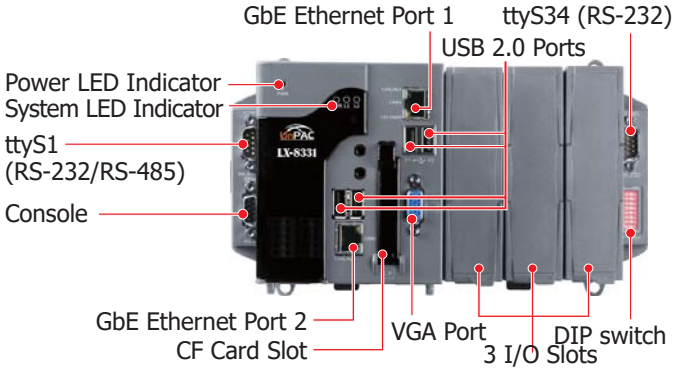
LP-8821, LP-8861



LX-8131



LX-8331



Selection Guide:

LP / LX - 8 X X X

NO. of I/O Slot

CPU
2: AM3354, 1 GHz
3: R3600, x86 CPU
6: AM6254, 1.4 GHz

Software
1: Standard
8: Win-GRAF



Standard LinPAC

Model Name	OS	Software	CPU	Flash	SDRAM	Ethernet	VGA Resolution	RS-232/ RS-485	I/O Slot	Audio Port
LP-8121	Linux kernel 3.2	None	AM3354, 1 GHz	512 MB	512 MB DDR3	2	1280 × 1024	2	1	None
LP-8421								4	4	
LP-8821									8	
LP-8161	5.4.x	None	AM6254, 1.4 GHz, quad-core	512 MB	512 MB DDR3	2	1920 x 1080	2	1	None
LP-8461								4	4	
LP-8861									8	
LP-8168	5.4.x	Win-GRAF	AM6254, 1.4 GHz, quad-core	8 GB	2 GB DDR4	2	1920 x 1080	2	1	None
LP-8468								4	4	
LP-8868									8	
LX-8031	Linux kernel 3.2	None	R3600, x86 CPU, 1 GHz, dual-core	32 GB	2 GB DDR3	2	1920 × 1080	5	0	Yes
LX-8131								4	1	
LX-8331									3	
LX-8731									7	

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Open System

3.4 iP-8000 Series (MiniOS7)



The iP-8000 is a family of compact, modular, intelligent and rugged, distributed PAC designed for data acquisition and control in manufacturing, research and education.

The iP-8000 is a modular network-based PAC with the capability of connecting I/O either through its own dual backplane bus or alternatively through remote I/O units and remote I/O modules. The unit comprises a main control unit with a range of standard communication interfaces, and a dual backplane bus permitting I/O expansion.

The unit can communicate using serial communications (RS-232, RS-485), Ethernet, or CAN bus. The Ethernet version of the product supports an integrated web server permitting Internet and Intranet applications.

Top 10 reasons to choose iP-8000 by ICP DAS:

❶ Powerful Embedded OS — MiniOS7

MiniOS7 is the most stable OS used in the last decade. Up to now, several hundred thousand copies with our PACs have been distributed worldwide.

Features:

- DOS-like embedded OS
- Internet connectivity
- **Short boot time period (<1 Second)**
- Less memory resource required
- Faster watchdog response time
- Libraries & demo programs for various peripherals, devices and remote I/O modules



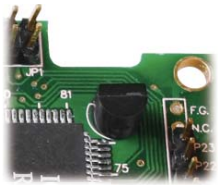
❷ Rich Development Support

We provide over 100 Libraries and Demos for users to develop applications easily and quickly to integrate with some popular software, SCADA, protocols or tools.

- Provide Libraries: Xserver, Modbus, MiniOS7 Framework
- Support development tool: ISaGRAF, C Language

❸ Patented Technology: "Self-Tuner" Chip

Our uPAC contains a patented "Self-tuner" chip which automatically tunes Baud rate and data format in the whole RS-485 network. It also handles the direction of RS-485 communication line.



❹ Unique 64-bit Hardware Serial Number Protecting Your Program

All uPAC-7186 series and most iP-8000 series comes with a 64-bit unique hardware serial number. A unique serial number is assigned to each hardware device to protect your software against piracy.

❺ Built-in RTC — Real Time Clock



- Provides second, minute, hour, day of week, day of month, month & year (1980 ~ 2079)
- With on-board battery
- Data valid up to 10 years
- Keep accurate time/date while the main power is lost

❻ 5-Digit 7-Segment LED Display

Optional 5-digit 7-segment LED display shows information, such as system status, userdefined message.

- Display numbers, letters, symbols, units, etc.



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❼ Highly Reliable Under Harsh Environment

Our PAC can operate in a wide range of temperature and humidity.

- Operating Temperature: -25 ~ +75°C
- Storage Temperature: -40 ~ +80°C
- Humidity: 10 ~ 90% RH, non-condensing



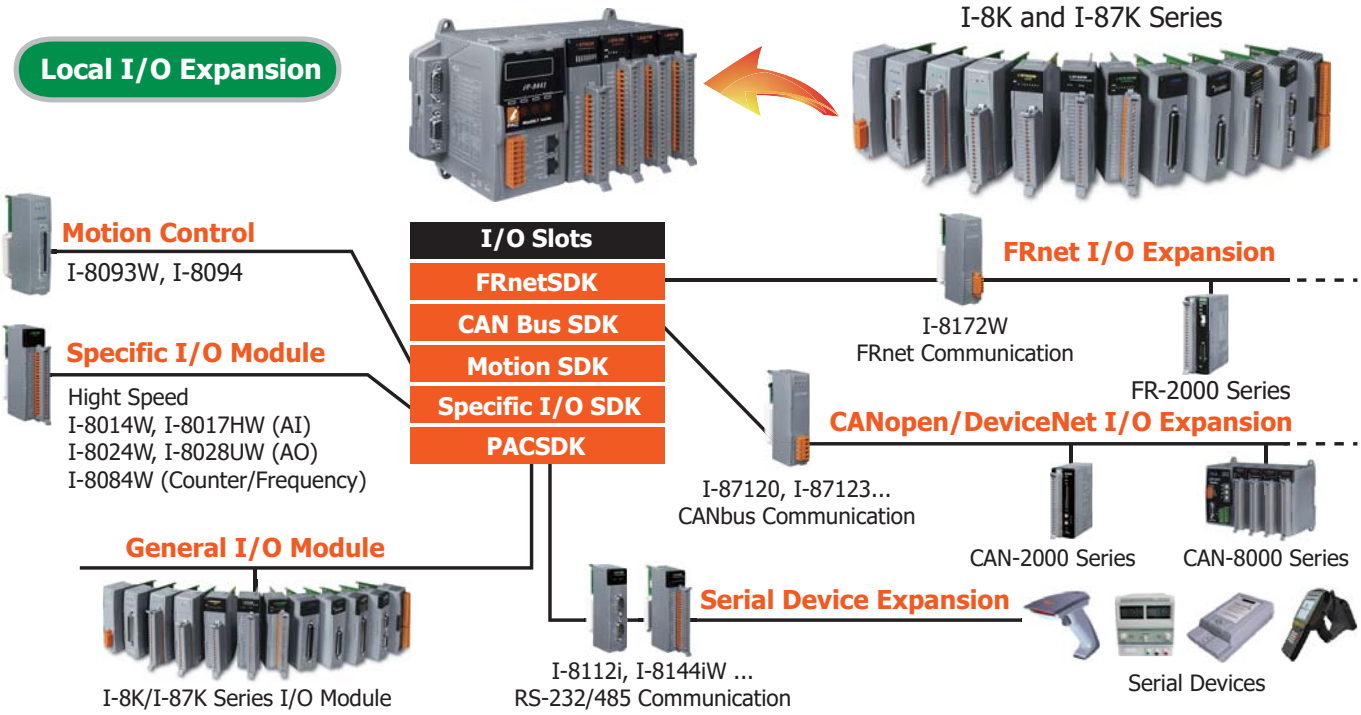
❽ Built-in WDT — Watchdog Timer

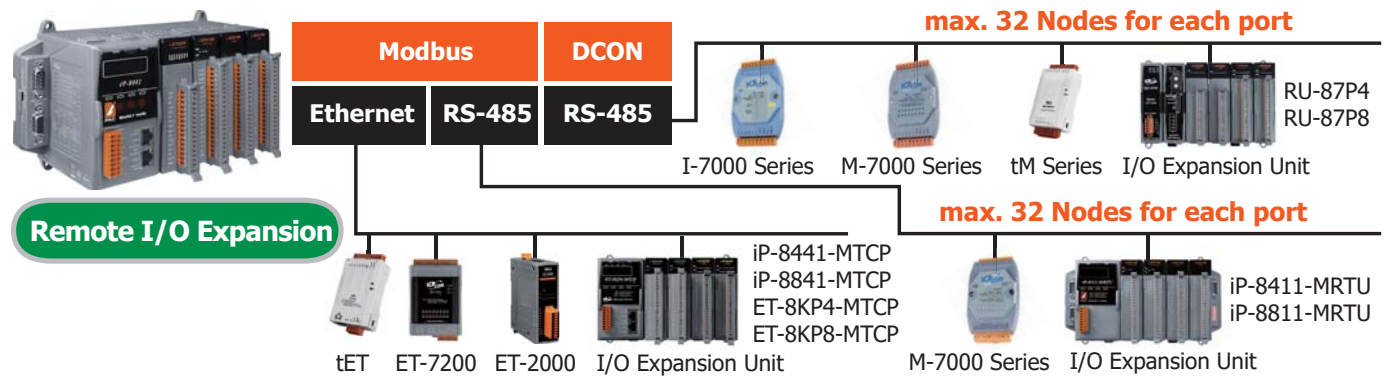
When iP-8000 is power-up, the watchdog timer can be enabled. The watchdog timer resets the controller after a short period (about 0.8 seconds) when the running software fails to reset the watchdog.

❾ Various Memory Expansion Options

Memory	Size	Description
micro SD	32 GB max.	FAT 32 file system for mass data storage
NVRAM	31 bytes	No writing limitation
EEPROM	2 KB or 16 KB	to store not frequently changed parameters.

❿ Various I/O Expansion

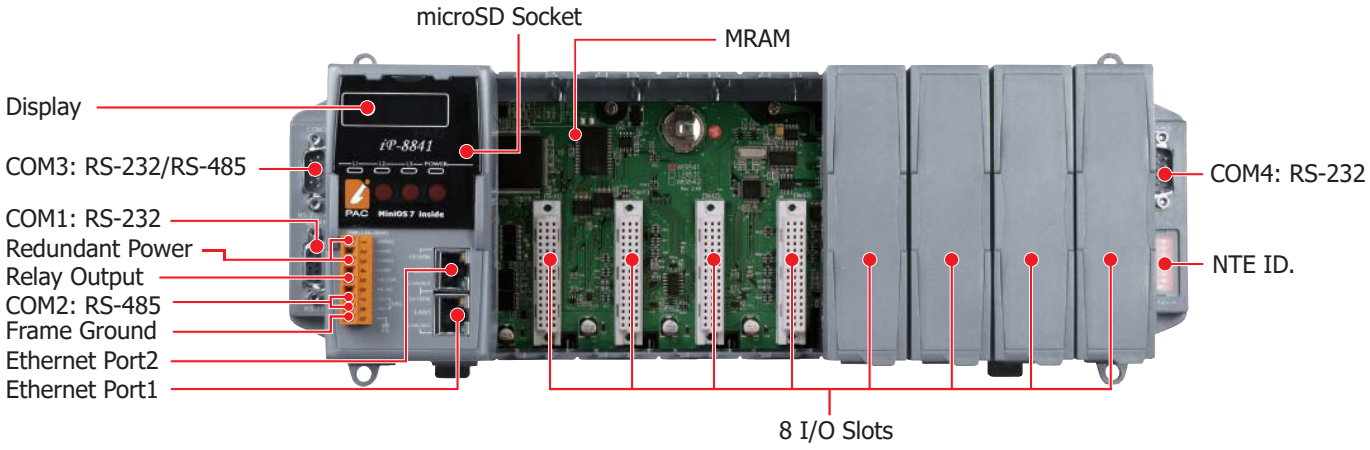




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Appearance:

iP-8841/iP-8847



Selection Guide:

iP - 8 X X X

NO. of I/O Slot

Hardware
1: Without Ethernet
4: Ethernet × 2

Software
1: Standard
7: ISaGRAF

Standard iPAC



Model Name	Pre-installed Software	CPU	Flash	512 MB Flash Disk	SRAM	Ethernet Port	RS-232/ RS-485	I/O Slot	Power Consumption
iP-8411	None	80 MHz	512 KB	-	512 KB	-	4	4	6.7 W
iP-8811								8	7.2 W
iP-8441					768 KB	2 (10/100 BaseTx)	4	4	6.7 W
iP-8841								8	7.2 W

The controller is equipped with a DOS-like OS, called MiniOS7. Users can use C compilers to develop a program in 16 bit executable file (*.exe), then download it to the controller.
There are many demo programs. For TCP/IP programming, ICP DAS provides a TCP/IP server template XServer which is a very powerful, easy-to-use and flexible tool saving 90% development time.

ISaGRAF Based iPAC



Model Name	Pre-installed Software	CPU	Flash	512 MB Flash Disk	SRAM	Ethernet Port	RS-232/ RS-485	I/O Slot	Power Consumption
iP-8417	ISaGRAF	80 MHz	512 KB	-	512 KB	-	4	4	6.7 W
iP-8817								8	7.2 W
iP-8447					768 KB	2 (10/100 BaseTx)		4	6.7 W
iP-8847								8	7.2 W

The controller fully supports all five of the IEC61131-3 standard PLC languages:
1. Ladder diagram,
2. Function block diagram,
3. Sequential function chart,
4. Structured text,
5. Instruction List plus flow chart.

It supports Modbus protocol and can link to distributed I/O modules with Modbus or DCON protocol via the RS-232/485 or Ethernet.

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3.5 PAC I/O Modules (I-8K and I-87K Series)

There are two types of I/O modules, parallel and serial. Both type of the modules can be plugged into the slots of PAC series. But only the serial module can be used in remote I/O units, such as RU-87Pn and ET-87Pn. Up to now, over 100 I/O, communication and motion control modules are available. For the new generation PACs, only the high profile I-8KW and I-87KW I/O modules can be used.

❶ Parallel I/O Modules (I-8KW Series)

Includes

- High speed A/D: 100 k samples/second
- High speed D/A: 30 k (-10 ~ +10 V)
- High speed DI & DO: All Digital I/O modules provide visual indication of status via LED indicators
- High speed stepping/Servo motion control modules
- High speed encoder modules
- High performance Counter/Frequency modules
- High speed multi-channel RS-232/422/485 modules
- CAN bus communication modules

❷ Serial I/O modules (I-87KW Series)

Includes

- RTD Input modules
- Thermocouple Input modules
- Strain Gauge Input modules
- VW Input modules
- High resolution multi-channel Analog Input modules
- Isolated multi-channel D/A modules
- Digital Input and Digital Output modules with Latch and counter function
- Counter/Frequency modules



❸ Comparison Table of I-8KW Series and I-87KW Series

Item	I-8KW Series	I-87KW Series
Communication Interface	Parallel bus	Serial bus
Protocol	-	DCON
DI with latched function	-	Y
DI with counter input	-	Y (100 Hz)
Power on value	-	Y
Safe value	-	Y
Programmable slew-rate for AO module	-	Y

❹ Supporting I/O Module list of MCU (Main Control Unit) and I/O expansion unit:

Item	I-8K Series	I-87K Series
XPAC-8000	Y	Y
WinPAC-8000	Y	Y
LinPAC-8000	Y	Y
iPAC-8000	Y	Y
ViewPAC	Y	Y
RU-87P1/2/4/8	-	Y
USB-87P1/2/4/8	-	Y
ET-87P4/8(-MTCP)	-	Y
ET-8KP4/8(-MTCP)	Y	Y
I-87K4/5/8/9	-	Y

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❺ Hot features

Dual Watchdog Operation

The I-87K I/O modules include an internal Dual Watchdog. It is the combination of module watchdog and host watchdog. The module watchdog is a hardware watchdog designed to reset the micro-controller of the module when the module fails. This mechanism can keep the module work continuously without disruption. The host watchdog is a software watchdog that monitors the operating status of the PAC. When the PAC fails, the outputs of the module will be set to the safe values to prevent any erroneous operations. With Dual Watchdog, the control system is more reliable and stable.

Power On Value and Safe Value of Digital/Analog Output

Besides setting by the set digital/analog output commands, the digital/analog outputs can be set under two other conditions. When the host watchdog is enabled and a host watchdog timeout occurs, the "safe value" is loaded into the digital/analog output ports. The set digital/analog output commands have no effect on the digital/analog output ports until the host watchdog timeout status is cleared. The host watchdog timeout status is saved in the EEPROM. The status is not changed even after power-on reset. It can be cleared only by the reset host watchdog timeout status command ~AA1. See Section A.2 for host watchdog details.

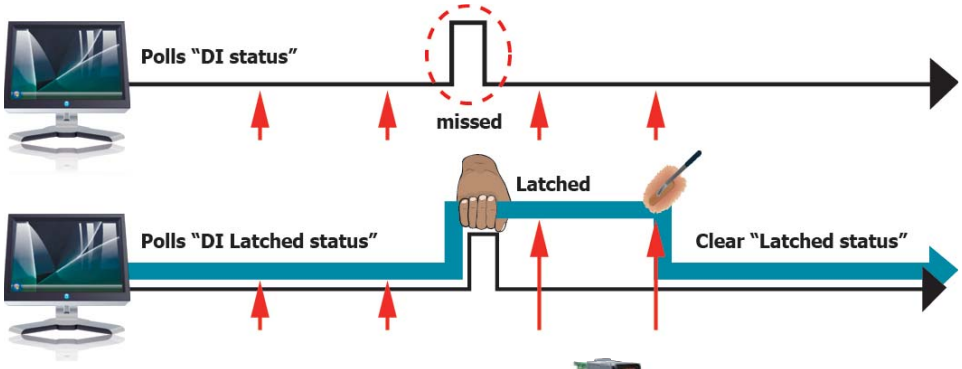
When the module is powered on and the host watchdog timeout status is cleared, the "power-on value" is loaded into the digital/analog output ports. If the host watchdog timeout status is not cleared on power-on, then the safe value is loaded into the digital/analog output ports. Both the safe value and power-on value are set by the ~AA5V command.

Advanced DI Functions of I-87K Series I/O Modules

DI channel is not only for reading digital input status but also provides several advanced functions in the meanwhile.

• DI Latch Function

All DI channels provide Latch function to keep the high/low events in the internal registers of the module. In general, the host controller polls modules one by one to get all DI status. Because RS-485 is a low speed field bus, the polling will take time and probably miss a short duration signal. With the DI latch function, the short duration (>=5ms) signal will not be lost any more.



• Low Speed Counter

The DI module automatically counts the DI signal in the background. The signal under 100Hz can be detected and counted.



Overvoltage Protection

Many of our analog input modules provide high overvoltage protection for the analog input channels. When user picks wrong line accidentally or high voltage spike is applied to the analog input terminals, the module will not be broken and can still get the correct readings. This feature improves the reliability, reduces maintenance frequency, and makes the whole system more robust.

Open Wire Detection

The thermocouple, RTD and thermistor sensors are widely used in temperature control applications. If the system can not monitor the open wire status of the sensors, it may be very dangerous and cause large damage to life and property. When the wire of sensor is broken and the controller does not know the open wire status, the system may heat the boiler continuously and result in fire or explosion. Our thermocouple, RTD, thermistor modules provide open wire detection and make the system safer.

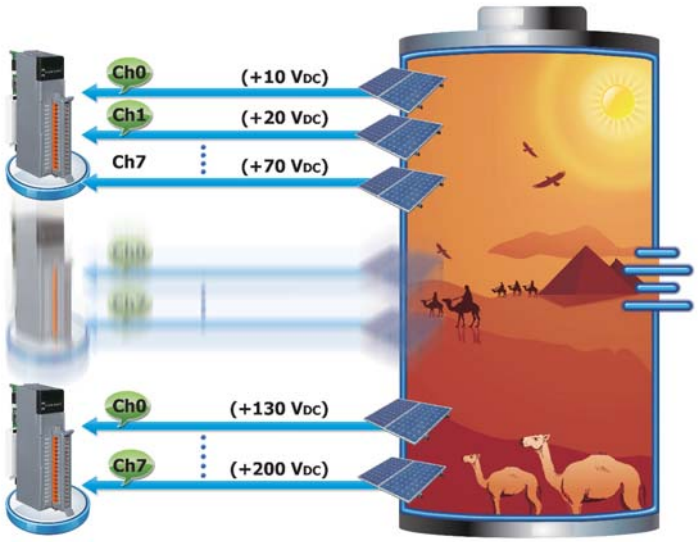
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Over-current Protection

For the current measurement module, it may be damaged when there is high current or voltage introduced into the current loop. The protection for current measurement is improved to ±120 VDC and ±1000 mA.. A high current or voltage in the current loop will not damage the current measurement, so the whole system can work normally.

Virtual Channel to Channel Isolation

The "R" and "Z" version of analog input modules provide ±400 VDC virtual channel to channel isolation to avoid the noise interference from adjacent channel in the industrial environment. To name a few of the modules, they are I-87017RW, I-87017ZW, I-87018RW, I-87018ZW, I-87019RW, and I-87019ZW. Though it is not real channel to channel isolation, there is only 1uA leakage current between two adjacent channels and the interference is very small and can be negligible.



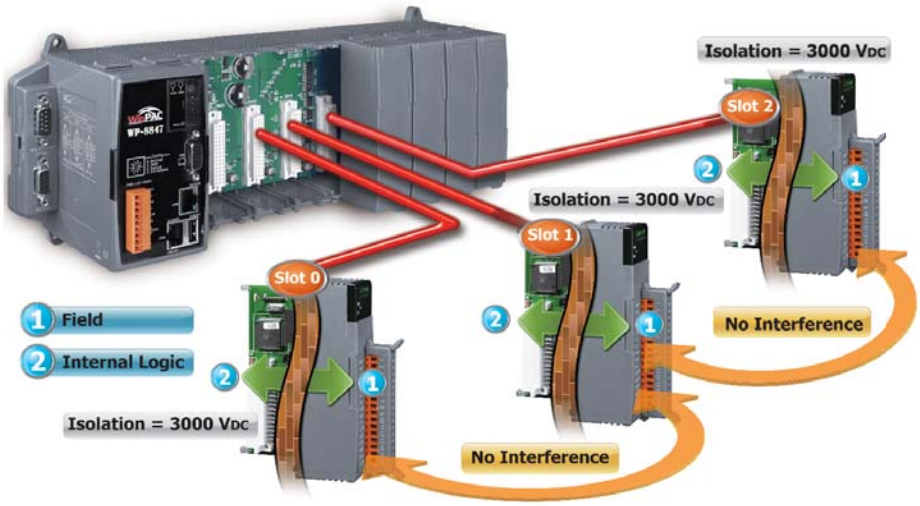
Common Voltage Protection

The typical application is to monitor the charging status of the batteries in series. The voltage of each battery is +10 VDC so the first battery is +10 VDC, the second battery is +20 VDC etc. The differential voltage of the 20th battery is only +10 VDC between vin+ and vin- terminal, while the common voltage is up to 200 VDC. If the common voltage of the analog input module is not large enough, then it can not measure the correct voltage of the battery in charging. ICP DAS analog input modules provide ±200 VDC high common voltage for industrial applications.

ESD Protection

In the industrial environment there are many noise, spike, electrostatic etc.. If the module is not strong enough, it is very easy to be damaged. The I-8KW and I-87KW modules all pass ±4 KV ESD contact and ±8 KV ESD air tests by static electricity gun in our laboratory. The test procedures follow the IEC 61000-4-2 standard. Our modules are immunity to the electrostatic discharges by using components that can clamp and resist to the high voltages defined by IEC 61000-4-2 standard.





3000 VDC Isolation

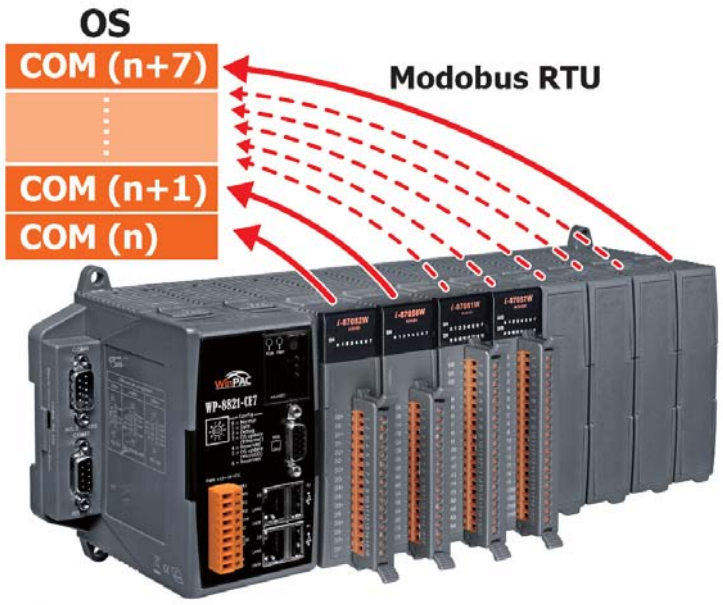
The I-8K and I-87K series have 3000 VDC isolation between the field and the internal logic. This isolation prevents the noise from the field to the internal logic that can damage the module. It is recommended to choose isolated modules that will be plugged into controller. There will be no interference from the adjacent slot because the noise from the adjacent slot is isolated.

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High-speed Temperature Input Module

Model Name	Analog Input			
	Channels	Resolution	Sampling Rate	Sensor
I-8015W	8	16-bit	90 Hz/ch	2/3-Wire RTD (Pt100, Ni120, Cu50, Cu100)
I-8015W-12	12			
I-8018W/S	8	16-bit	100 Hz/ch	Thermocouple (J, K, T, E, R, S, B,N, C, L, M, LDIN43710)
I-8018W-16/S1	16			

- COM port driver available on PACs with Windows 10 IoT, WES7, WinCE 6.0, WinCE 7.0, Linux
- 90/100 Hz high-speed sampling rate for each channel
- Modbus RTU protocol
- 921k bps UART communication
- Each module occupies one COM port







I-8015W



I-8015W-12



I-8018W/S
= I-8018W Connects CN-1825 Daughter Board



I-8018W-16/S1
= I-8018W-16 Connects CN-1826 Daughter Board

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Analog Input Modules



Model Name	Analog Input				
	Channels	Resolution	Sampling Rate	Input Range	Sensor
I-87004W (*1)	4	12-bit	1 Hz	-	DS18B20 (-55 ~ +125°C)
I-87005W (*2)	8	16-bit	8 Hz	-	Thermistor
I-87013W	4	16-bit	10 Hz	-	RTD: Pt100, Pt1000, Cu50, Ni120
I-8014W	8/16	16-bit	250/45/25 kHz	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (with external 125 Ω resistor)	-
I-8014CW	8			±20 mA	-
I-87015W	7	16-bit	12 Hz	-	RTD: Pt100, Pt1000, Cu50, Cu100, Cu1000, Ni120
I-87015PW				-	
I-8017HW	8/16	14-bit	90/16 kHz	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (with external 125 Ω resistor)	-
I-8017HCW	8/16	14-bit	90/16 kHz	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±20 mA (jumper)	-
I-8017DW					
I-87017W	8	16-bit	10/60 Hz	±10 V, ±5 V, ±1 V, ±0.5 V, ±150 mV, ±20 mA, 0 ~ 20 mA ,4 ~ 20 mA (with external 125 Ω resistor)	-
I-87017DW	8/16				
I-87017RW	8				
I-87017ZW	10/20	16-bit/ 12-bit	10/50 Hz	±10 V, ±5 V, ±1 V, ±0.5 V, ±150 mV, ±20 mA, 0 ~ 20 mA ,4 ~ 20 mA (jumper)	-
I-87017W-A5	8			±50 V, ±150 V	-
I-87017W-RMS	8	16-bit	10 Hz	0 ~ +10 Vrms, 0 ~ +5 Vrms, 0 ~ 1 Vrms, 0 ~ 500 mVrms, 0 ~ 150 mVrms	-
I-87017RCW	8	16-bit	10/60 Hz	0 ~ 20 mA, +4 ~ 20 mA, ±20 mA	-
I-87018W	8	16-bit	10 Hz	±2.5 V, ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA (with external 125 Ω resistor)	Thermocouple (J, K, T, E, R, S, B, N. C, L, M)
I-87018RW					
I-87018PW-G/S	8			±2.5 V, ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA, 0 ~ 20 mA, 4 ~ 2 0 mA (with external 125 Ω resistor)	
I-87018ZW-G/S	10				
I-87018ZW-G/S2					
I-87019RW	8	16-bit	8 Hz	±2.5 V, ±1 V, ±500 mV, ±100 mV, ±50 mV, ±20 mA (jumper)	
I-87019PW-G/S	8			±2.5 V, ±1 V, ±500 mV, ±100 mV, ±50 mV, ±15 mV, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA (jumper)	
I-87019ZW-G/S	10				
I-87019ZW-G/S2					



I-87018PW-G/S



I-87018ZW-G/S
= I-87018ZW Connects DB-1820 Directly



I-87019PW-G/S



I-87019ZW-G/S
= I-87019ZW Connects DB-1820 Directly



I-87018ZW-G/S2
= I-87018ZW Connect DN-1822 Directly and CA-252518D-1 1.8 m Cable



I-87019ZW-G/S2
= I-87019ZW Connect DN-1822 Directly and CA-252518D-1 1.8 m Cable

(*1): I-87004 has 4 ports, each port can link 20x DS18B20, total 80 sensors
(*2): I-87005 also includes 8 channel DO (Open Collector, sink, 700 mA)

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Analog Output Modules



Model Name	Analog Outputs					
	Channels	Resolution	Response Time	Output Range	Wiring Current Output	channel to channel Isolation
I-87022W	2	12-bit	10 ms per channel	0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Sink	Yes, 3 kv
I-87024W	4	14-bit		0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA		-
I-87024RW						
I-87024DW						
I-87024CW		12-bit		0 ~ 20 mA, 4 ~ 20 mA		Yes, 1 kv
I-87024UW		16-bit		0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source	-
I-87028CW	8	12-bit		0 ~ 20 mA, 4 ~ 20 mA	Sink	Yes, 1 kv
I-87028CDW						Yes, 3 kv
I-87028UW		16-bit		0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source	-
I-87028VW		12-bit		0 ~ 10 V	-	Yes, 2 kv
I-87028VW-20V				0 ~ 20 V		
I-8024W	4	14-bit	25 us per channel	±10 V, ±20 mA	Sink	-
I-8024UW	4	16-bit	105 us per channel	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	Source	-
I-8028UW	8					

Digital Input Modules

Model Name	Digital Input		
	Channels	Contact	ON Voltage Level
I-8040W	32	Wet	10 ~ 30 VDC
I-8040PW			19 ~ 30 VDC
I-8040PW-A1			3.5 ~ 30 VDC
I-8046W	16	Dry	Connect to GND
I-8048W (*)	8	Dry + Wet	4 ~ 30 VDC
I-8051W	16	Dry	Connect to GND
I-8052W	8	Wet	10 ~ 30 VDC
I-8053W	16		
I-8053PW	16		19 ~ 30 VDC
I-8053W-A1	16		3.5 ~ 30 VDC
I-8058W	8	AC, Differential	80 ~ 250 VAC
I-87040W	32	Wet	10 ~ 30 VDC
I-87040PW			19 ~ 30 VDC
I-87046W-G	16	Dry	Connect to GND
I-87051W-G			
I-87052W-G	8	Wet	3.5 ~ 30 VDC
I-87058W-G		AC, Differential	80 ~ 250 VAC
I-87059W-G			10 ~ 80 VAC
I-87053W-G	16	Dry + Wet	3.5 ~ 30 VDC
I-87053PW-G			19 ~ 30 VDC
I-87053W-A2			19 ~ 50 VDC
I-87053W-A5			68 ~ 150 VDC
I-87053W-AC1		Wet	10 ~ 80 VAC
I-87053W-E5			68 ~ 150 VDC

(*) : I-8048W is a 8-ch digital input interrupt module.

Digital Output Modules

Model Name	Digital Output			
	Channels	Type	Sink/Source	Max. Load
I-8037W	16	Open Collector	Source (PNP)	100 mA
I-8041W	32		Sink (NPN)	100 mA
I-8041PW				100 mA
I-8041AW			Source (PNP)	100 mA
I-8057W	16	Open Collector	Sink (NPN)	100 mA
I-8057PW				700 mA
I-87037W	16	Open Emitter	Source (PNP)	700 mA
I-87041W	32	Open Collector	Sink (NPN)	100 mA
I-87041PW				200 mA
I-87057W	16			100 mA
I-87057PW	16			700 mA

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Digital Modules

Model Name	Digital Input			Digital Output			
	Channels	Contact	ON Voltage Level	Channels	Type	Sink/Source	Max. Load
I-8042W	16	Wet	10 ~ 30 VDC	16	Open Collector	Sink (NPN)	100 mA
I-8050W (*)							100 mA
I-8054W	8			8			700 mA
I-8055W		Dry	Connect to GND				100 mA
I-87042W	16	Wet	3.5 ~ 30 VDC	16	Open Collector	Sink (NPN)	100 mA
I-87054W	8			8			700 mA
I-87055W		Dry	Connect to GND				100 mA

(*) : I-8050W is a 16-ch universal digital input/output module.



I-8017DW, I-87017DW 8/16 Channels AI Module



I-87024DW, I-87028CDW, 4/8 Channels AO Module



I-8040W, I-87040W Series, 32-ch Isolated DI Module



I-8041W, I-87041W Series, 32-ch Isolated DO Module



I-8042W, I-87042W Series, 16-ch Isolated DI & 16-ch Isolated DO Module



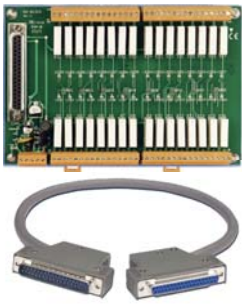
DN-37-381-A

Female DB37 to Screw Terminal Board (Pitch= 3.81 mm) with DIN-rail Mounting
Dimensions: 99 mm × 81 mm
Include: CA-3710A (DB37 Male to Female Cable, 90º, 1 M)



DN-37-A

Female DB37 to Screw Terminal Board (Pitch= 5.08 mm) with DIN-rail Mounting
Dimensions: 144 mm × 72 mm
Include: CA-3710A (DB37 Male to Female Cable, 90º, 1 M)



DN-8K32R CR

32-channel Relay (Form A, 3A) Output Board (Pitch= 3.81 mm) with DIN-rail Mounting
Dimensions: 174 mm × 118 mm
Include: CA-3705A
(DB37 Male to Female Cable, 90º, 0.5 M)



DN-8K16P16R

16-channel digital input terminal and 16-channel relay output board
(Pitch= 3.81 mm) with DIN-rail Mounting
Dimensions: 174 mm × 118 mm
Include: CA-3705A (DB37 Male to Female Cable, 90º, 0.5 M)

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Multi-Function/Strain Gauge Modules

Model Name	Analog Inputs		Analog Outputs	Digital Inputs	Digital Outputs
	Channels	Sampling Rate			
I-87016W	2 (Strain Gauges) (Full-bridge, Half-bridge, Quarter-bridge)	10 Hz	2 (Voltage, Current)	2 (Wet, Sink)	2 (Open Collector, Sink)
I-87026PW	6 (Voltage, Current)	10/60 Hz			
I-8026W		9 kHz			

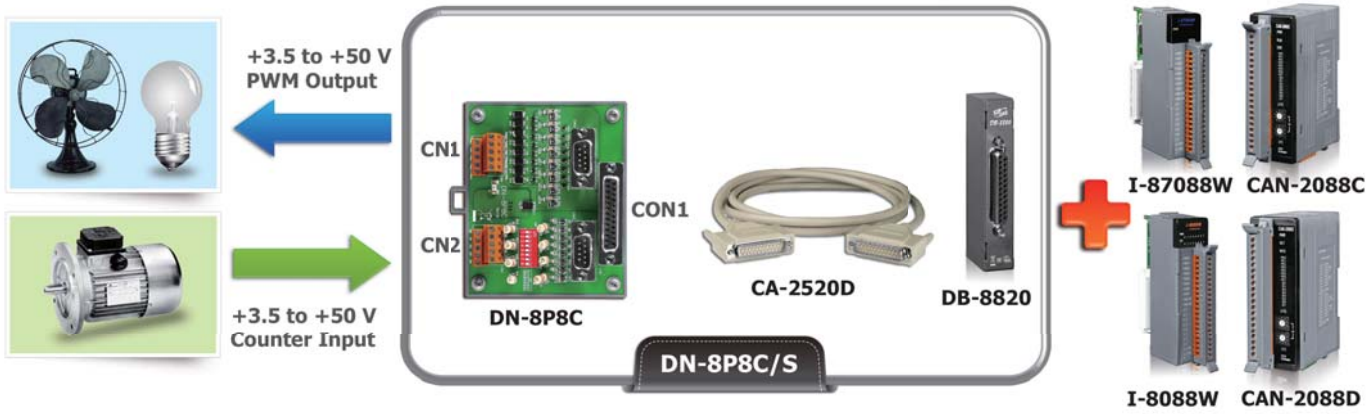
Relay Modules

Model Name	Channels	Type	Contact	Load Current	
I-8060W	6	Power Relay	Form C	0.5 A @ 125 VAC, 0.25 A @ 250 VAC, 2 A @ 30 VDC	
I-8063W (*)	4	Power Relay	Form C	5 A(NO)/3 A(NC) @ 30 VDC 5 A(NO)/3 A(NC) @ 277 VAC	
I-8064W	8	Power Relay	Form A	5 A @ 250 VAC, 5A @ 30 VDC	
I-8068W	8	Power Relay	Form A × 4 Form C × 4	Form A: 5 A @ 250 VAC/28 VDC	Form C: 5 A (NO) @ 277 VAC/30 VDC 3 A (NC) @ 277 VAC/30 VDC
I-8069W	8	PhotoMOS	Form A	1 A @ 60 VDC	
I-87061W	16	Power Relay	Form A	10 A @ 250 VAC/24 VDC	
I-87061PW				3 A @ 250 VAC/24 VDC	
I-87063W (*)	4	Power Relay	Form C	5 A (NO)/3 A (NC) @ 30 VDC 5 A (NO)/3 A (NC) @ 277 VAC	
I-87064W	8	Power Relay	Form A	5.0 A @ 250 VAC/30 VDC	
I-87065W	8	AC SSR	Form A	1.0 A @ 265 VAC	
I-87066W	8	DC SSR	Form A	1.0 A @ 30 VDC	
I-87068W	8	PhotoMOS	Form A × 4 Form C × 4	Form A: 8 A @ 250 VAC/28 VDC	Form C: 5 A (NO) @ 277 VAC/30 VDC 3 A (NC) @ 277 VAC/30 VDC
I-87068W-2A		Signal Relay		Form A: 2 A @ 30 VDC 0.24 A @ 220 VDC 0.25 A @ 250 VAC	Form C: 2 A @ 30 VDC 0.24 A @ 220 VDC 0.25 A @ 250 VAC
I-87069W	8	PhotoMOS	Form A	0.13 A, 350 V Max. at DC/AC	
I-87069PW				1.0 A, 80 V Max. at DC/AC	

(*): I-8063W and I-87063W also have 4 DI (Wet contact, sink and source)

Counter/Frequency/PWM Modules

Model Name	Counter/Frequency Input					PWM Output		
	Channels	Counter	Signal	Speed	Frequency Accuracy	Channels	Type	
I-87082W	2	32-bit	Up	100 kHz	1 Hz	2	Open Collector	
I-8084W	4/8	32-bit	Up, CW/CCW, A/B, Pulse/Dir	250 kHz	+/-0.025 %	-	-	
I-87084W					+/-0.02 %	-	-	
I-8088W	-	-	-	-	-	8	PWM	Duty: 0.1 ~ 99.9%
I-87088W	8	32-bit	Up	1 MHz				Freq: 1 ~ 500 KHz



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Motion Control Modules



Model Name	Encoder Input				Command Pulse Output				Daughter Board	Other Functions
	Axis	Counter	Input Rate (pps)	Signal	Axis	Speed (pps)	Counter	Signal		
I-8092F	2	32-bit	4 M	CW/CCW, A/B	2	4 M	32-bit	CW/CCW, PULSE/DIR	DN-8237	FRnet Master
I-8093W	3	32-bit	1 M	CW/CCW, A/B, Pulse/Dir	-	-	-	-	-	-
I-8094	4	32-bit	4 M	CW/CCW, A/B	4	4 M	32-bit	CW/CCW, PULSE/DIR	DN-8468	-
I-8094F	4	32-bit	4 M	CW/CCW, A/B	4	4 M	32-bit	CW/CCW, PULSE/DIR	DN-8468	FRnet Master
I-8196F	6	32-bit	12 M	CW/CCW, A/B	6	12 M	32-bit	CW/CCW, PULSE/DIR	DN-8368	FRnet Master

Daughter-Board for two-axis motion controller

DN-8237GB: for general purpose usage

DN-8237MB: for Mitsubishi servo J2 Amplifier

DN-8237YB: for Yaskawa servo Amplifier

DN-8237DB: for Delta ASDA A servo Amplifier

DN-8237PB: for Panasonic servo minas A Amplifier

DN-8237 Series



Dimensions: 110 mm × 107 mm

Daughter-Board for four-axis motion controller

DN-8468GB: for general purpose usage

DN-8468MB: for Mitsubishi servo J2 Amplifier

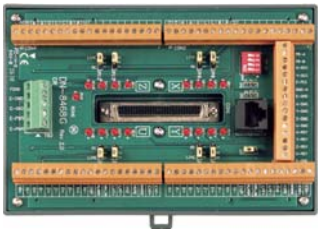
DN-8468YB: for Yaskawa servo Amplifier

DN-8468DB: for Delta ASDA A servo Amplifier

DN-8468PB: for Panasonic servo minas A Amplifier

DN-8468FB: for FUJI FALDIC-W servo Amplifier

DN-8468 Series



Dimensions: 162 mm × 107 mm

Daughter-Board for six-axis motion controller

DN-8368GB: for general purpose usage

DN-8368MB: for Mitsubishi servo J2 Amplifier

DN-8368UB: for universal snap -on usage

DN-8368 Series



Dimensions: 162 mm × 107 mm

Serial Communication Modules



Model Name	Bus	Ports	Type	Isolation	Connector	Accessories
I-8112iW	Parallel	2	RS-232	2500 Vrms	2 × D-Sub9	CA-0915
I-8114W		4		-	D-Sub 37	CA-9-3705 CA-9-3715D
I-8114iW		4		2500 Vrms		
I-8142iW		2	RS-232/485		Terminal Block	-
I-8144iW-G		4				



CA-0915
Line length: 1.5 M



CA-9-3705
Line length: 20 cm



CA-9-3715D
Line length: 1.5 M



I-8114W/D2
I-8114W with 4× DB9 male connectors (20 cm)

I-8114iW/D2
I-8114iW with 4× DB9 male connectors (20 cm)

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CAN/CANopen/DeviceNet Master Modules



Model Name	Bus	Ports	Max Speed	Protocol
I-8120W	Parallel	1	1 Mbps	CAN 2.0A/2.0B
I-8123W				CANopen
I-87123W	Serial			
I-8124W	Parallel		500 Kbps	DeviceNet
I-87124W	Serial			

3G/4G/GPS Modules



Model Name	Frequency (MHz)	GPS Interface	Max. Download Speed	AT Command	TCP/IP Protocol
I-8212W-3GWA	2G (GSM/GPRS): 850/900/1800/1900 3G (UMTS/HSDPA/HSUPA): 2100/1900/850	-	9.6 ~ 115.2 Kbps	Yes	Yes
I-8213W-3GWA	2G (GSM/GPRS): 850/900/1800/1900 3G (UMTS/HSDPA/HSUPA): 2100/1900/850	Yes			
I-8213W-4GE	2G (GSM/GPRS): 850/900/1800/1900 3G (UMTS/DC-HSPA+): 850/900/2100 4G (FDD LTE): B1/B3/B5/B7/B8/B20		100 Mbps		

Model Name	GPS Channels	SBAS	GPS Output Interface	GSM/ GPRS	Digital Output	Protocol/ Interface	Description
I-87211W	32	WAAS, EGNOS, MSAS	RS-232	-	2	DCON	GPS Receiver and 2 DO Module

GPS/GLONASS Time Sync Module

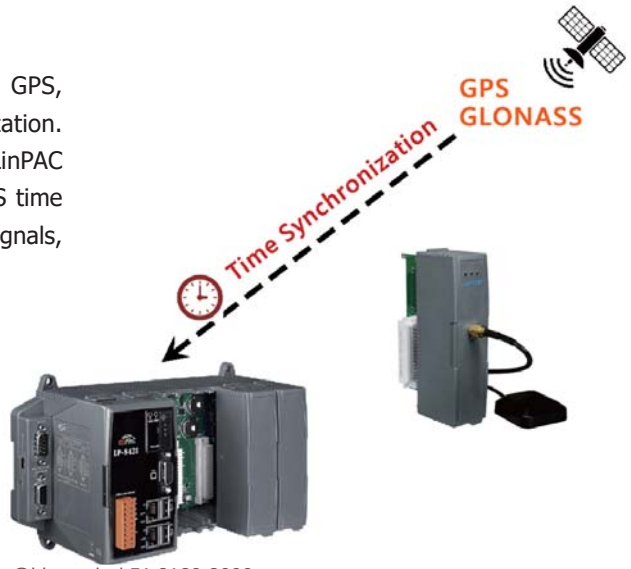


Model Name	GNSS	SBAS	Acquisition Time	Cable Length of Antenna
I-8211W	GPS, GLONASS	WAAS, EGNOS, MSAS	Warm start = 2 seconds (typical) Cold start = 36 seconds (typical)	5 m

Introduction:

I-8211W-G is a GPS, GLONASS receiver module designed to use GPS, GLONASS satellite time for automatic and precise time synchronization. The I-8211W-G can be plugged into any slot of the LinPAC, the LinPAC will automatically launch the application and acquire GPS, GLONASS time to reduce RTC drift to 1ms. The I-8211W is preset to receive GPS signals, you can modify the LinPAC settings to receive GLONASS signals.

PS: LinPAC with NTPD package: LP-8x21, LX-8x31



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CH4
7188/7186 Series uPAC

4.1 Top 10 reasons to choose uPAC by ICP DAS 62

4.2 I-7188/uPAC-7186 Selection Guid 64

4.3 I/O Expansion Boards for 7188/7186 Series

- ▶ DI, DO Expansion 65
- ▶ AI, AO, DI, DO Expansion 65
- ▶ RS-232/422/485, DI, DO Expansion 66
- ▶ Memory Expansion 66
- ▶ Encoder Expansion 66
- ▶ 7188XC only 66



7188/7186 Series uPAC



ICP DAS develops a family of palm-size PAC named **uPAC** (micro Programmable Automation Controller). Featuring robust, powerful, space-saving, cost-effective and more, uPAC presents excellent performance in various Industry Automation applications in the challenging environments.

I-7188 — the 1st generation

"I-7188 Series", the first generation of uPAC, has been widely used in various Industry Automation applications. It is characterized by fast-booting operating system MiniOS7, interchangeable X-Board for function expansion, flexible COM port configuration and user-defined I/O pins.



uPAC-7186 — the 2nd generation

"uPAC-7186 Series", debuting in 2008, further improves and upgraded features, such as faster CPU, better 10/100 Base-TX Ethernet port, lower power consumption and diversified Memory combination selections. With better performance, it is suitable for more sophisticated applications: auto-reporting data acquisition, M2M automation system, wire/wireless remote control, data logger application, redundant solution.

Generation	CPU	Ethernet	Memory Expansion	Power consumption
I-7188 Series	40 MHz	10 BaseT	SRAM, Flash	2 W
uPAC-7186	80 MHz	10/100 BaseTX	SRAM, Flash	1.5 W

4.1 Top 10 reasons to choose uPAC by ICP DAS:

❶ Powerful Embedded OS — MiniOS7

MiniOS7 is the most stable OS used in the last decade. Up to now, several hundred thousand copies with our PACs have been distributed worldwide.

Features:

- DOS-like embedded OS
- Antivirus ability
- Internet connectivity
- **Short boot time period (<1 Second)**
- Less memory resource required
- Faster watchdog response time
- Libraries & demo programs for various peripherals, devices and remote I/O modules



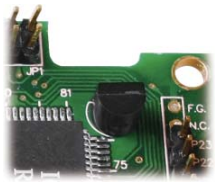
❷ Rich Development Support

We provide over 100 Libraries and Demos for users to develop applications easily and quickly to integrate with some popular software, SCADA, protocols or tools.

- Provide Libraries: Xserver, Modbus, MiniOS7 Framework
- Support development tool: ISaGRAF, C Language

❸ Patented Technology: "Self-Tuner" Chip

Our uPAC contains a patented "Self-tuner" chip which automatically tunes Baud rate and data format in the whole RS-485 network. It also handles the direction of RS-485 communication line.

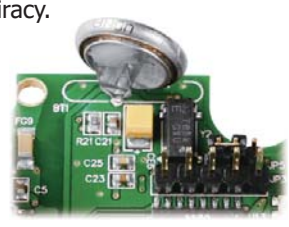


❹ Unique 64-bit Hardware Serial Number Protecting Your Program

All uPAC-7186 series and most I-7188 series come with a 64-bit unique hardware serial number. A unique serial number is assigned to each hardware device to protect your software against piracy.

❺ Built-in RTC — Real Time Clock

- Provides second, minute, hour, day of week, day of month, month & year (1980 ~ 2079)
- With on-board battery
- Data valid up to 10 years
- Keep accurate time/date while the main power is lost

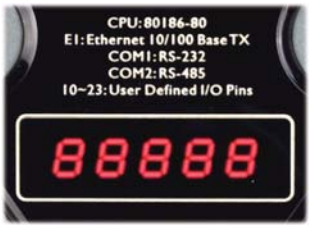


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❻ 5-Digit 7-Segment LED Display

Optional 5-digit 7-segment LED display shows information, such as system status, user-defined message.

- Display numbers, letters, symbols, units, etc.



❼ Highly Reliable Under Harsh Environment

Our PAC can operate in a wide range of temperature and humidity.

- Operating Temperature: -25 ~ +75°C
- Storage Temperature: -40 ~ +80°C
- Humidity: 10 ~ 90% RH, non-condensing



❽ Built-in WDT — Watchdog Timer

When I-7188 or uPAC-7186 is power-up, the watchdog timer can be enabled. The watchdog timer resets the controller after a short period (about 0.8 seconds) when the running software fails to reset the watchdog.

❾ Various Memory Expansion Options

- **Memory Configuration:**

Memory	Size	Description
Flash Disk	64 MB NAND	rugged data storage that resists shock and vibration. MiniOS7 file system and APIs are provided to read/write files.
NVRAM	31 bytes	No writing limitation
EEPROM	2 KB or 16 KB	to store not frequently changed parameters.
Note: Different model has different SRAM size, NVRAM and Flash size. Please refer to the Selection Guide.		

- **Expansion Memory Board (Optional):**



Flash memory Board



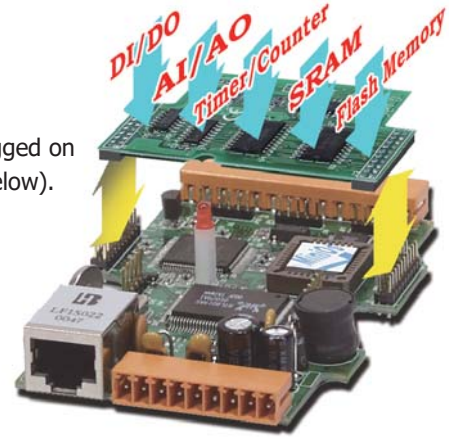
Battery-backup RAM Board

The writing protection and limitation of Flash and EEPROM prevent memories from being modified due to noise interference. NVRAM doesn't have writing limitation. It is the best choice for temporary data storage. Furthermore, it is non-volatile, data can be kept even when the power is lost or the system crashes.

❿ Expandable Local I/Os & Hardware Functions

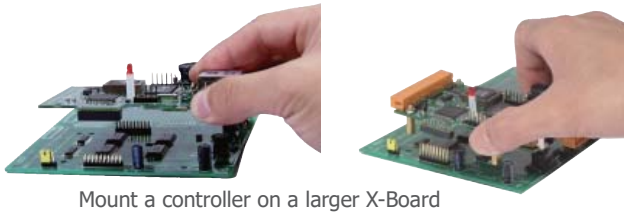
Most uPAC-7186 and I-7188 series have a built-in expansion bus. X-Board can be plugged on the Bus to expand I/O channels, COM Ports, memories or hardware functions (Listed below).

- DI, DO, AI, O, Timer/Counter, Communications, Flash memory, Battery backup SRAM, Motion control , Self-test We provide various standard X-Boards, and also ODM service.
  The X-Board has two methods to combine with the palm-size PAC. Plug an X-Board into a palm-size PAC or mount a controller on a larger X-Board.





Plug an X-Board into a palm-size PAC



Mount a controller on a larger X-Board

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4.2 I-7188/uPAC-7186 Selection Guid

I-7188

Ethernet Port
- : Without I/O Expansion Bus & Ethernet Port
E: With Ethernet Port
X: Without Ethernet Port

Software & Communication Ports
A: C language based (2-DI , 2-DO, RS-232 and RS-485)
B: C language based (1-DI , 1-DO, RS-232 and RS-485)
C: C language based (2-DI , 3-DO, RS-232 and RS-485)
X: C language based (RS-232 and RS-485)
G: ISaGRAF

LED Display
D: With 5-digit 7-segment LED Display

uPAC-7186

Software
X: C language based
G: ISaGRAF

LED Display
D: With 5-digit 7-segment LED Display

Special Feature
SM: 640 KB SRAM
FD: 64 MB NAND Flash

C Language Based I-7188 and uPAC-7186



Serial Connectivity									
Model Name	**CPU**	**SRAM**	**Flash**	**I/O Expansion Bus**	**64-bit Hardware Serial Number**	**RTC**	**DI**	**DO**	**RS-232/RS-485**
I-7188/512 **I-7188D/512**	40 MHz	256 KB	512 KB	-	-	Yes	-	-	4 (Note)
I-7188XA **I-7188XAD**		512 KB		For memory board only	Yes		2	2	
I-7188XB-512 **I-7188XBD-512**				Yes			1	1	1/1
I-7188XC-512 **I-7188XCD-512**	20 MHz	128 KB		Yes	-	-	2	3	
Note: RS-232 × 2, RS-485 × 1, RS-232/485 × 1									

Model Name	**CPU**	**SRAM**	**Flash**	**NAND Flash**	**I/O Expansion Bus**	**RTC**	**DI**	**DO**	**Ethernet**	**RS-232/RS-485**
I-7188EA **I-7188EAD**	40 MHz	512 KB	512 KB	-	-	Yes	6	7	10 Base-T	1/1
I-7188EX **I-7188EXD**					Yes		-	-		
uPAC-7186EX **uPAC-7186EXD**	80 MHz	512 KB	512 KB	-	Yes	Yes	-	-	10/100 Base-Tx	1/1
uPAC-7186EX-SM **uPAC-7186EXD-SM**		640 KB								
uPAC-7186EX-FD **uPAC-7186EXD-FD**		512 KB		64 MB						

ISaGRAF Based uPAC-7186 & I-7188

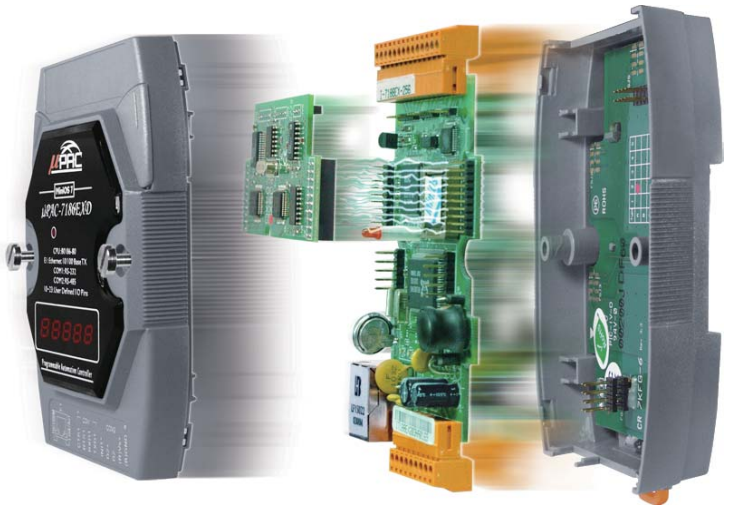


Model Name	**CPU**	**SRAM**	**Flash**	**I/O Expansion Bus**	**RTC**	**DI**	**DO**	**Ethernet**	**RS-232/RS-485**
uPAC-7186EG **uPAC-7186EGD**	80 MHz	768 KB	512 KB	Yes	Yes	-	-	10/100 Base-TX	1/1
I-7188XG **I-7188XGD**	40 MHz	512 KB				1	1	-	1/1

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4.3 I/O Expansion Boards for 7188/7186 Series

X-Board is a small I/O expansion board inserted in uPAC (uPAC-7186 Series & I-7188 series) for expanding I/O functions. Most uPACs (except some modules like I-7188 & I-7188D) support one I/O expansion bus. Each bus can be plugged in one X-Board.



The X-Board allows users to implement various I/O functions such as DI, DO, A/D, D/A, Timer/Counter, UART, flash memory, battery backup SRAM, AsicKey & other I/O functions.

Users may choose our functioned X-Boards (model number X1xx ~ X7xx) or design their own I/O expansion boards (module number X0xx). We have designed several X-Boards for expanding the uPAC's features. If users choose a small size X-Board, then they can mount this I/O expansion board directly onto the uPAC. Customized I/O Expansion Boards can be ordered through ODM project.

Selection Guide:

Following uPAC supports I/O Expansion Bus, can mount one X-Board

- For C language solution: I-7188XB(D), I-7188EX(D), uPAC-7186EX(D), uPAC-7186PEX(D),uPAC-7186EX(D)-FD, uPAC-7186EX(D)-SM
- For ISaGRAF solution: I-7188XG(D), uPAC-7186EG(D)

X-Board is Series has following common specifications

- DI channel: Dry contact, sink type, non-isolated
- DO channel: Open Collector, sink type, 100 mA/channel load current, non-isolated

DI, DO Expansion



Model Name	DI (Dry Contact)	DO (Open Collector)
X107	6	7
X110	14	-
X111	-	13

AI, AO, DI, DO Expansion



Model Name	AI (12-bit)		AO (12-bit)		DI (Dry Contact)	DO (Open Collector)
	Channel	Range	Channel	Range		
X202	7	0 ~ 20 mA	-	-	-	-
X203	2	0 ~ 20 mA	-	-	2	6
X303	1	±5 VDC	1	±5 VDC	4	6
X304	3	±5 VDC	1	±5 VDC	4	4
X305	7	±5 VDC	1	±5 VDC	2	2
X308	4	0 ~ 10 VDC	-	-	-	6
X310	2	0 ~ 20 mA 0 ~ 10 VDC	2	0 ~ 10 VDC	3	3
X324	-	-	4	0 ~ 5 VDC	-	4

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RS-232/422/485, DI, DO Expansion



Model Name	Serial Port			DI (Dry Contact)	DO (Open Collector)	EEPROM
	Type	Channel	Wire			
X503	RS-232	1	5 Wire	-	-	-
X504	RS-232	2	5 Wire and 9 Wire			
X505	RS-232	3	5 Wire			
X506	RS-232	6	3 Wire			
X507	RS-422/485	1	4/2 Wire	4	4	
X508	RS-232	1	5 Wire	4	4	
X509	RS-232	2	3 Wire	4	4	
X510	RS-232	1	3 Wire	5	5	256 KB
X510-128	RS-232	1	3 Wire	5	5	128 KB
X511	RS-485	3	2 Wire	-	-	-
X511i	RS-485	3	2 Wire (Isolation)	-	-	
X518	RS-232	1	5 Wire	-	8	
X520	RS-232	4	3 Wire	1	2	

Memory Expansion



Model Name	Memory Type	Size	Data Retention	Endurance
X602	NAND Flash	64 MB	10 years	100,000 erase cycles
X603		256 MB		
X607	Battery Backup SRAM	128 KB	9 years	No erase cycle limitation
X608		512 KB		

Encoder Expansion



Model Name	Axis	Counter	Mode	Max. Speed	5V Input Level	12V Input Level (with 1 KΩ external resistors)	24V Input Level (with 2 KΩ external resistors)
X702	2	32-bit	Quadrant, CW/CCW, Pulse/Direction	1 MHz	3.5 ~ 5 V 0 ~ 2 V	5 ~ 12 V 0 ~ 2 V	7 ~ 24 V 0 ~ 2 V
X703	3						

Note: ISaGRAF doesn't support X702 and X703.



7188XC only

Model Name	DI (Dry Contact)	DO (Open Collector)	AI (12-bit)		AO (12-bit)	
			Channel	Range	Channel	Range
X101	-	8	-	-	-	-
X106	DI × 3 or DO × 2		-	-	-	-
X200	-	-	1	0 ~ 2.5 VDC	-	-
X302	-	-	1	±5 VDC	1	±5 VDC

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CH5
5000 Series PAC

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5.4 I/O Expansion Boards

- ▶ DIO Board 77
- ▶ Multifunctional Boar 77
- ▶ RS-485 Expansion 78
- ▶ Serial Port Board 78
- ▶ DIO Expansion 78
- ▶ elay output Expansio 78
- ▶Encoder/Frequency/Counter Input 78



5.1 uPAC-5000 Series (MiniOS7)



The uPAC-5000 Series is equipped a 80186 CPU running a MiniOS7 operating system, a variety of connectivity options (Ethernet, RS-232/485) and an I/O expansion bus.

The uPAC-5000 series is an enhanced version of uPAC-7186. Owing to the bigger and special form factor design, the optional I/O expansion board, XW-board, is two times larger than the X-board of uPAC-7186 and provides high-protection I/O. With built-in micro SD, the uPAC-5000 can be used as a data logger.

Features:

❶ MiniOS7 Inside

MiniOS7
80186 CPU
uPAC-5000 Series

- DOS-like real-time OS
- **Short boot time period (< 1 second)**
- Built-in hardware diagnostic
- Standard version for C language programming
- ISaGRAF version for IEC 61131-3 programming

❷ Local I/O and Communication Expansion Board

The uPAC 5000 series is equipped with an I/O expansion bus to support one optional expansion board, called XW-Board. It can be used to implement various I/O functions such as DI, DO, A/D, D/A, Timer/Counter and various communication interface options, such as RS-232/422/485, CAN.





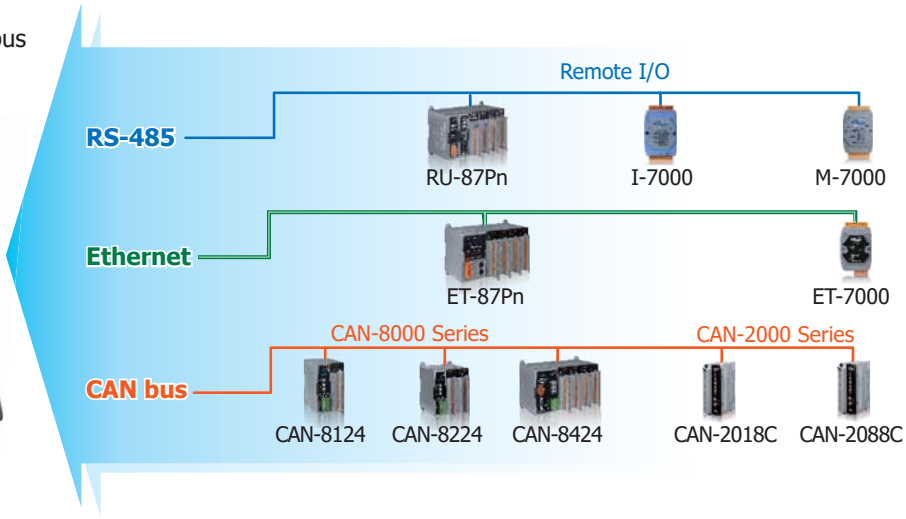
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4 Multiple Communication Interfaces

Several different types of communication interface are available that enable I/O modules to be expanded and connected to external devices:

1. Ethernet 2. RS-232/485 3. CAN bus





3 Remote I/O Module and Expansion Unit

With the built-in RS-485 and Ethernet ports, the 5000 series can connect RS-485/Ethernet remote I/O units (RU-87Pn/ ET-87Pn) or modules (I-7000/M-7000/ET-7000). With an XW-Board, the 5000 series can have more communication ports or different interface to connect to other type of devices, for example, CANOpen devices, or DeviceNet devices.

5 Various Memory Storage Options

uPAC-5000 provides various memory storage options. Customers can choose the memory based on their characteristics.

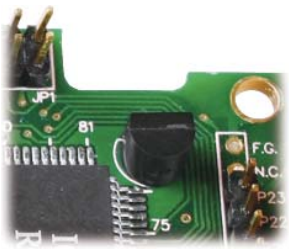
- 16 KB EEPROM: to store not frequently changed parameters.
- microSD: to implement portable data logging applications.
- 256 MB NAND Flash Disk: rugged data storage to resist shock and vibration.





6 Unique 64-bit Hardware Serial Number to Protect Your Program

A unique 64-bit serial number is assigned to each hardware device to protect your software against piracy.



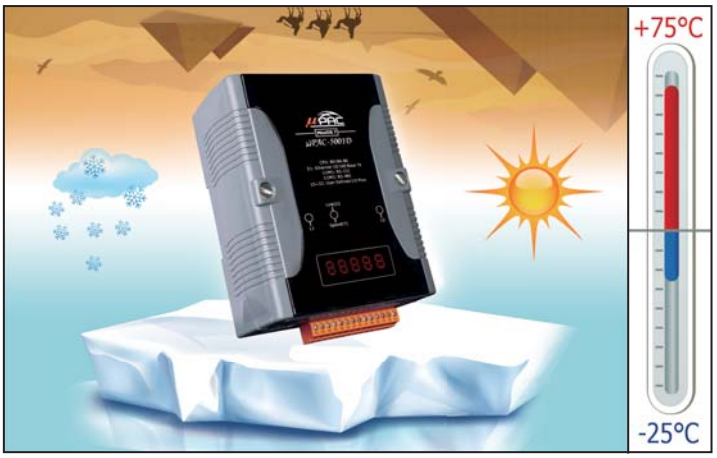
7 Plastic and Metal Casing

The default case is plastic material. Metal casing is also offered to OEM version.

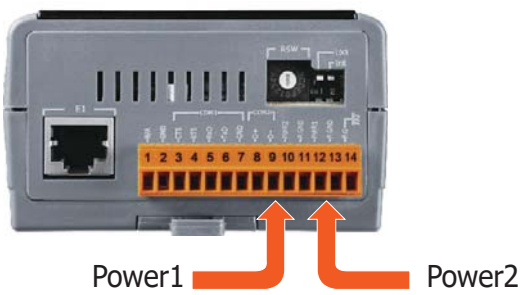
8 Highly Reliable Under Harsh Environment

Our uPACs operate in a wide range of temperature and humidity.

- Operating Temperature: -25 ~ +75°C
- Storage Temperature: -30 ~ +80°C
- Humidity 10 ~ 90% RH (non-condensing)

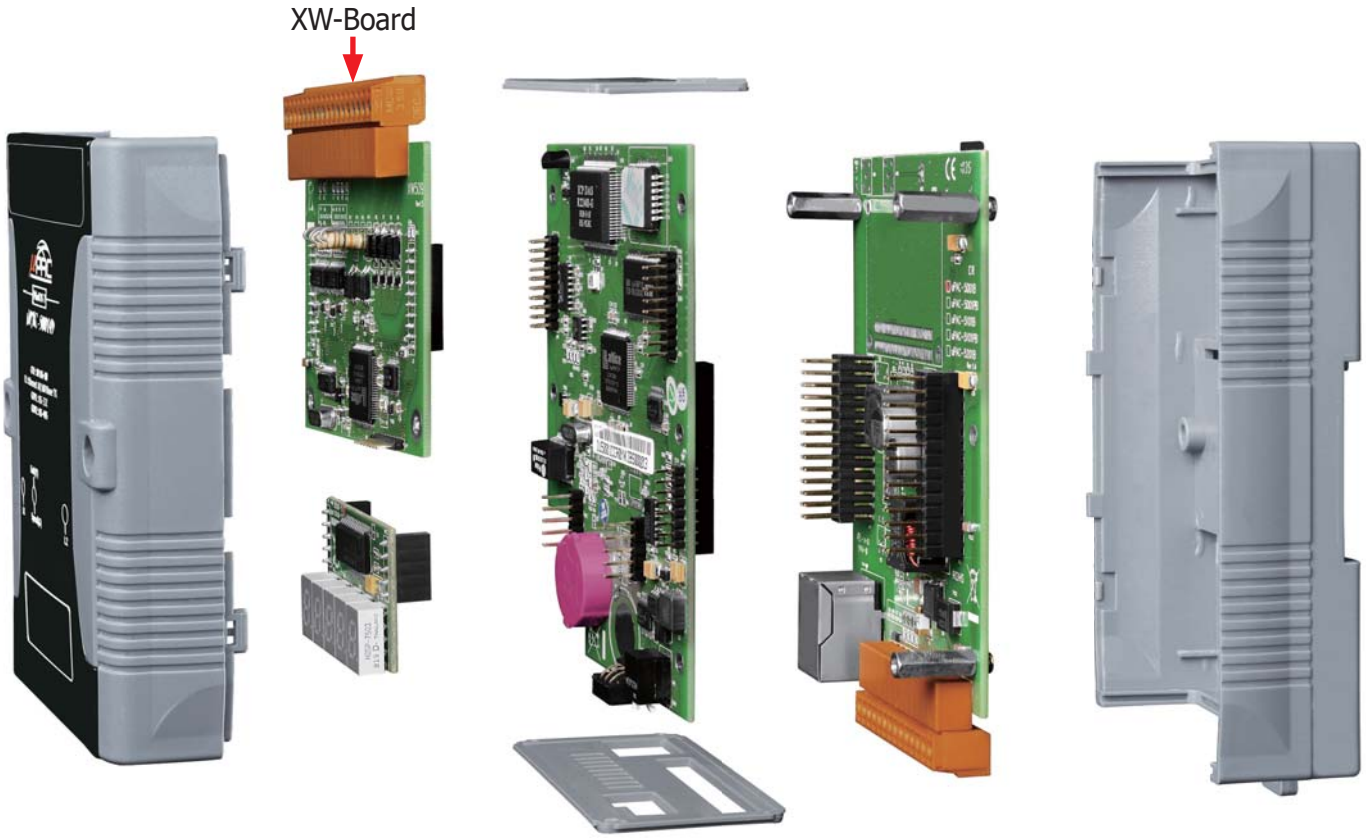


9 Redundant Power Inputs



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uPAC-5000 + XW-Board:



uPAC-5000 Selection Guid:

uPAC-5 X O X D - F D

Wireless Communication
0: None

Software
1: C language based
7: ISaGRAF

Display or Casing
D: LED Display
M: Metal Casing

Memory
FD: 256 MB Flash

C Language Based uPAC-5000

Model Name	CPU	Flash	SRAM	Memory Expansion	Ethernet	Wireless Communication	RS-232/ RS-485
uPAC-5001(D)	80 MHz	512 KB	512 KB	microSD	10/100 BaseTX	-	1/1
uPAC-5001(D)-FD				microSD + 256 MB Flash			

ISaGRAF Based uPAC-5000

Model Name	CPU	Flash	SRAM	Memory Expansion	Ethernet	Wireless Communication	RS-232/ RS-485
uPAC-5007(D)	80 MHz	512 KB	768 KB	microSD + 512 KB Battery Backup SRAM	10/100 BaseTX	-	1/1

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5.2 WP-5000 Series (WinCE)

The WP-5000 series is equipped an ARM CPU and running a Windows CE.NET 5.0/7.0 operating system. Compared to uPAC-5000, WP-5141 series has a VGA port to support graphic display and no need HMI. WP-5231 series has an optional internal wireless module, such as GPS, 4G. Using Windows CE.NET 5.0/7.0, it is capable of running PC-based software, such as Visual Basic.NET, Visual C#, Embedded Visual C++, SCADA software, Win-GRAF.

Features:

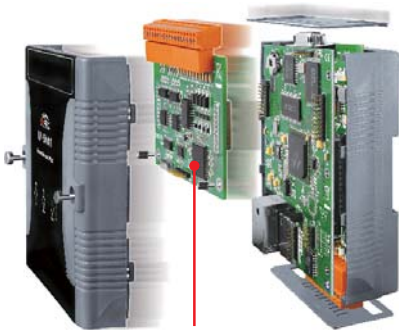
❶ Microsoft Windows CE.net

- Supports PC based software: eVC and VS .NET 2005/2008
- Web server, FTP server, Telnet server
- Win-GRAF version for IEC 61131-3 programming
- InduSoft version for SCADA solution

The WinPAC-5000 series features hard real-time capability, small core size, fast boot speed, interrupt handling at a deeper level, achievable deterministic control and low cost. Using Windows CE.NET 5.0/7.0 gives it the ability to run PC-based control software such as Visual Basic.NET, Visual C#, Embedded Visual C++, SCADA software, SoftPLC.

❷ Local I/O and Communication Expansion Board

The optional I/O expansion board, XV-Board and XW-Board, provides high-protection I/O, such as DI, DO, A/D, D/A and various communication ports.



XV-Board or XW-Board

❸ Remote I/O Module and Expansion Unit

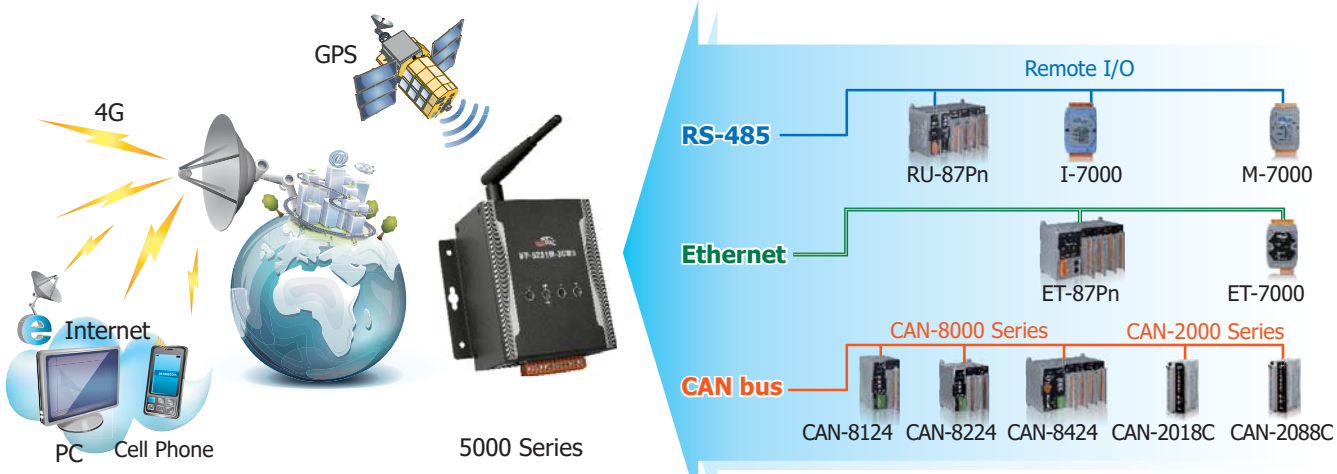
With the built-in RS-485 and Ethernet ports, the 5000 series can connect RS-485/ Ethernet remote I/O units (RU-87Pn/ET-87Pn) or modules (I-7000/M-7000/ET-7000). With an XW-Board, the 5000 series can have more communication ports or different interface to connect to other type of devices, for example, CANopen devices, or DeviceNet devices.

❹ Multiple Communication Interfaces

Several different types of communication interface are available that enable I/O modules to be expanded and connected to external devices:

1. Ethernet 2. RS-232/485 3. CAN bus 4. GPS 5. 4G

The internal wireless module options are available for WP-5231 series.



❺ Various Memory Storage Options

WinPAC-5000 provides various memory storage options, such as EEPROM and microSD.

- 16 KB EEPROM: to store not frequently changed parameters.
- microSD/microSDHC: to save application program, image file, audio file and data.

❻ Unique 64-bit Hardware Serial Number to Protect Your Program

A unique 64-bit serial number is assigned to each hardware device to protect your software against piracy.

❼ Plastic and Metal Casing

The default case is plastic material. Metal casing is also offered to provide extra security.

❽ Highly Reliable Under Harsh Environment

Our WinPAC operate in a wide range of temperature and humidity.

- Operating Temperature: -25 ~ +75°C
- Storage Temperature: -30 ~ +80°C
- Humidity 10 ~ 90% RH (non-condensing)

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WinPAC-5000 Selection Guide:

WP-5 X X X (M) - YY - OS

CPU
1: PXA270
2: Cortex-A8, 1 GHz

Software
1: Standard
7: ISaGRAF
8: Win-GRAF
9: InduSoft

Case
Metal

Options
4GE: 4G LTE

Standard WinPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	RS-232/ RS-485	I/O Expansion Bus	Audio Port	Case
WP-5231-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	2/2	XV-Board	-	Plastic
WP-5231M-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	2/2	XV-Board	-	Matel
WP-5141	WinCE 5.0	PXA270, 520 MHz	64 MB	128 MB	800 × 600	2	2/1	XW-Board	-	Plastic

Win-GRAF Based WinPAC



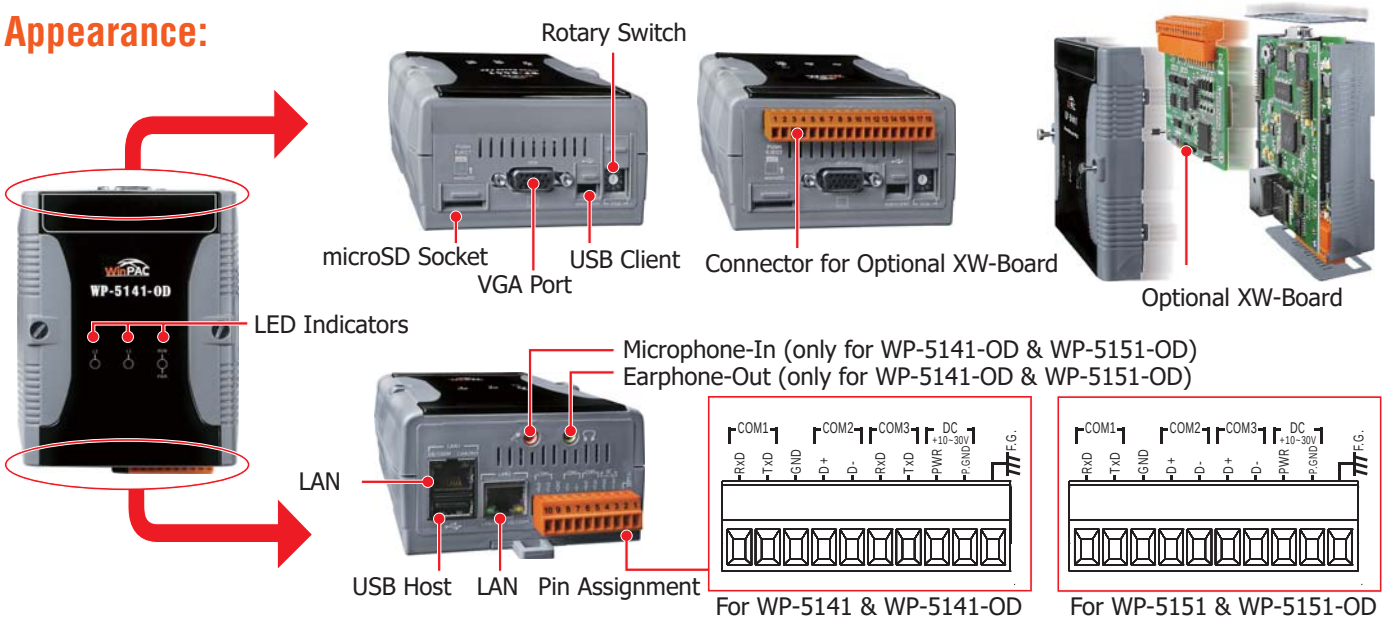
Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	RS-232/ RS-485	I/O Expansion Bus	Audio Port	Case
WP-5238-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	2/2	XV-Board	-	Plastic
WP-5238M-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	2/2	XV-Board	-	Matel

InduSoft Based WinPAC



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	RS-232/ RS-485	I/O Expansion Bus	Audio Port	Case
WP-5239-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	2/2	XV-Board	-	Plastic
WP-5239M-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	2/2	XV-Board	-	Matel

Appearance:



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Standard WinPAC with 4G LTE



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	RS-232/ RS-485	I/O Expansion Bus	Wireless	GPS
WP-5231PM-4GE-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	1/2	XV-Board	4G LTE	Yes
WP-5231PM-4GC-CE7									4G LTE	

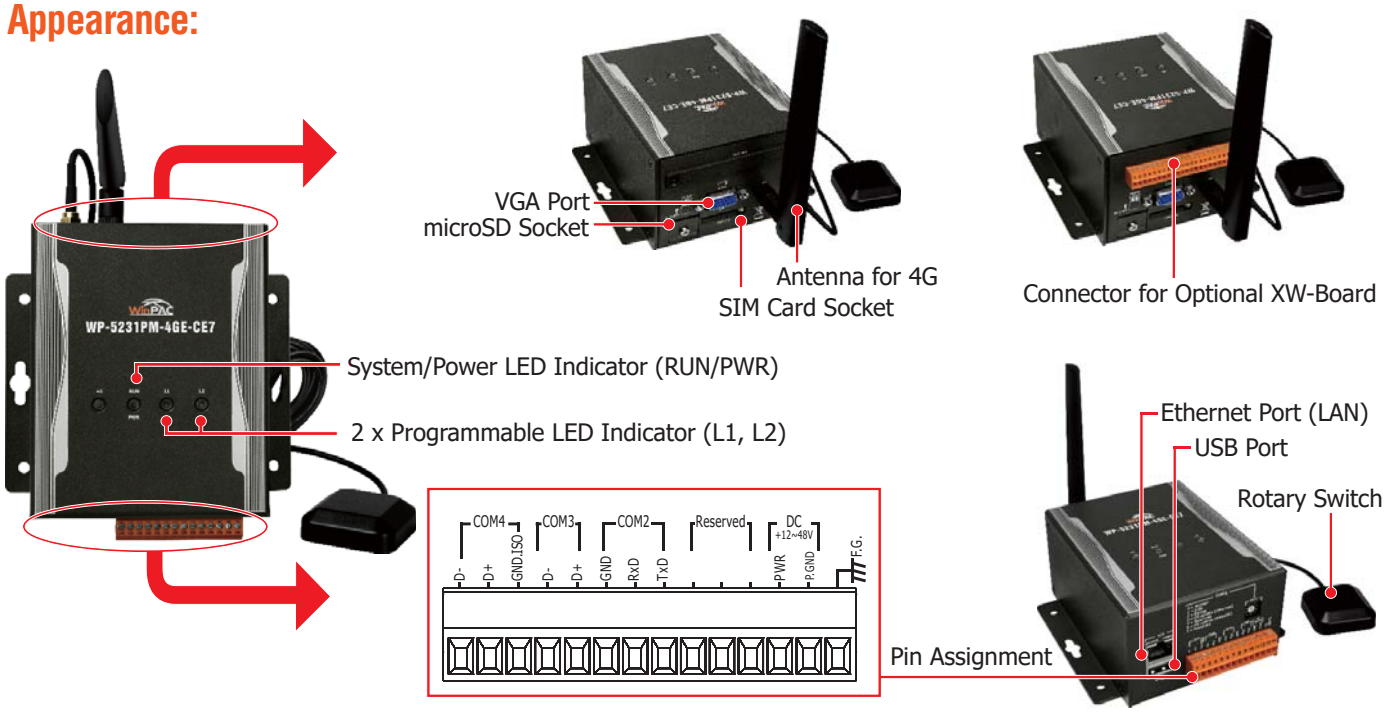
Win-GRAF Based WinPAC WinPAC with 4G LTE



Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	RS-232/ RS-485	I/O Expansion Bus	Wireless	GPS
WP-5238PM-4GE-CE7	WinCE 7.0	Cortex-A8, 1 GHz	256 MB	512 MB	1024 × 768	1	2/2	XV-Board	4G LTE	Yes

Models	WP-5231PM-4GE	WP-5231PM-4GC
GSM System		
Frequency Band	GSM : 850/900/1800/1900 MHz	
GPRS connectivity	GPRS class 12/10; GPRS station class B	
DATA GPRS	Downlink transfer: Max. 85.6 kbps; Uplink transfer: Max 42.8 kbps	
3G System		
Frequency Band (MHz)	WCDMA 850/900/2100	WCDMA 900/2100 TD-SCDMA 1900/2100 CDMA2000 (BC0) 800
Data Transmission	DC-HSPA+ Download: Max. 42 Mbps; Upload: Max 5.76 Mbps TD-SCDMA Download: Max. 4.2 Mbps; Upload: Max 2.2 Mbps CDMA2000 EVDO Download: Max. 14.7 Mbps; Upload: Max 5.4 Mbps	
4G System		
Frequency Band (MHz)	FDD LTE: B1/B3/B5/B7/B8/B20 TDD LTE: B38/B40/B41	FDD LTE: B1/B3/B8 TDD LTE: B38/B39/B40/B41
Data Transmission	Download Max 100 Mbps / Upload Max 50 Mbps	

Appearance:



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5.3 LP-5000 Series & LP-7231M (Linux)

The LinPAC-5000 family is a palm-size PAC and is designed to provide fast, convenient, flexible and simplified solutions for industrial and embedded applications. It is equipped with an ARM CPU running a Linux Kernel operating system, multiple communication interfaces (VGA, USB, Ethernet, RS-232/485 and audio ports) and powerful software including development tools.

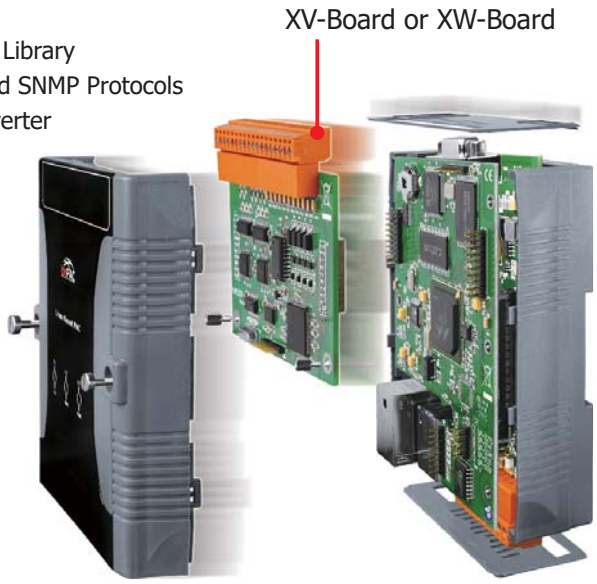
Features:

1 Wide range of Development Support Tools



Linux Kernel
ARM CPU
LP-5000 Series

- LinPAC SDK for Windows and Linux
- Support for GNU C Language
- Support for GUI: Using GTK + Library
- Support for DCON, Modbus and SNMP Protocols
- Support for USB to Serial Converter



2 Local I/O and Communication Expansion Board

The LinPAC-5000 series is equipped with an I/O expansion bus to support one optional expansion board, called the XV-Board or XW-Board. It can be used to implement various I/O functions, such as DI, DO, A/D, D/A, Timer/Counter and various communication interfaces, such as RS-232/422/485.

3 Remote I/O Module

With the built-in RS-485 and Ethernet ports, the LinPAC-5000 series can connect to remote RS-485/Ethernet I/O units (RU-87Pn/ET-87Pn) or modules (I-7000/M-7000/ET-7000).

4 Multiple Communication Interfaces

Several different types of communication interface are available that enable I/O modules to be expanded and connected to external devices:

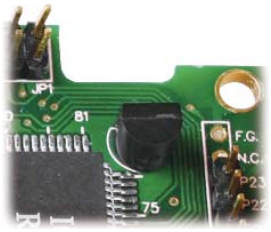
1. Ethernet
2. RS-232/485
3. USB host
4. GPS
5. GSM/GPRS

5 Various Memory Storage Options

LinPAC-5000 provides various memory storage options, such as EEPROM, Flash or microSD. Customers can choose the memory based on their characteristics.

- 16 KB EEPROM: to store not frequently changed parameters.
- microSD/microSDHC: to implement portable data logging applications.





6 Unique 64-bit Hardware Serial Number to Protect Your Program

A unique 64-bit serial number is assigned to each hardware device to protect your software against piracy.

7 Plastic and Metal Casing

The default case is plastic material. Metal casing is also offered to provide extra security.

8 Highly Reliable Under Harsh Environments

The LinPAC-5000 operates in a wide range of temperatures and humidity levels.

- Operating Temperature: -25 ~ +75°C
- Storage Temperature: -30 ~ +80°C
- Humidity 10 ~ 90% RH (non-condensing)



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Standard LinPAC

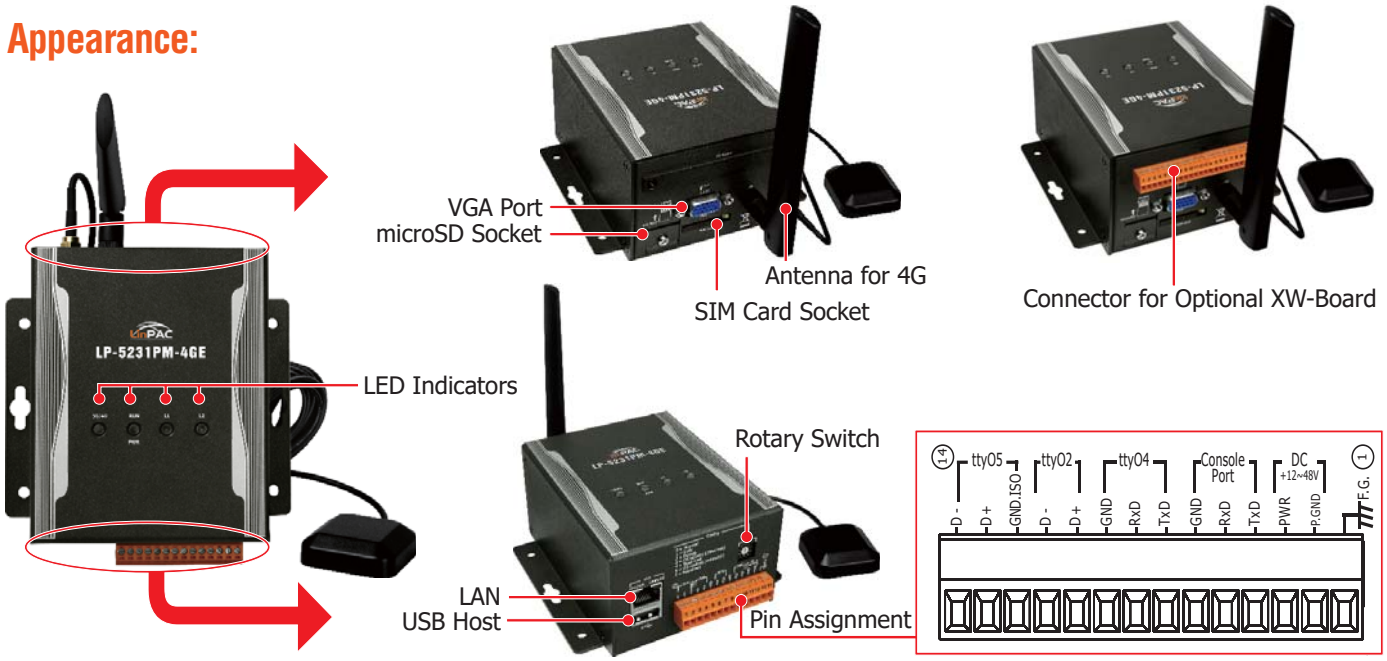


Model Name	OS	CPU	Flash	SDRAM	VGA Resolution	Ethernet	RS-232/ RS-485	I/O Expansion	Wireless	GPS	Audio Port	Case
LP-5231	Linux kernel 3.2	Cortex-A8, 1 GHz	512 MB	512 MB	1280 × 1024	1	2/2	XV-Board	-	-	-	Plastic
LP-5231M												Matel
LP-5231PM-4GE									4G LTE	Yes	-	Matel
LP-5231PM-4GC												

The controller supports following software development tools:
1. SDK for Linux environment
2. SDK for Windows environment

Models	LP-5231PM-4GE	LP-5231PM-4GC
GSM System		
Frequency Band	GSM : 850/900/1800/1900 MHz	
GPRS connectivity	GPRS class 12/10; GPRS station class B	
DATA GPRS	Downlink transfer: Max. 85.6 kbps; Uplink transfer: Max 42.8 kbps	
3G System		
Frequency Band (MHz)	WCDMA 850/900/2100 MHz	WCDMA 900/2100 TD-SCDMA 1900/2100 CDMA2000 (BC0) 800
Data Transmission	DC-HSPA+ Download: Max. 42 Mbps; Upload: Max. 5.76 Mbps TD-SCDMA Download: Max. 4.2 Mbps; Upload: Max. 2.2 Mbps CDMA2000 EVDO Download: Max. 14.7 Mbps; Upload: Max. 5.4 Mbps	
4G System		
Frequency Band (MHz)	FDD LTE: B1/B3/B5/B7/B8/B20 TDD LTE: B38/B40/B41	FDD LTE: B1/B3/B8 TDD LTE: B38/B39/B40/B41
Data Transmission	Download Max 100 Mbps / Upload Max 50 Mbps	

Appearance:



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LP-7231M

Linux Based Metal PAC with Cortex-A8 CPU, Debian 10.3 OS, 8GB flash and 1 LAN Port

Features:

- High C/P Ratio Linux Controller
- Cortex-A8, 1 GHz CPU
- Linux Kernel 3.2.14
- Debian 10.3 OS
- 512 MB RAM and 8 GB eMMC
- Hard Real-Time Capability
- 64-bit Hardware Serial Number for Software Protection
- 1 × 10/100M Ethernet port
- 1 × Console port (RS-232)
- 1 × Serial port (RS-232/422/485), 2.5 kV isolated
- Operating Temperature: -25 ~ +75 °C
- Dimensions: 97 × 120 × 42 mm

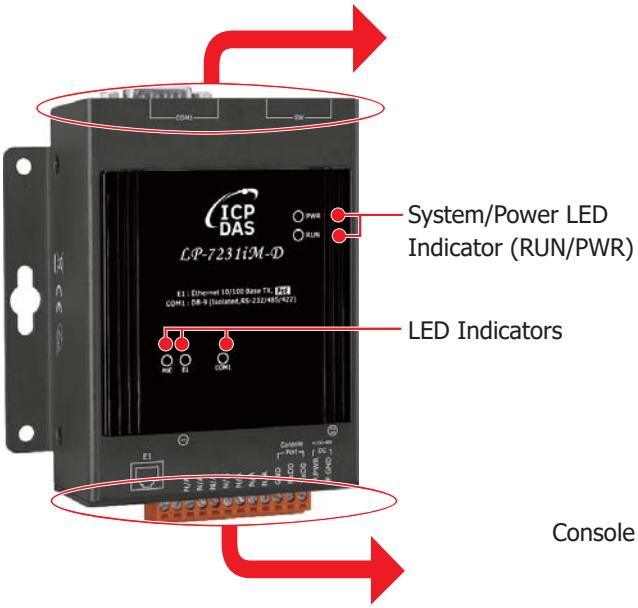
Introduction:

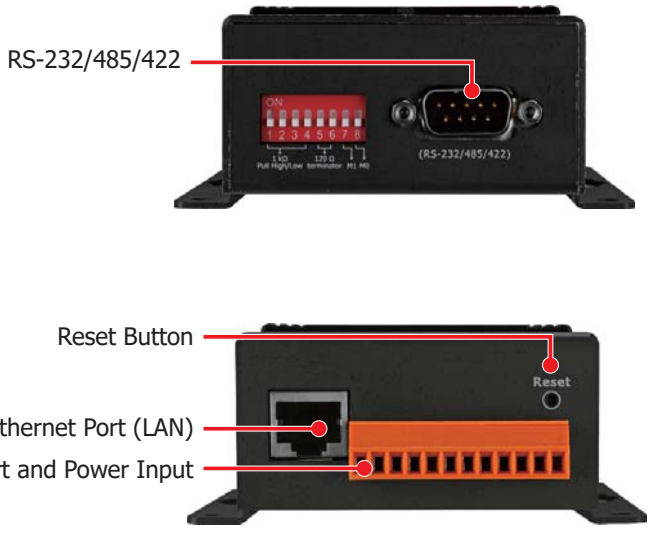
LP-7231M is equipped with Cortex-A8 CPU (1 GHz) and Linux environment (Linux Kernel 3.2.14). The built-in high-performance operating system (Debian 10) provides openness, high flexibility, scalability and allows the user to easily add or delete applications and services through the configuration mechanism.

The Linux Kernel 3.2.14 has real-time capability and can be used to quickly build time critical and high-performance applications. When applied to LP-7231M, it not only becomes a high-quality controller, but also has outstanding stability, smaller kernel size, and support for web services (SFTP / SSH server) and other advantages.

It is suitable for developing various gateways for converting communication protocols, such as Modbus RTU to Modbus TCP, MQTT, SNMP, Ethernet/IP, SECS, etc.





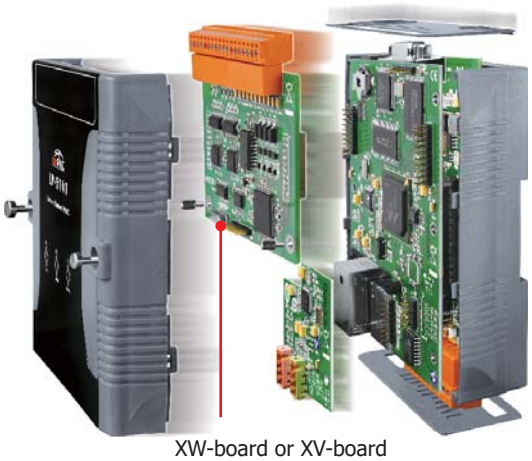


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5.4 I/O Expansion Boards

One PAC can only plug only one XV-Board or XW-Board.

	XV-Board	XW-Board
PAC Supported	WP-52xx, LP-52xx, VPD-1xx	uPAC-5000, WP-51xx, LP-51xx
Bus Type	Serial	Parallel
Bus Speed	Slow	Fast
DIO Board	Yes	Yes
Multifunction Board (AI+AO+DIO)	Yes	Yes
RS-232/485 Board	-	Yes



XW-board or XV-board

DIO Board



Model Name	Series	DI			DO		
		Channel	Sink/Source	Contact	Channel	Type	Sink/Source
XV107	XV	8	Source	Wet	8	Open Collector	Sink/Source
XV107A		8	Sink		8	Open Emitter	Source
XV110		16	Sink/Source	Wet + Dry	-	-	-
XV111		0	-	-	16	Open Collector	Sink
XV111A		0	-	-	16	Open Emitter	Source
XV116		5	Sink/Source	Wet	6	Power Relay, Form A	-
XW107	XW	8	Source	Dry	8	Open Collector	Sink
XW107i		8	Sink/Source	Wet	8	Open Collector	Sink
XW110i		16	Sink/Source	Wet + Dry	-	-	-
XW111i		-	-	-	16	Open Collector	Sink

Multifunctional Board



Model Name	AI		AO		DI			DO	
	Channel	Range	Channel	Range	Channel	Type	Sink/Source	Channel	Sink/Source (NPN/PNP)
XV303	–	–	4	0 V ~ +5 V, ±5 V, 0 V ~ +10 V, ±10 V, 0 mA ~ +20 mA, +4 mA ~ +20 mA	4	Wet	Sink/Source	4	Relay, FormA, 6A
XV305	4	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA, 0 ~ +20 mA, +4 ~ +20 mA Thermocouple: J, K, T, E, R, S, B, N, C	–	–					
XV306	4	±1 V, ±2.5 V, ±5 V, ±10 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	–	–					
XV307	–	–	2	0 V ~ +5 V, ±5 V, 0 V ~ +10 V, ±10 V, 0 mA~ +20 mA, +4 mA ~ +20 mA					
XV308	8	±1 V, ±2.5 V, ±5 V, ±10 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	–	–	DI+DO=8	Dry/Wet	Source	DI+DO=8	Sink (NPN)
XV310	4	±1 V, ±2.5 V, ±5 V, ±10 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	2	0 V ~ +5 V, ±5 V, 0 V ~ +10 V, ±10 V, 0 mA~ +20 mA, +4 mA ~ +20 mA	4	Dry	Source	4	Source (PNP)
XV315	3	**RTD:** Pt100, Pt1000, Ni120, Cu50, Cu100, Cu1000	3	0 V ~ +5 V, ±5 V, 0 V ~ +10 V, ±10 V	4 (DI / 3 kHz Counter)	Wet	Sink/Source	-	-

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Multifunctional Board

Model Name	AI		AO		DI			DO	
	Channel	Range	Channel	Range	Channel	Type	Sink/Source	Channel	Sink/Source (NPN/PNP)
XW304	6	±5 V	1	±5 V	4	Dry	Source	4	Sink (NPN)
XW310	4	±10 V	2	±10 V		Dry	Source	3	Sink (NPN)
XW310C	4	0 ~ 20 mA	2	0 ~ 20 mA	3	Dry	Source		Sink (NPN)

RS-485 Expansion

Model Name	Type	Channels	Speed
XV511i	RS-485	4 Channels (Data+, Data-)	921.6 K

Note : XV511i Supports UA-2241M/WP-2241M-CE7/LP-2241M/WP-2641-CE7/LP-2841/LP-5231AM Only.

Serial Port Board



Model Name	Serial port			DI		DO	
	Type	Channel	Wire	Channel	Type	Channel	Type
XW506	RS-232	6	TxD, RxD, GND	-		-	
XW509		2	TxD, RxD, GND and TxD, RxD, CTS, RTX, GND	4	Wet, Sink/Source	4	Open Collector, Sink
XW507	RS-422/485	1	TxD+/D+ TxD-/D-, RxD+, RxD-, GND	5	Wet, Sink/Source	5	Open Collector, Sink
XW511i	RS-485	4	Data+, Data-	-		-	
XW514		8		-		-	

DIO Expansion



Model Name	DI			DO		
	Channel	Sink/Source	Contact	Channel	Type	Sink/Source
XV107	8	Source	Wet	8	Open Collector	Sink
XV107A	8	Sink		8	Open Emitter	Source
XV110	16	Sink/Source	Wet + Dry	-	-	-
XV111	-	-	-	16	Open Collector	Sink
XV111A	-	-	-	16	Open Emitter	Source

Relay output Expansion



Model Name	DI			DO		
	Channel	Sink/Source	Contact	Channel	Type	Load Current
XV116	5	Sink/Source	Wet	2	Signal Relay (Form A)	2 A @ 30 VDC, 0.24 A @ 220 VDC, 0.25 A @ 250 VAC
				4	Power Relay (Form A)	6 A @ 35 VDC, 6 A @ 240 VAC
XV119	-			9	Signal Relay	2 A @ 30 VDC 0.24 A @ 220 VDC 0.25 A @ 250 VAC

Encoder/Frequency/Counter Input

Model Name	Channel	Encoder	Counter	Frequency	Resolution	Maximum counting rate
XV484	4/8	CW/CCW, Dir/Pulse	Up or Up/Down	Yes	32bit	200 kHz

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CH6
2000 Series PAC

6.1 WP-2241M-CE7 (WinCE) / LP-2241M (Linux) 80

6.2 WP-2841M-IoT (Win10 IoT) 81

6.3 LP-2841M (Linux) 82



6.1



WP-2241M-CE7 (WinCE 7.0)
LP-2241M (Linux Kernel 3.2.x)

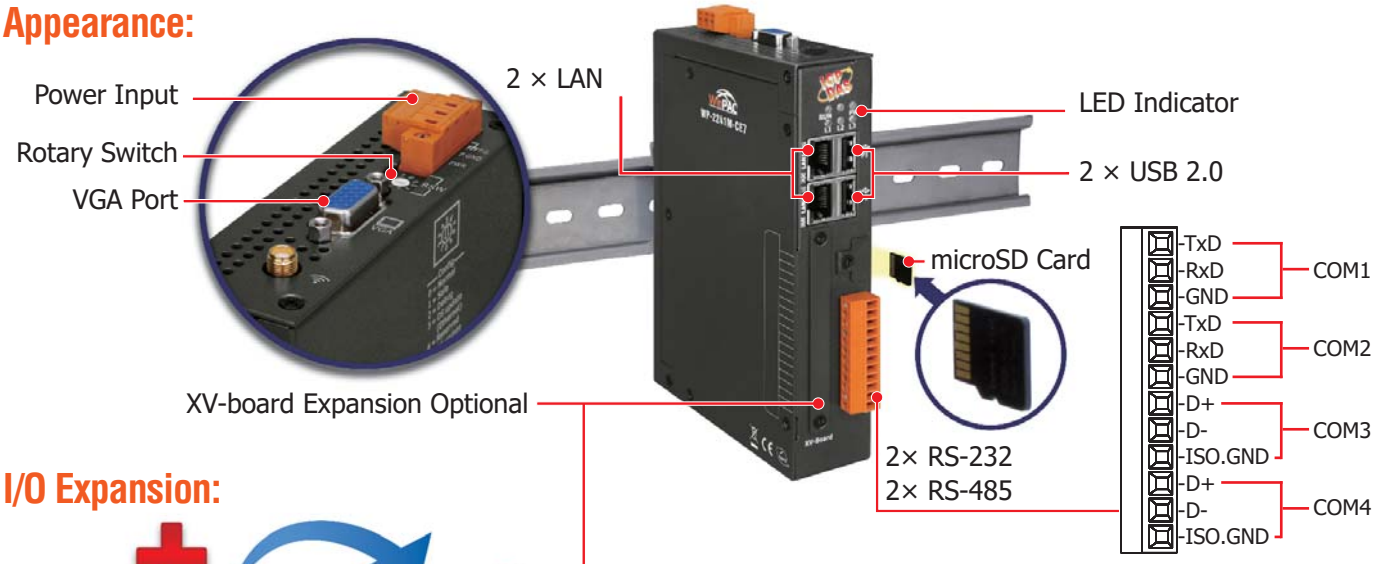
Features:

- Embedded OS: WinCE 7.0, Linux Kernel 3.2.x
- Cortex-A8, 32-bit (1.0 GHz) CPU
- 512 MB DDR3 SDRAM, 256/512 MB Flash
- 1× slot for microSD Card
- **4G LTE modem as Optional Add-on**
- 1 × VGA, 2× LAN, 2 × USB 2.0
- 2 × RS-232, 2 × RS-485
- 1 × slot for XV-board
- Redundant Power Inputs
- Fanless, Metal Housing
- Wide operating temperature range: -25 to +75°C
- Dimension (W × L × H) 35 × 167 × 119 mm

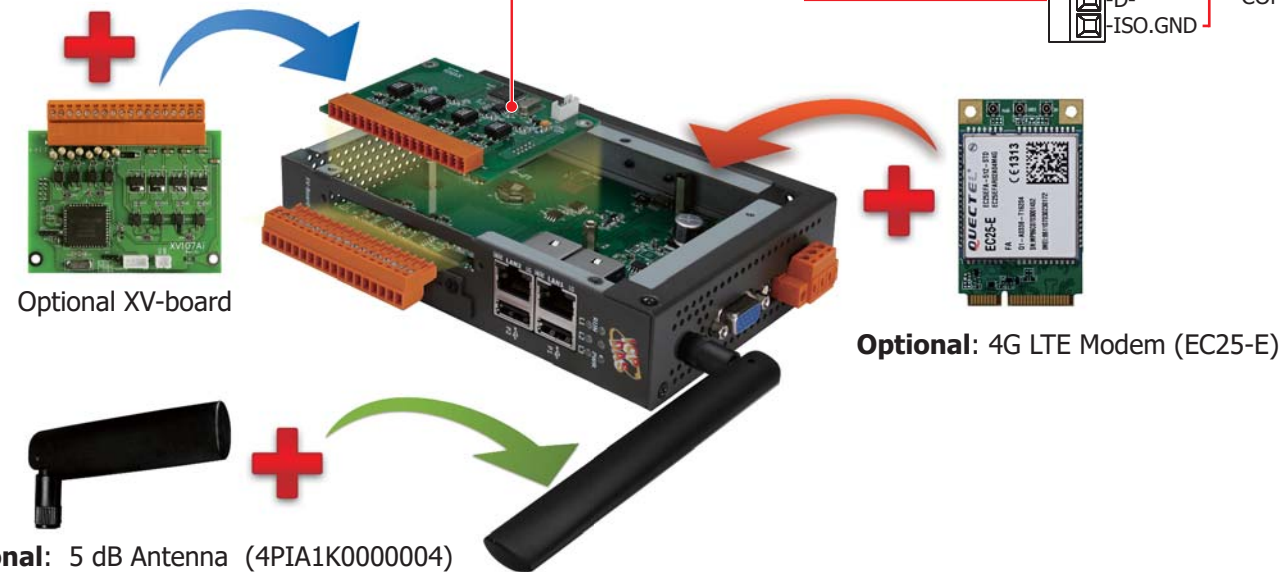
Introduction:

The WP-2241M-CE7 is a WinCE 7.0 embedded controller, and the LP-2241M is a Linux embedded controller. WP-2241M-CE7 and LP-2241M has the same hardware specifications but comes with different OS. The PAC has one PCIe slot to add one 4G LTE modem and antenna to implement a simple 4G LTE connectivity solution.

Appearance:



I/O Expansion:



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6.2



WP-2841M-IoT

Standard WP-2000-IoT with Windows 10 IoT, quad core CPU (1.6 GHz, Cortex-A53) and I/O expansion slot

Features:

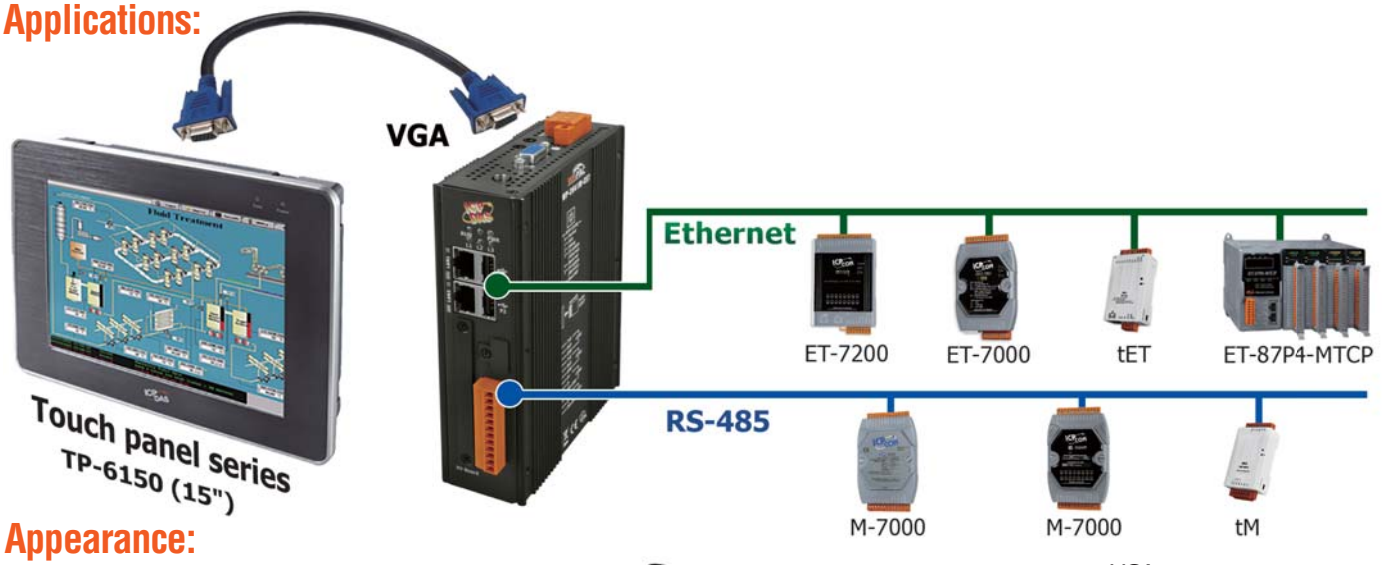
- i.MX8M Mini CPU (1.6 GHz, Cortex-A53)
- Windows 10 IoT
- 2 GB DDR3 RAM and 8 GB eMMC Flash
- 64-bit Hardware Serial Number for Software Protection
- I/O Expansion Slot (for XV-board)
- 2 × 10/100/1000M Ethernet ports, USB ports
- 4 × Serial ports (RS-232/485), 2.5 kV isolated
- Operating Temperature: -25 ~ +75 °C
- Dimension (W × L × H) 35 × 167 × 119 mm

Introduction:

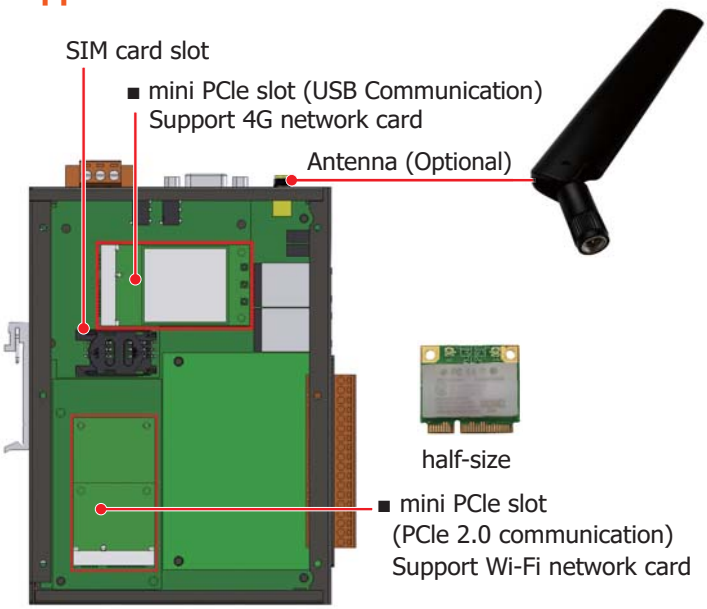
WP-2841M-IoT is a controller with the Windows 10 IoT operating system, equipped with a high-performance, low-power consumption Quad-Core Cortex-A9 (1.6 GHz/Core) processor. In terms of I/O expansion, a highly protective XV-board is available for purchase and use.

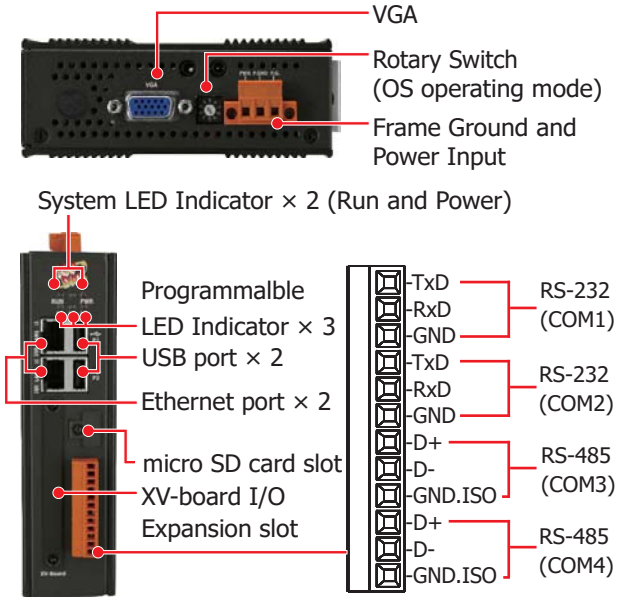
It also offers a microSD slot and microSD card that can not only store frequently used applications, graphics and data, but also provide users with options for system updates and backups, as well as storage tools that are convenient to carry and expand.

Applications:



Appearance:





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6.3



LP-2841M

LP-2841M with Linux OS, quad core CPU
(1.6 GHz, Cortex-A53) and I/O expansion slot

Features:

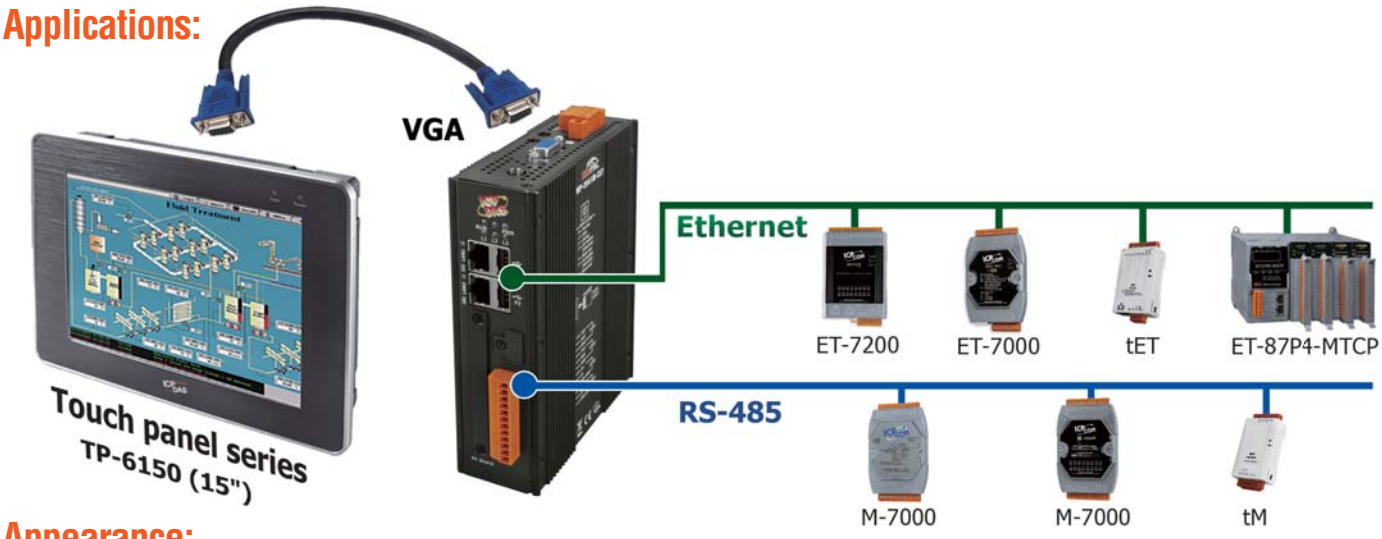
- i.MX8M Mini CPU (1.6 GHz, Cortex-A53)
- Linux Kernel 5.4.70
- Ubuntu 20.04 OS
- 2 GB RAM and 8 GB eMMC Flash
- Hard Real-Time Capability
- 64-bit Hardware Serial Number for Software Protection
- I/O Expansion Slot (for XV-board)
- 2 × 10/100/1000M Ethernet ports, USB ports
- 1 × Console port (RS-232)
- 3 × Serial ports (RS-232/485), 2.5 kV isolated
- Operating Temperature: -25 ~ +75 °C
- Dimension (W × L × H) 35 × 167 × 119 mm

Introduction:

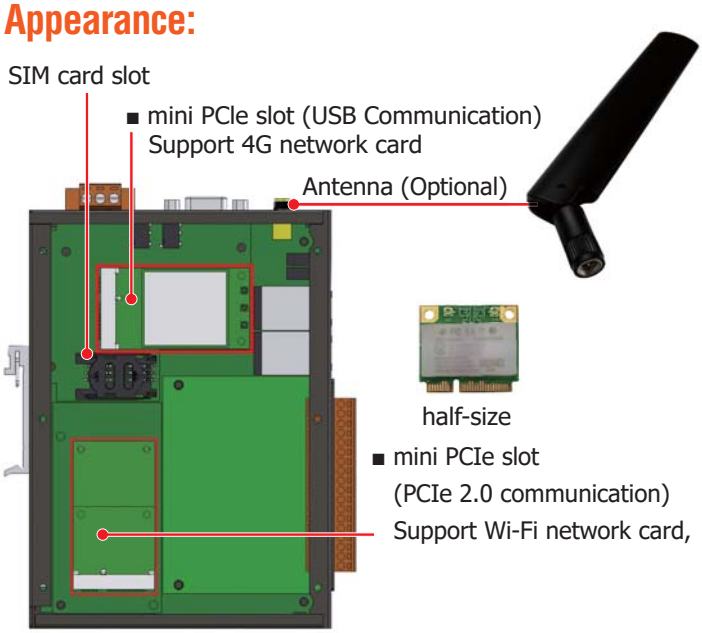
LP-2841M uses an i.MX8M Mini quad-core processor (1.6 GHz, Cortex-A53), is equipped with a Linux environment (Linux Kernel 5.4.70) and offers a powerful operating system.

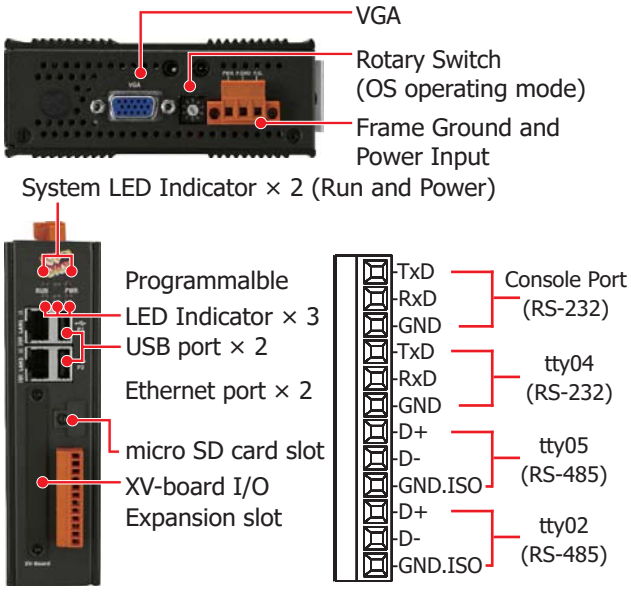
The LP-2841M has the real-time capability and it can be used to quickly create time-critical and high-performance applications. Moreover, it is quite easy for the user to configure the system via the VGA, various I/ O expansion interfaces, expandable memory (microSD card), and wireless functions, etc. Using LP-2841M can bring the best solution for industrial control.

Applications:



Appearance:





Note 1: 4G network card, Wi-Fi network card, Bluetooth module, you can only use one of them. (Because there is only one antenna connector)
Note 2: If you use Wi-Fi network card or Bluetooth module, you cannot use SSD and can only use micro SD to expand storage capacity.

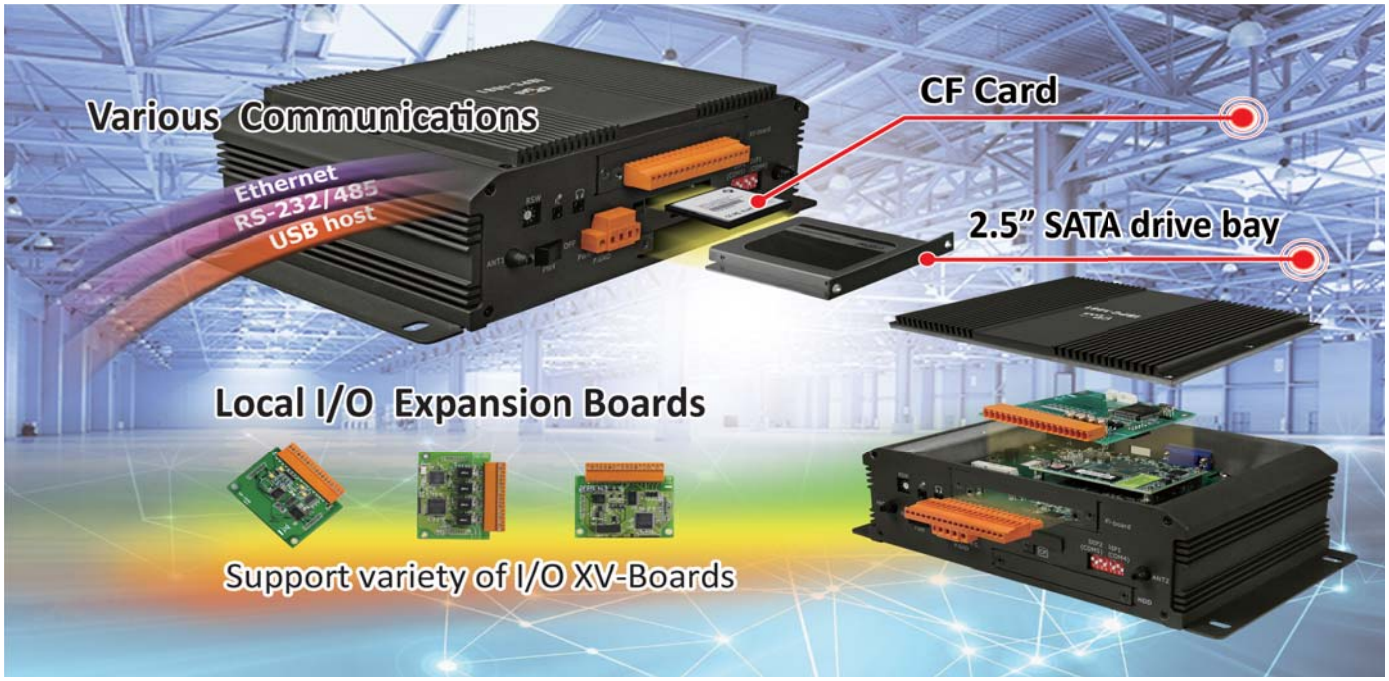
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CH7
iBPC Series BoxPC

7.1 Standard Box PC 84



7.1 iBPC Series BoxPC



The iBPC series is a fanless embedded box PC, which has a wide operating temperature range and a wide voltage range, allowing it to be used in harsh environments.

The iBPC series has the same interfaces: four RS-232/422/485 ports, VGA, HMDI, audio, dual Gigabit Ethernet LAN ports and four high-speed USB 2.0 ports.

The iBPC series has various CPU options:

iBPC-4081 is with an Intel® ATOM Quad Core 1.91Ghz Processor E3845 (with 4 GB on-board memory).

iBPC-4091 is with an Intel® ATOM Quad Core 2.00Ghz Processor E3950 (with 8 GB on-board memory).

The iBPC series features two SMA type connector opening for antenna, an optional I/O expansion board (XV-board) that provides high protection I/O, a +10 ~ 30 VDC power input connector, and a power switch. In addition, a 2.5-inch SATA HDD drive bay is built into the embedded computer to provide sufficient storage space.

Features:

❶ Powerful Hardware Design

- iBPC-4081: Intel® Atom E3845 CPU (with 4 GB on-board memory)
- 2 × 10/100/1000M Ethernet and 4 × USB 2.0 port
- One 2.5" SATA drive bay and 1 CF socket
- Ultra-Rugged Construction and Reliable Design
- Supports VGA and HDMI dual display
- RS-232/422/485 port
- I/O Expansion Bus for XV-board
- One Mini PCI Express Card slot
- Operating Temperature: -25 ~ +70°C

❷ Local I/O Expansion Board

The iBPC-4081 can support one an I/O expansion card, which allow you implement various I/O functions.





❸ Remote I/O Module and Expansion Unit

With the built-in RS-485 and Ethernet ports, the iBPC-4081 can connect RS-485/Ethernet remote I/O units (RU-87Pn/ET-87Pn) or modules (I-7000/M-7000/ET-7000).

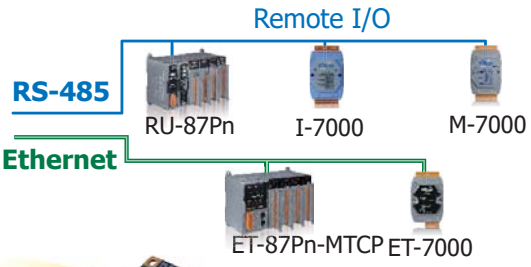
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4 Multiple Communication Interfaces

iBPC series provides different communication interfaces, easy to expand various I/O modules or connect to external devices.

1. Ethernet
2. RS-485
3. USB host
4. CAN Bus

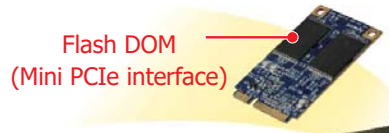




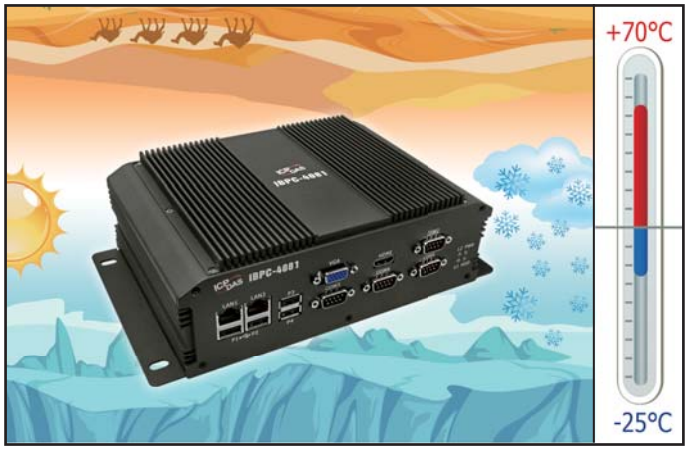
5 Various Memory Storage Options

iBPC series provides various memory storage options.

- CF card: Portable data logging applications.
- 2.5" SATA drive bay or mSATA Flash: Rugged storage and shock absorption.



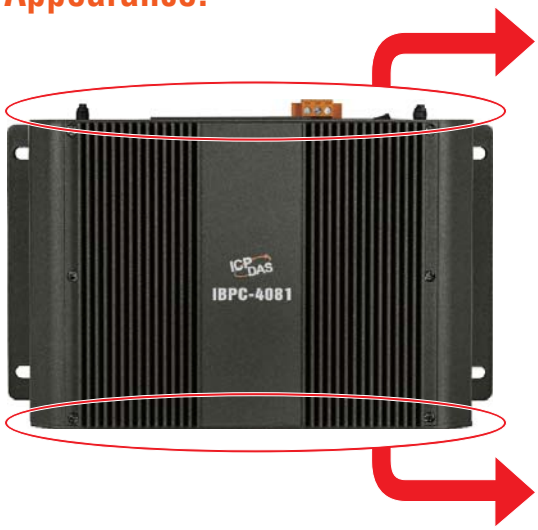


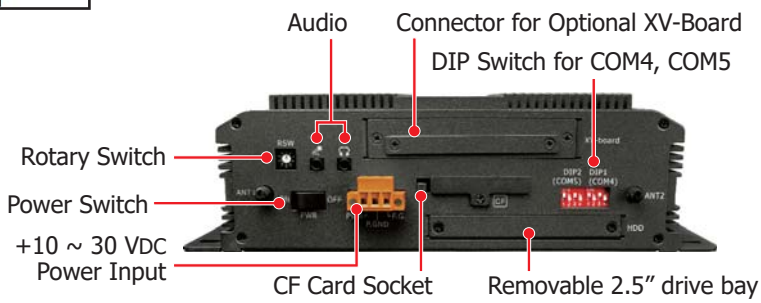


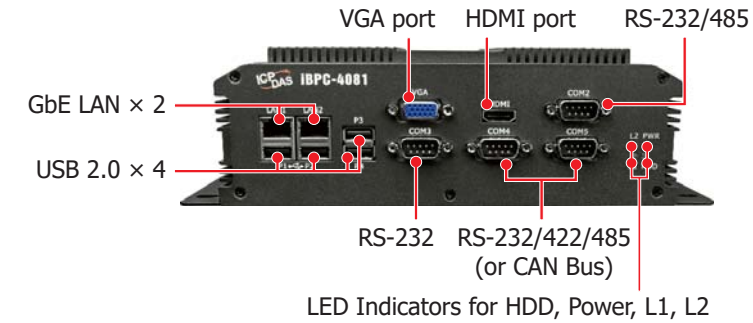
6 Highly Reliable Under Harsh Environment

- Operating Temperature: -25 ~ +70°C
- Storage Temperature: -40 ~ +75°C
- Humidity 10 ~ 90% RH (non-condensing)

Appearance:







Standard Box PC

Model Name	CPU	SDRAM	VGA/HDMI Resolution	Ethernet	RS-232/422/485	CAN Bus	USB 2.0	I/O Expansion	Resolution
iBPC-4081	E3845, 1.91 GHz, quad core	4 GB DDR3 on-board	1280 × 1024 to 1920 × 1080	2	4	-	4	XV-Board	Yes
iBPC-4081-CAN					2	2			

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CH8
Touch Monitor

8.1 Touch Monitor series 87



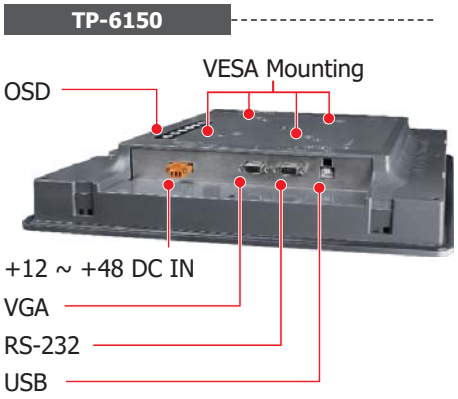
8.1 Touch Monitor

ICP DAS Touch Monitor series features wide operating temperature and full driver support for Windows 2k/XP/Vista/7/WES, WinCE 5.0/6.0 and Linux. It is guaranteed to work with ICP DAS PAC control system, such as XP-8000 series, WP-8000 series, WP-5000 series and LinPAC series.



Models	TP-2070	TP-3080	TPM-4100	TP-4100	TP-5120	TP-6150	TP-7170
Display							
Size	7″	8.4″	10.4″	10.4″	12.1″	15″	17"
Resolution	800 × 480	800 × 600				1024 × 768	1280 × 1024
Max. Color	16.7 M						
Luminance	400 cd/m2						350 cd/m2
Touch screen	4 Wire, analog resistive, Light Transmission: 80%	5 Wire, analog resistive, Light Transmission: 80%	4 Wire, analog resistive, Light Transmission: 80%	5 Wire, analog resistive, Light Transmission: 80%	5 Wire, analog resistive, Light Transmission: 80%	5 Wire, analog resistive, Light Transmission: 80%	5 Wire, analog resistive, Light Transmission: 80%
Contrast Ratio	500 : 1						
Viewing Angle (H/V)	140/120	140/130					
Backlight Life (hrs)	20,000	50,000					
Touch Screen Function	Combo RS-232 & USB interface						
Input Signal	VGA (Analog RGB)						
MMI (Man Machine Interface)							
OSD Control	Functions: Power Brightness, Contrast, Phase, Horizontal Position, Vertical Position and Sharpness						
LED Indicators	Power, Display signal is detected						
Power							
Input Range	+12 ~ +48 VDC						
Power Consumption	5 W	7 W	8.5 W	8.5 W	13 W	14.4 W	22 W
Mechanical							
Material	Plastic	Plastic	Aluminum	Plastic	Plastic	Plastic	Plastic
Dimensions (W × L × H)	213 × 148 × 44 mm	249 × 207 × 65 mm	293 × 231 × 53 mm	291 × 229 × 54 mm	323 × 254 × 65 mm	381 × 305 × 65 mm	413 × 359 × 70 mm
Installation	Panel Mounting, VESA Mounting (75 × 75 mm)	Panel Mounting, VESA Mounting (75 × 75 mm; 100 × 100 mm)	Panel Mounting	Panel Mounting, VESA Mounting (75 × 75 mm)	Panel Mounting, VESA Mounting (75 × 75 mm; 100 × 100 mm)		
Ingress Protection	Front panel: IP65						
Environmental							
Operating Temperature	-20 ~ +70°C						
Storage Temperature	-30 ~ +80°C						
Ambient Relative Humidity	10 ~ 90% RH (non-condensing)						

Appearance:



Ordering Information:

Model No.	Description
TP-2070	7" Touch Monitor with power supply
TP-3080	8.4" Touch Monitor with power supply
TP-4100	10.4" Touch Monitor with power supply
TPM-4100	TP-4100 with Aluminum Casing
TP-5120	12.1" Touch Monitor with power supply
TP-6150	15" Touch Monitor with power supply
TP-7170	17" Touch Monitor with power supply

Model No.	Description
TP-2070/NP	TP-2070 w/o power supply
TP-3080/NP	TP-3080 w/o power supply
TP-4100/NP	TP-4100 w/o power supply
TPM-4100/NP	TPM-4100 w/o power supply
TP-5120/NP	TP-5120 w/o power supply
TP-6150/NP	TP-6150 w/o power supply
TP-7170/NP	TP-7170 w/o power supply

Standard Accessories:

VGA cable, RS-232 cable, USB cable, Mounting clamps and screws

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CH9
EtherCAT Masters

9.1 EtherCAT Motion Control Master Overview 89
9.2 EMP-2848M EtherCAT (Soft PLC Based) 98
9.3 EtherCAT Master Card (PC Based) 103
9.4 ECATDAQ Lightweight EtherCAT Master Library 107



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9.1 EtherCAT Motion Control Master Overview

ICP DAS combines high-performance processing technology with independent hardware controllers to provide stable and reliable motion control in real-time. In addition to general basic motion functions like point-to-point, interpolation, semiconductor management, and even vertical group movement command control functions on robot control, etc. With high precision and speed, as well as synchronous motion control, it significantly reduces the operational complexity and development cycle of industrial applications in all fields.

The motion controllers and master cards from ICP DAS are compatible with 3rd party EtherCAT I/O slave devices. It allows users to provide optimized synchronization between motion and I/O control, therefore maximizing application throughput. With professional motion control team, ICP DAS's customized motion control function service creates optimized automation control system for you. As the market leader, ICP DAS offers software, hardware, and services three-in-one EtherCAT solutions.

PC-Based Solution



ECAT-M801 Series
ECAT-M808 Series
EtherCAT PCIe Master Cards

Highlights
Supports up to 64 axes, integrated API function and a built-in comparison trigger.

Benefits
I/O control and high-precision motion.

Advantages
Simple wiring, easy to use, and saves a lot of development time.

PAC Motion Controllers

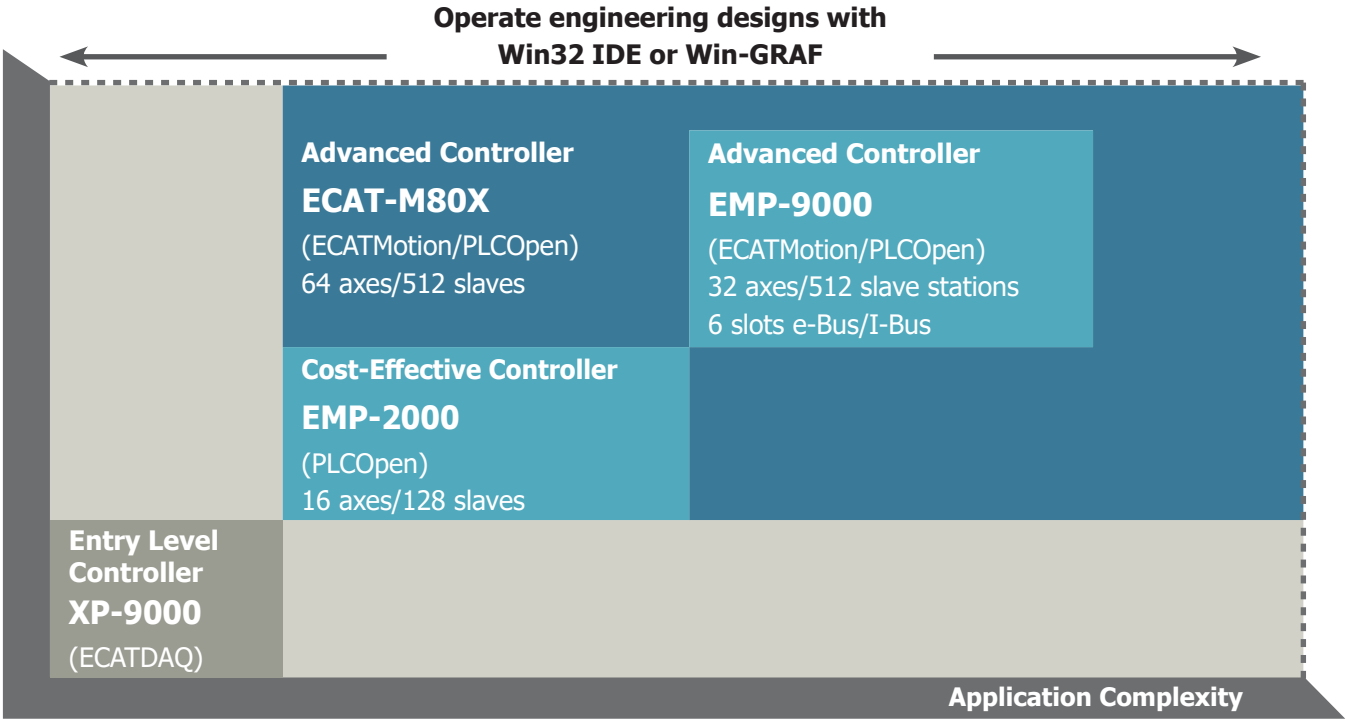


EMP-9000 Series
EMP-2000 Series
EtherCAT Motion Controllers

Highlights
Provide IEC 61131-3 for integrating Win-GRAF Soft PLC with EtherCAT solutions.

Benefits
To facilitate the integration of various IoT applications, an open platform and a standard interface are provided.

Advantages
Compact size, improved equipment intelligence & stability, and maintenance efficiency.



ICP DAS provides a variety of controllers to meet a wide range of automation requirements. The new generation of EtherCAT motion controllers include Cost-Effective, Advanced and Premium models, leading other products of the same type in the market with its scalability, stability and high performance.

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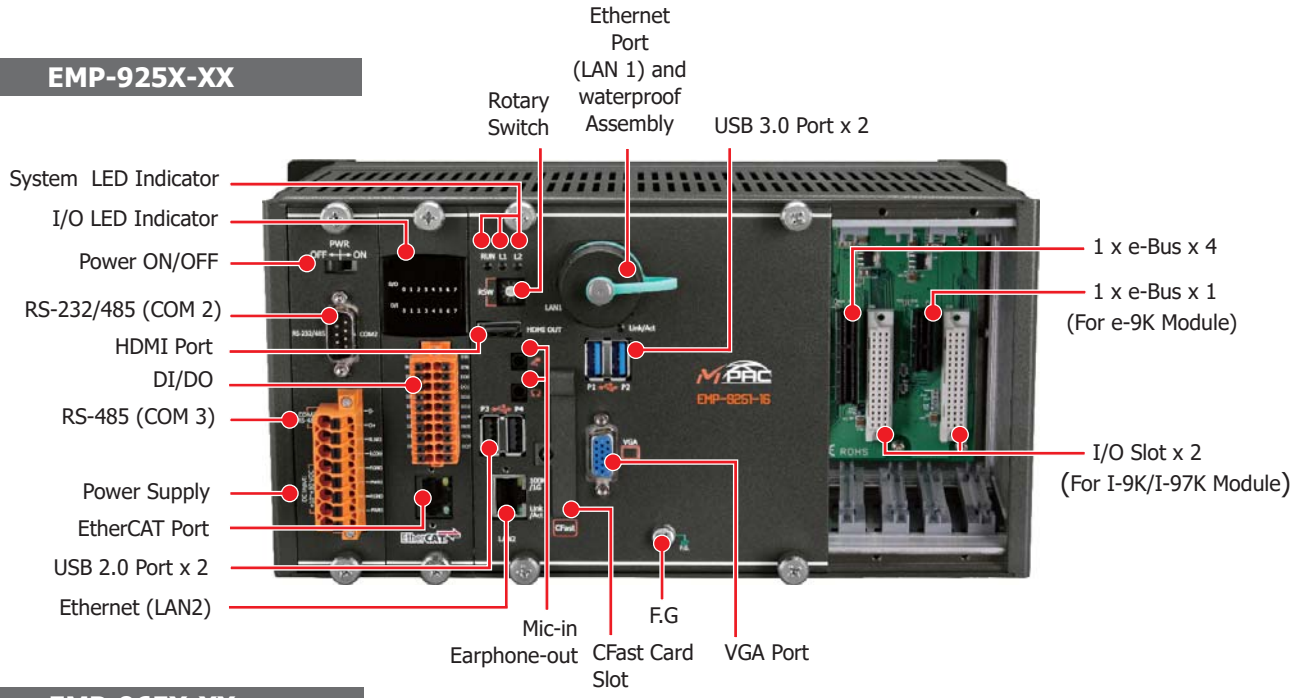
EMP-9

X	X	X	-	XX
I/O Slot 0/2	CPU 5: i5-8365UE 9: E3950	Version 1: Standard 8: Win-GRAF		Number of axes 16: 16 axes 32: 32 axes

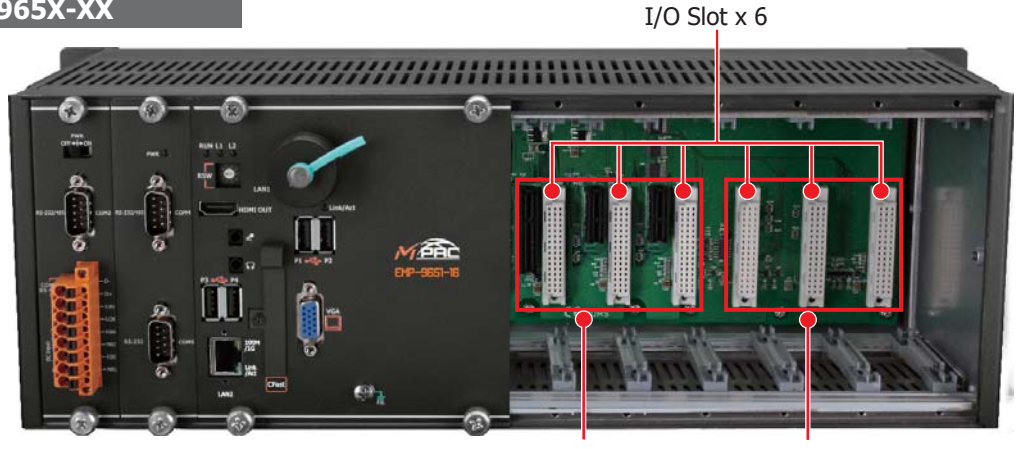
EMP-909X-XX / EMP-905X-XX



EMP-925X-XX



EMP-965X-XX



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Windows 10 IoT Standard Edition (Built-in ICP DAS EtherCAT Win32 Library)

Model	CPU	RAM	e-Bus/I-Bus Expansion Slot (Shared)	Cycle Time	EtherCAT Slaves	Motion Axes
EMP-9051-32	i5-8365UE (1.6 ~ 4.1 GHz, 4C8T)	16 GB	-	0.5/1/2/4/8 ms	512	32
EMP-9051-16						16
EMP-9251-32			2			32
EMP-9251-16						16
EMP-9651-32			6			32
EMP-9651-16						16
EMP-9091-32	E3950 (1.6 ~ 2.0 GHz, 4C4T)	8 GB	-			32
EMP-9091-16						16

Windows 10 IoT Win-GRAF Version (Built-in ICP DAS EtherCAT Win32 Library and Win-GRAF EtherCAT PLC

Model	CPU	RAM	e-Bus/I-Bus Expansion Slot (Shared)	Cycle Time	EtherCAT Slaves	Motion Axes
EMP-9058-32	i5-8365UE (1.6 ~ 4.1 GHz, 4C8T)	16 GB	-	0.5/1/2/4/8 ms	512	32
EMP-9058-16						16
EMP-9258-32			2			32
EMP-9258-16						16
EMP-9658-32			6			32
EMP-9658-16						16
EMP-9098-32	E3950 (1.6 ~ 2.0 GHz, 4C4T)	8 GB	-			32
EMP-9098-16						16

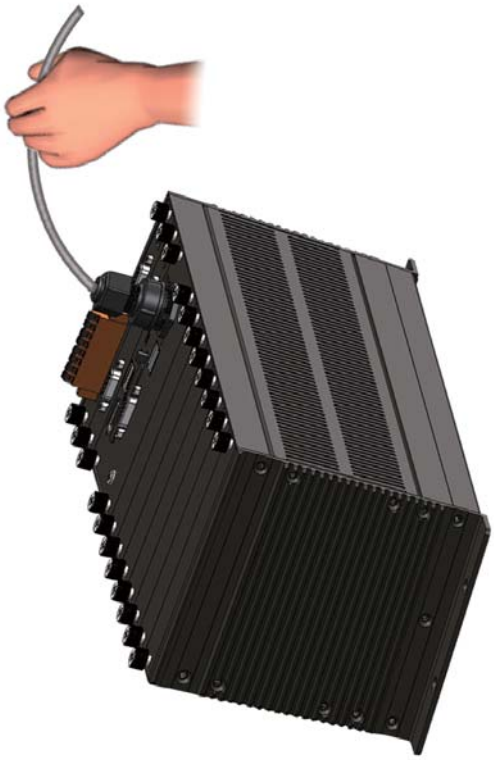


▲ **Flexible system design capabilities, can be used with a variety of applications and the use of devices to choose, to enhance the freedom of design.**

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Securing the Ethernet Cable

ICP DAS provides two types of RJ-45 network port designs, which can secure the Ethernet cable, avoid poor communication caused by vibration and pulling, and increase the reliability of RJ-45 cable connector.



• Secured RJ45 connector

This RJ45 connector not only can be used with the regular network cable, but also can add a secured connector. Besides, the package allows the regular network connector to get the most reliable locking force.



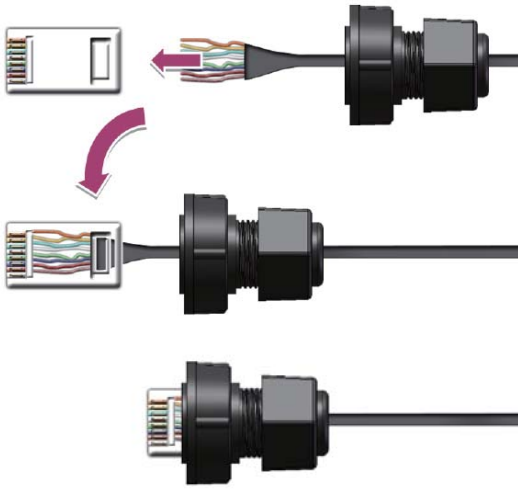
▲Regular Ethernet Cable



▲Secured RJ45 Connector Kit



▲Waterproof Connector Kit



• RJ45 Screw-lockable Connectors

Screw holes (spaced 20 mm) are located on both sides of the RJ45 connectors. Screw holes can also be used in addition to standard network cables.

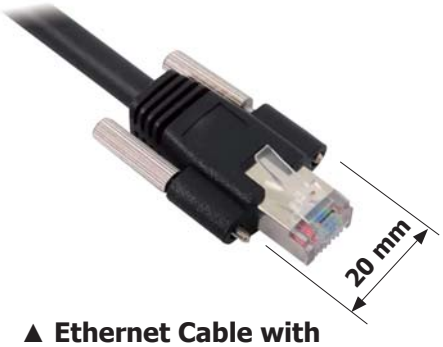
The wire-locked network cable lessens the possibility of the network cable falling off due to vibration.



▲ Screw-lockable RJ45 Connector



▲ General Ethernet Cable



▲ Ethernet Cable with a Screw-on Lock

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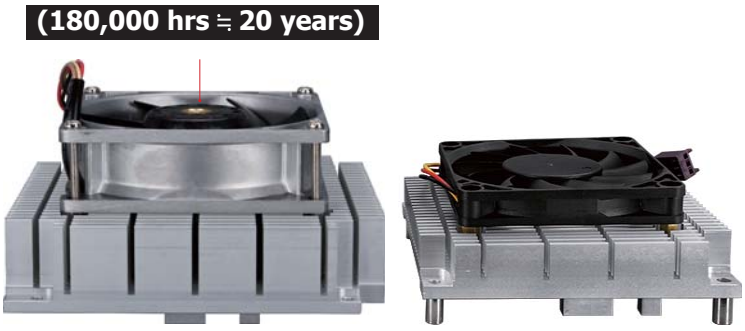
High-Efficiency Heat Dissipation CPU

• Design of CPU Heat Dissipation



▲ CPU with Long-life Heat Dissipation

The temperature of the entire CPU can be reduced by another 10°C with larger heat sinks and fans, extending the service life of electronic components. The fan has been specially selected for the long-life type, with a lifespan of 180,000 hours (about 20 years).

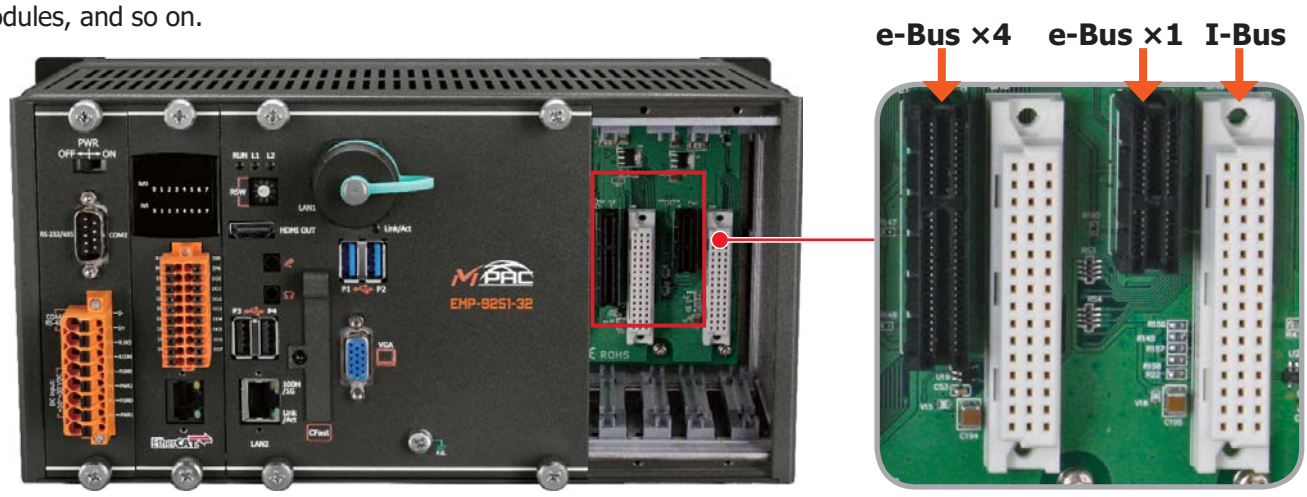


▲ Long Life Design

▲ Regular Design

Expandable I/O Slot Design

The EMP-9000 series offers a variety of I/O expansion options. User can directly integrate e-9K/I-9K/97K series modules via the expansion slot. The e-9K/I-9K/97K high-speed data transmission module can meet the needs of high-speed and stable data acquisition by providing a variety of analog, digital input and output modules, encoder input modules, and so on.

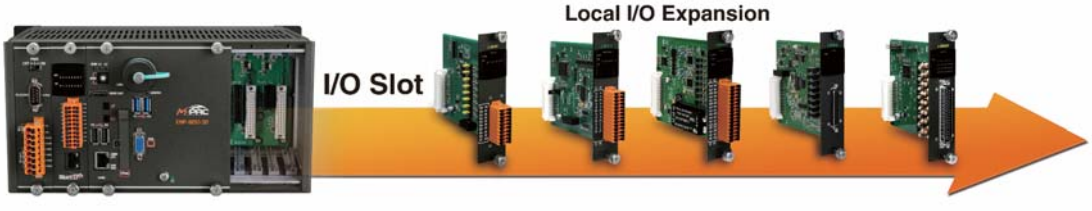


The I/O Module's Communication Interface

The EMP-9000 series can support I/O and communication expansion modules from the e-9K/I-9K/97K series

- The e-9K (e-bus) utilizes PCIe 3.0 communication, has an x1 or x4 communication interface, and has a speed of 500 MB/s or 2 GB/s.
- I-9K uses 8-bit parallel communication, with speeds ranging from 200 to 500 KB/s depending on CPU level.
- The I-97K (I-bus) uses uart communication at 115 kbit/s.

• I-9K/97K Series (I-bus)



Scan the QR code to learn more about the I-9K/I-97K series modules

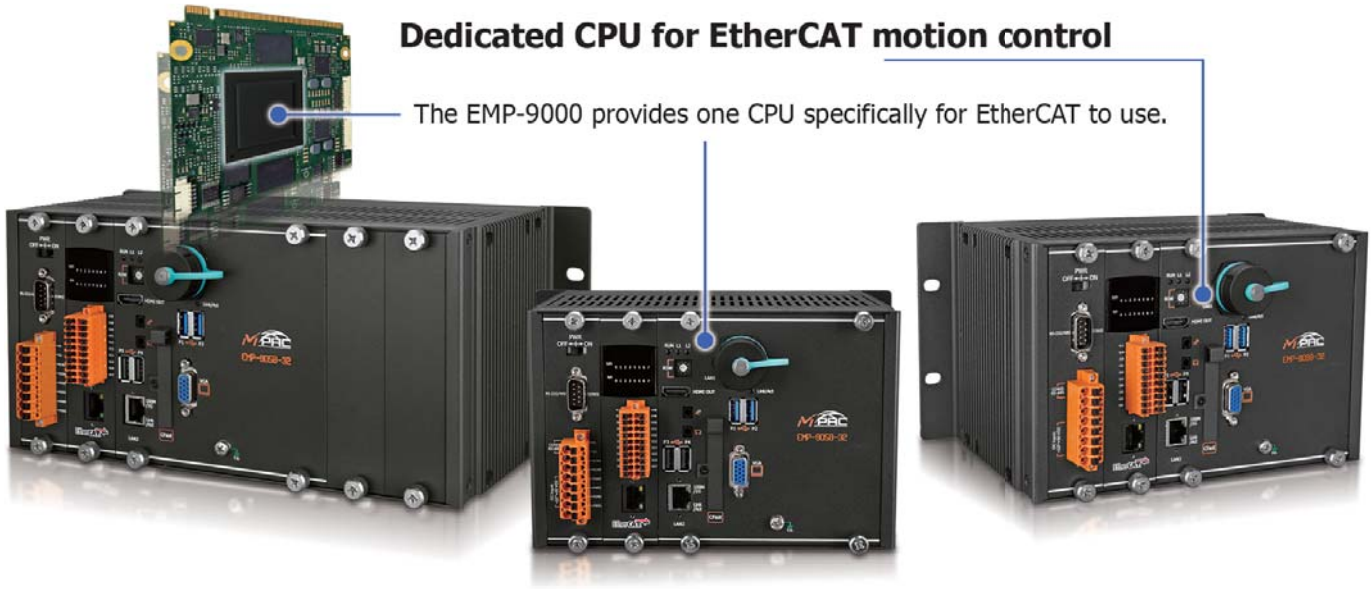
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	Motion Controller			Motion Control Card	
	EMP-9000	**EMP-2000**	**XP-9000**	**ECAT-M801**	**ECAT-M808**
Type	**PAC/PLC**	**PLC**	**PAC**	**(Interface) PCI Express**	
Support 3rd Party Slave	V		-	V	V
No. of Slaves Node	512	128	20	512	
No. of Motion Control Axes	64 Axes (Max.)	16 Axes	8 Axes	32 Axes (Max.)	64 Axes (Max.)
Windows API	ECATMotion	-	ECATDAQ	ECATMotion	
PLC Open	V		-	V	

EtherCAT Motion Control Master Selection Guide

Model		Type	No. of Axes	Preloaded EtherCAT Win-GRAF	Software
PAC Controller - The EtherCAT Motion Control Master is competitive in terms of performance, size and price.					
	**EMP-9091-16**	Motion Controller	16	-	Windows API
	EMP-9091-32		32	-	
	EMP-9098-16		16	V	
	EMP-9098-32		32	V	
	EMP-9051-16		16	-	
	EMP-9051-32		32	-	
	EMP-9058-16		16	V	
	EMP-9058-32		32	V	
	EMP-9251-16		16	-	
	EMP-9251-32		32	-	
	EMP-9258-16		16	V	
	EMP-9258-32		32	V	
PLC controller - A compact and efficient motion controller that can communicate with all EtherCAT slaves without programming					
	**EMP-2848M**	Motion Controller	16	Win-GRAF Runtime	Soft PLC
PCI Express Card - Compatible with IPC of various brands. PCI Express can transform the device into a high-efficiency EtherCAT master.					
	**ECAT-M80x-8AX**	PCI Express Master	8	-	Windows API
	ECAT-M80x-16AX		16	-	
	ECAT-M80x-32AX		32	-	
	ECAT-M808-64AX		64	-	

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▲The EMP-9000 series EtherCAT motion controller with an all-metal case meets users' most stringent requirements for anti-interference capability and system size.

	EMP-9000 (PAC/PLCs)	Conventional IPC + EtherCAT master card in the market
Development Platform	Developers can use PLC Open or standard Windows API to develop the program. WIN	Provides only Windows API library
Reduce development time	ECATMotion API and PCL Open functions are easy to use. Provides professional consultation from motion control technical service team. WIN	Provides only Windows API library
size	Save 80% space of conventional IPC WIN	big and heavy
Expandability	Provide 0/2/6 slot expansion modules, which can install high-performance e-9K and PAC I/O modules WIN	Available in conventional PCI or PCIe slots only

ICP DAS Exclusive Features

- Built-in 10 groups of PID control loops
- High-speed data logger
- Analog module filter
- Event trigger control
- Gantry control parameter adjustment program
- Stewart Platform









- **Boost the efficiency of your development**
- **It can be programmed in a variety of languages**
- **EtherCAT motion controller with the highest level of dependability**
- **3U rack-mounted design saves space and wiring**

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• e-9K Series , DAQ Modules (e Bus)

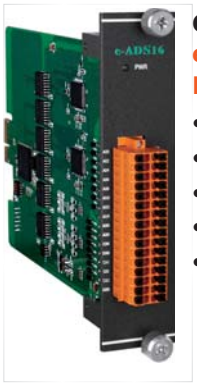
Model	e-Bus	Description
e-LCell4	e-Bus x1	High-speed LoadCell (24-bit, 15KHz) module , 4-channel, Terminal Block
e-ADS16	e-Bus x1	High-speed AI module , 16-channel, 16-bit, 200KHz, Sample & Hold, Terminal Block
e-D96S	e-Bus x1	High-speed bidirectional DIO module , 96-channel, SCSI II 96-pin connector
e-AR300T	e-Bus x1	Accelerometers input , 3-port IEPE interface , 1 channel thermistor input
e-AR400	e-Bus x1	Accelerometers input , 4-port IEPE interface
e-USB400	e-Bus x1	4-port USB3.0 expansion module. 500 MB/s total bandwidth
e-USB404	e-Bus x4	4-port USB3.0 expansion module. 2 GB/s total bandwidth
e-PoE204	e-Bus x4	2-port PoE (10/100/1000 Mbps) expansion module
e-PoE404	e-Bus x4	4-port PoE (10/100/1000 Mbps) expansion module



e-LCell4

e-Bus, 24-bit High-precision Load Cell Input Card

- e-Bus x1
- 4-channel 24-bit load cell input
- 4-channel 24-bit analog input
- 15 kHz sampling frequency



e-A16SH

e-Bus, 200 kS/s, 16 Channels and 16 bits High-speed Analog Input Card

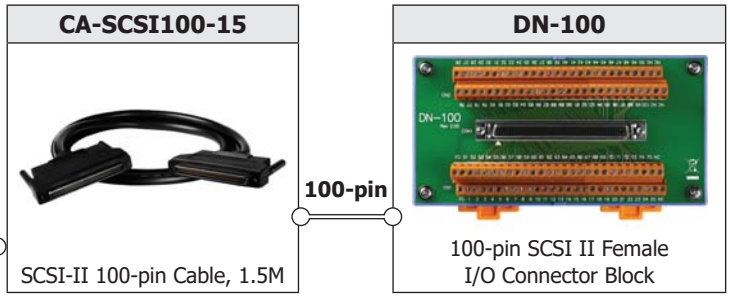
- e-Bus x1
- Simultaneous sampling
- 16-bit 16-channel single-ended analog input
- 2k WORD FIFO
- 16-channel simultaneous sampling single-ended analog input



e-D96S

e-Bus, 96-channel Digital I/O Card

- e-Bus x1
- 96 channels of Digital I/O
- I/O response time 500kHz
- SCSI-II terminal





e-AR300T

e-Bus, 3-channel Accelerometer

- e-Bus x1
- 3 channels with 16-bit simultaneous sampling
- 3 IEPE input ports, drive current is 3 mA
- 1 channel thermistor input
- Up to 125kHz sampling frequency
- Signal dynamic range: ±10V
- There are several trigger modes available, including button trigger, time schedule trigger, threshold trigger, digital input trigger, and remote tool software trigger



e-AR400

e-Bus, 4-channel Accelerometer

- e-Bus x1
- 4 channels 16-bit simultaneous sampling
- 4 IEPE input ports, with 3 mA drive current
- Up to 125kHz sampling frequency
- Signal dynamic range: ±10V
- There are several trigger modes available, including button trigger, time schedule trigger, threshold trigger, digital input trigger, and remote tool software trigger

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e-USB400

e-Bus, 4-port USB3.0 Expansion Module



- e-Bus x1
- 4-port USB3.0 host module that is backward compatible with USB2.0/1.1/1.0
- 500 MB/s total bandwidth
- Each port has a maximum current supply of 900 mA.
- USB Camera Supported



e-PoE204

e-Bus, 4-port PoE Expansion Module



- e-Bus x4
- Supports IEEE 802.3at PoE
- 4 ports 10/100/1000 Mbps Ethernet
- Supports PoE power management and monitoring
- Supports PoE Camera



e-USB404

e-Bus, 4-port USB3.0 Expansion Module



- e-Bus x4
- 4-port USB3.0 host module that is backward compatible with USB2.0/1.1/1.0
- 2 GB/s total bandwidth
- Each port has a maximum current supply of 900 mA.
- USB Camera Supported



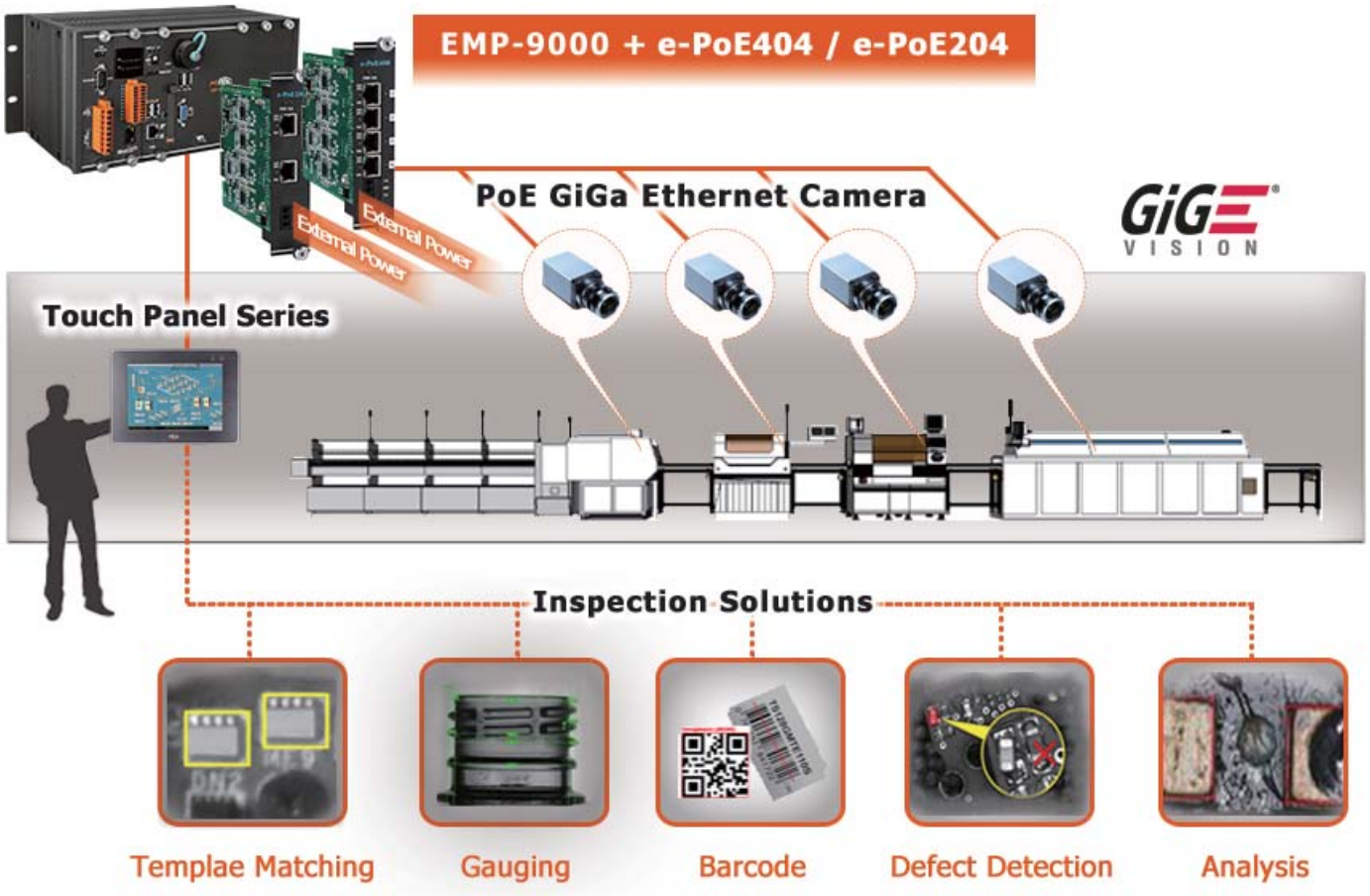
e-PoE404

e-Bus, 4-port PoE Expansion Module



- e-Bus x4
- Supports IEEE 802.3at PoE
- 4 ports 10/100/1000 Mbps Ethernet
- Supports PoE power management and monitoring
- Supports PoE Camera





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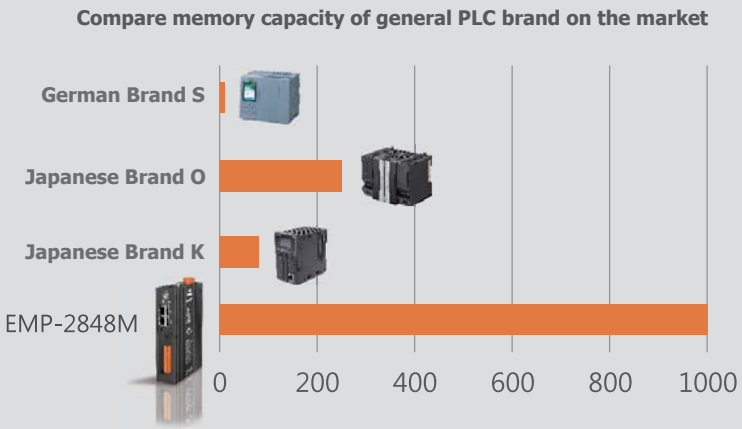
9.2 EMP-2848M EtherCAT Motion Controller (Soft PLC Based)

ICP DAS compact EtherCAT motion controller is with metal casing and can fit in a 3U cabinet. It features durable structure and strong anti-noise ability. It is compact and perfect for use under harsh environments. And the network topology and settings of the modules can be done by the built-in web page.

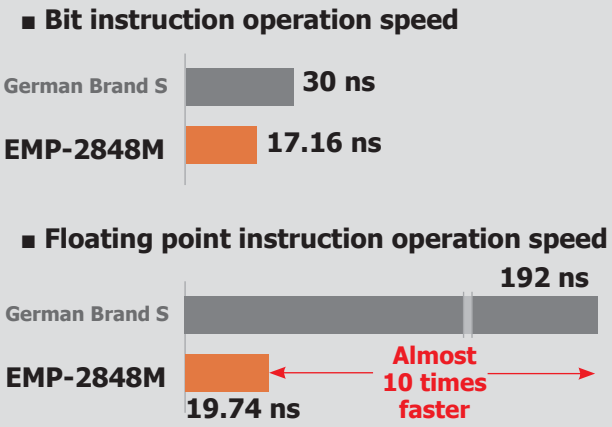
EMP-2000 can integrate control, data processing and network connection into one control platform. It provides Win-GRAF that supports IEC 61131-3 PLC programming language which can meet multi-purpose and high expansion requirements of the automation applications. It can control 16 servo axes and 128 slaves for motion control at the same time.

ICP DAS **EMP-2848**

Large memory capacity for easy to use



EMP-2848M is really fast!



Support multiple networks

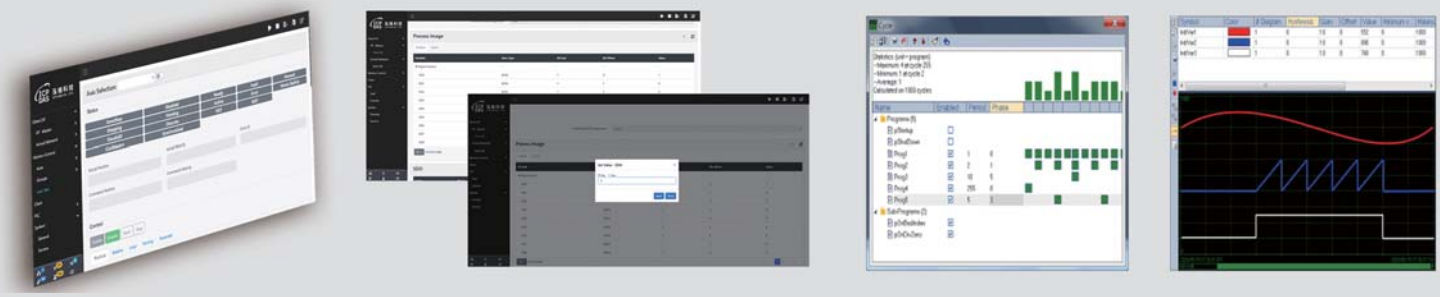
- Support EtherCAT Master
- Support Modbus TCP (Master/Slave)
- Support Modbus RTU/ASCII (Master/Slave)
- Support OPC UA (Available soon)

Easy to Develop

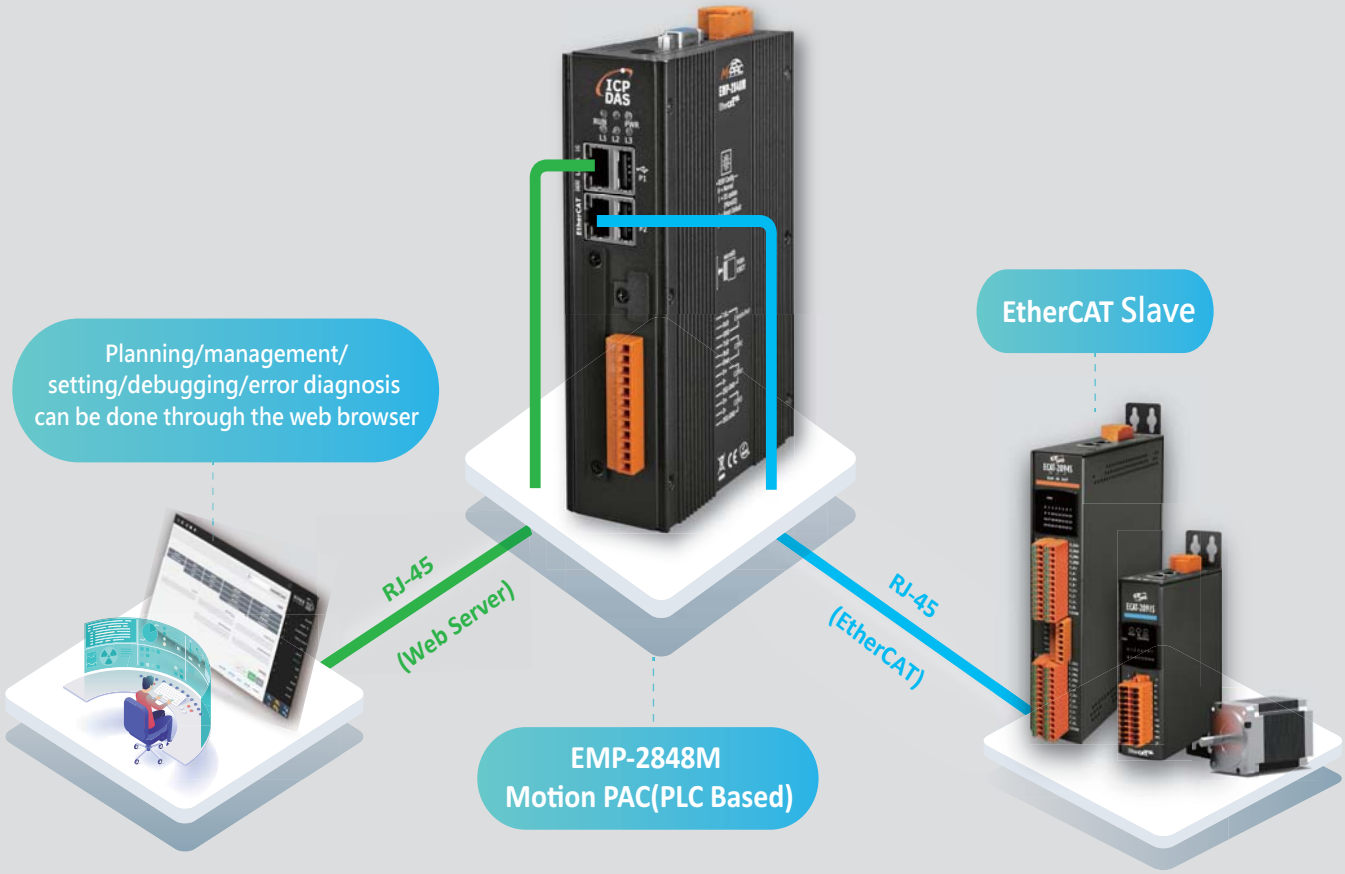
- Support Win-GRAF Workbench according to IEC 61131-3 PLC Language
- Multiple Soft PLC languages (FBD/LD/IL/ST/SFC)

Built-in integrated web page

- Get EtherCAT network topology with one click
- Compatible with ESI files from third-party slave
- Easy troubleshooting
- Perform commissioning of the motion controller
- Configure slave module parameters
- Support virtual slave ID memory function



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▲ The EMP-2000 series is with a metal casing and features anti-interference and compact in system and space. It lowers the barrier in development and configuration, and take all factors such as compact size, safety, stability, and convenience into account.

EMP-2848M

Thinner than a dictionary!



High efficiency and high protection

- Cortex-A53 1.6GHz quad-core processor
- Control cycle up to 500 μs
- EtherCAT engine independently developed by ICP DAS
- Single axis motion control
- Metal casing is effective against noise
- Built-in 1G large capacity memory

Support multitasking function

- Up to 4 tasks can be executed simultaneously
- Different communication protocols can be used separately
- Don't worry about the timing of different protocols





- **Make programming development more efficient**
- **Programmable in standard PLC language**
- **Most reliable EtherCAT motion controller**
- **Compact and robust, saving space and wiring**

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Convenient web management interface

Open the webpage through the browser to plan the topology settings and debug the slave module. When an unusual event occurs, the error diagnosis can be performed in real time.

Simultaneous control of up to 16 axes

Control 16 axes synchronously in real time
through the standard EtherCAT protocol.
The fastest control cycle can reach 0.5ms



Compatible with all ICP DAS slave stations and third-party slaves

EMP-2848M supports ESI file configuration, ESI file can be imported through the web interface to be compatible with all slaves.



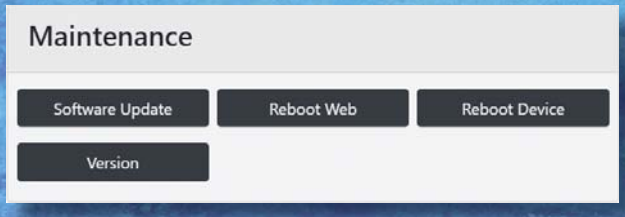
Network Connection Diagnosis Interface

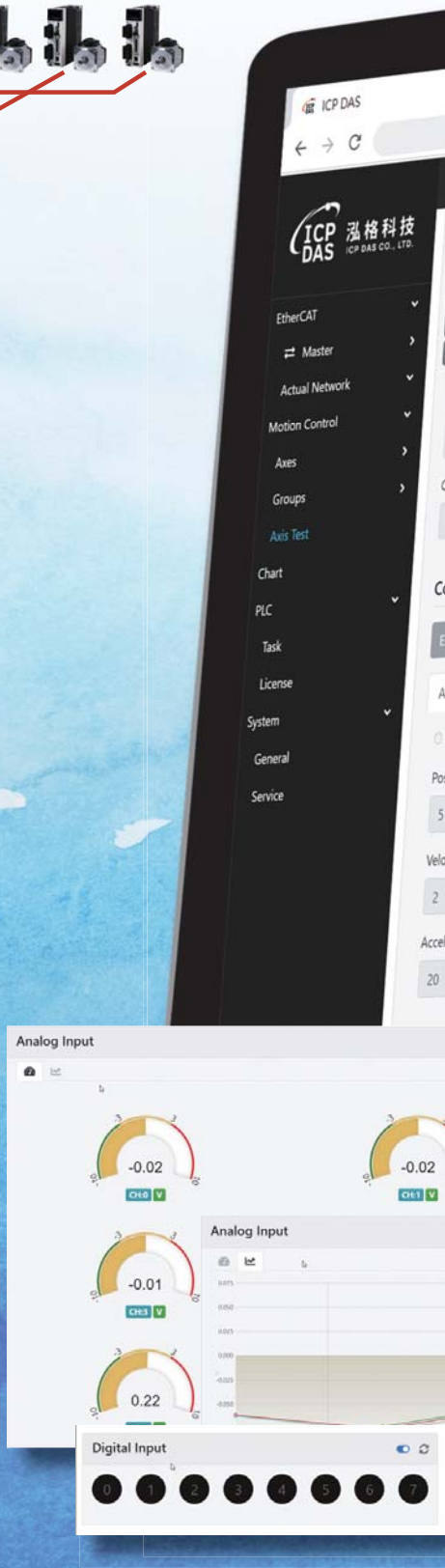
Provide an interface to show error, counter, and connection status of each port of the slaves.



Update firmware function

Users can update the firmware at local side through the Maintenance page of the EMP-2848M web interface for function update and problem solving.





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Task1 EtherCAT
Task2 Modbus RTU
Task3 Modbus TCP
Task4 OPC UA

Multitask function

Users can assign tasks of different communication protocols to different task blocks to run the tasks simultaneously, which can greatly reduce the complexity of communication terminals and program development.

CiA402 PDO Automatic assignment function

Provides CiA402 slave station module PDO automatic assignment function, which will automatically assign the PDO configuration of the slave module according to different motion control functions.

Visual Module Data Interface

Users can easily control or obtain DAQ module data.

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EtherCAT®



Each Pac supports multiple open networks.

The EMP-2848M also has all kinds of interfaces to support various networks at any time, unlike other PLCs that require expansion modules.

- Supports EtherCAT, Modbus TCP, Modbus RTU/ASCII, and OPC UA
- Provides EtherCAT, Ethernet and serial ports

High real-time behavior and deterministic

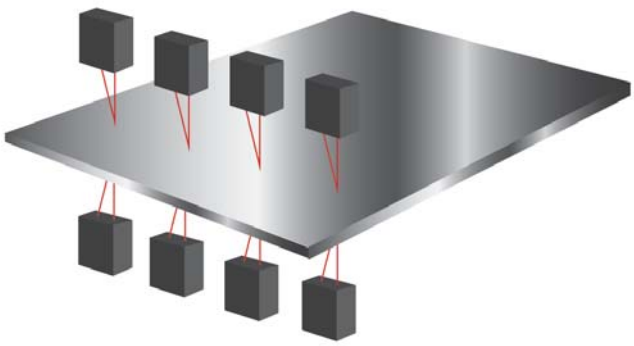
The EMP-2848M provides WinGRAF SoftPLC to solve the problem of other brands being interfered by operating systems, network cards and other systems.

- Cortex-A53 1.6GHz quad-core processor
- Reliable Real-Time Linux (RT-Preempt) for enhanced real-time and deterministic

Controlling various motors by wiring-saving



- Connect up to 16 axes and is mapped to PLC variables to the motion control axes, and then easily control them through PLC language.
- Synchronized motion control is as simple as point-to-point control.



▲Import analog values for multiple channels at the same time.



▲Simultaneous activation of multi-axis motors

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9.3 EtherCAT Master Card (PC Based)

ICP DAS offers EtherCAT network motion control cards that are compatible with Windows and Linux operating systems, allowing you to enjoy convenient and efficient real-time motion control on any computer and platform by plugging in a card. Up to 64 servo axes and 512 slave devices can be controlled synchronously for movement, and a variety of common movement control functions are provided to speed up software development.

ICP DAS **EMP-M801**

Model	Axes	Slaves	Function
ECAT-M801-8AX	8	512	Full
ECAT-M801-16AX	16	512	Full
ECAT-M801-32AX	32	512	Full
ECAT-M801-64AX	64	512	Linear

Module	Number of axes	Number of Stations
ECAT-2094S	4	1
ECAT-2091S	1	1
ECAT-2513	0	2
ECAT-2515	0	4
ECAT-2517	0	5
ICP DAS I/O Module	0	1



Single Axis Motion Control

- Supports CiA402 driver and ICP DAS stepper motor drivers
- Auto Homing function
- Point to point and constant velocity motion
- Virtual axes
- Supports CiA402 servo drives Touch Probe function

High Performance

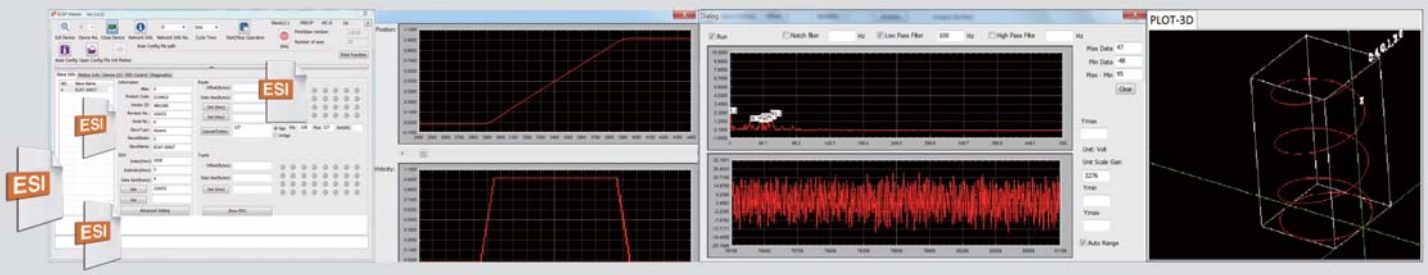
- Cycle times of up to 500 μs
- Supports Windows 10 and Linux operating systems
- Supports 32 and 64-bit operating systems

High Performance

- Cycle times of up to 500 μs
- Supports Windows 10 and Linux operating systems
- Supports 32 and 64-bit operating systems

Quick Configuration Tools

- Easy configure the slave device
- Compatibility with 3rd party slave device
- An easy-to-use troubleshooting function
- Supports the slave alias name function



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3D Circular | 3D Helical | Continuous Path
T/S Curve | Compare Trigger | Position Limit
Velocity Feedforward | Position Reset | Speed Reset
Linear | Helical | Continuous

▲ **ECAT-M801 handles motion control, allowing the PC system to focus on other tasks**

Quick Deployment without Knowing EtherCAT

- Supports a DLL library
- Supports a simple motion control API
- Code samples in a variety of programming languages C++/C#/VB.NET/BCB/LabVIEW/Python
- Special ICP DAS I/O module functions

Multi-axis Group Motion Control

- Add/Remove axis from a group easily
- Multi-axis interpolation motion (PV/PT/PVT mode)
- 2/3-axis Circular interpolation, Helical interpolation, Profile motion control
- Continuous Interpolation motion (Up to 7000 data buffered)
- Supports Buffered/Aborting/Blending and other commands
- Up to eight groups of simultaneous control

Exclusive ICP DAS Features



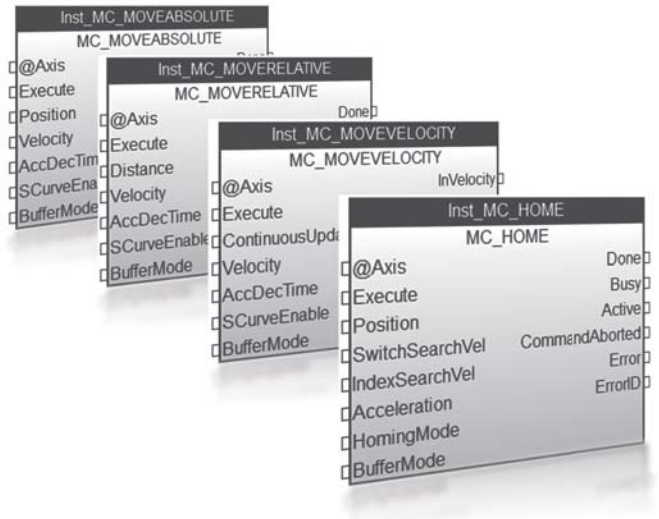
- Built-in 10 groups of PID control loops
- High-speed data logger
- Analog input filter
- Event trigger
- Stewart Sports Platform
- Gantry control parameter adjustment program

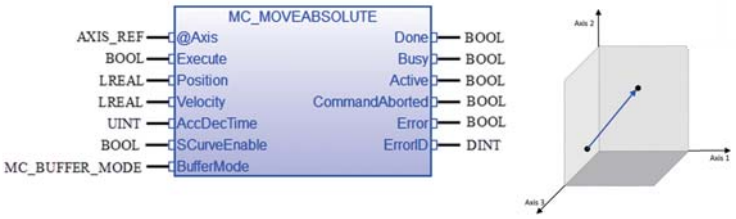
- **Improve the efficiency of your development**
- **Can be programmed in a variety of languages**
- **Allow the ECAT-M801 to assist the system in performing more real-time actions such as motion control, measurement, and so on**

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Win-GRAF PLCopen Library

- Supports up to 32 axes
- The built-in real-time operating system's high-performance motion engine ensures consistent performance

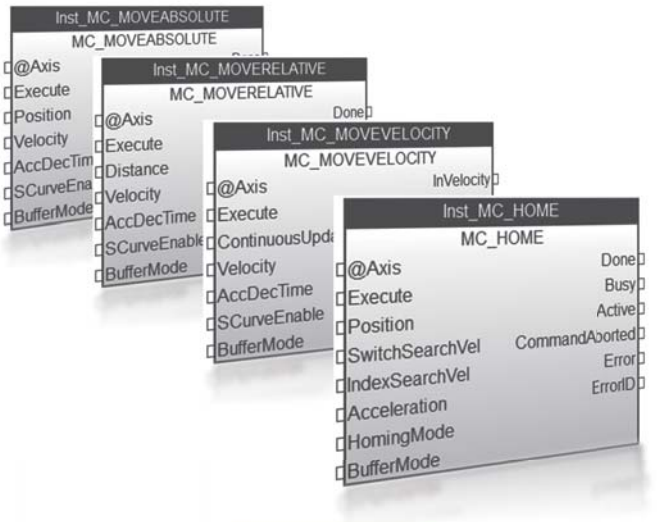




▲The Straight Path

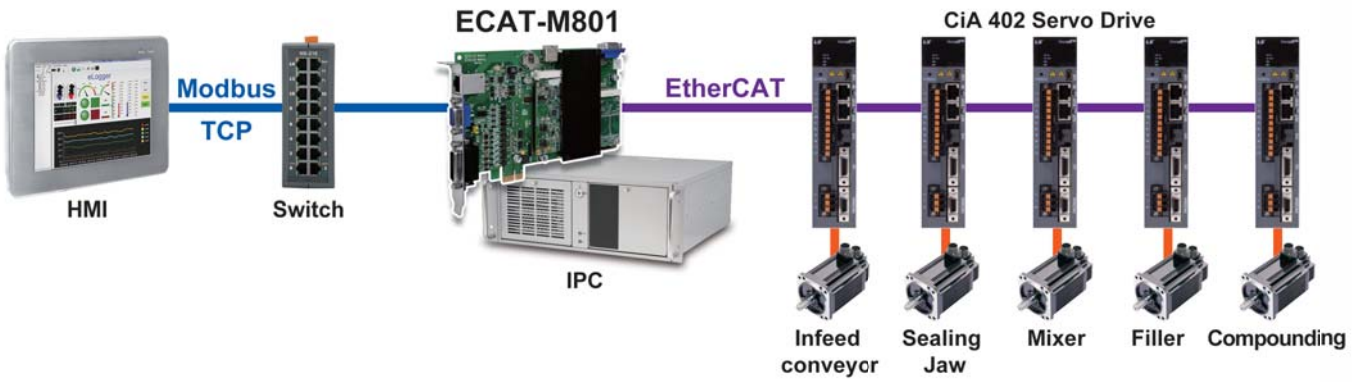
Supports EtherCAT servos and stepper motors with CiA402 drive configuration

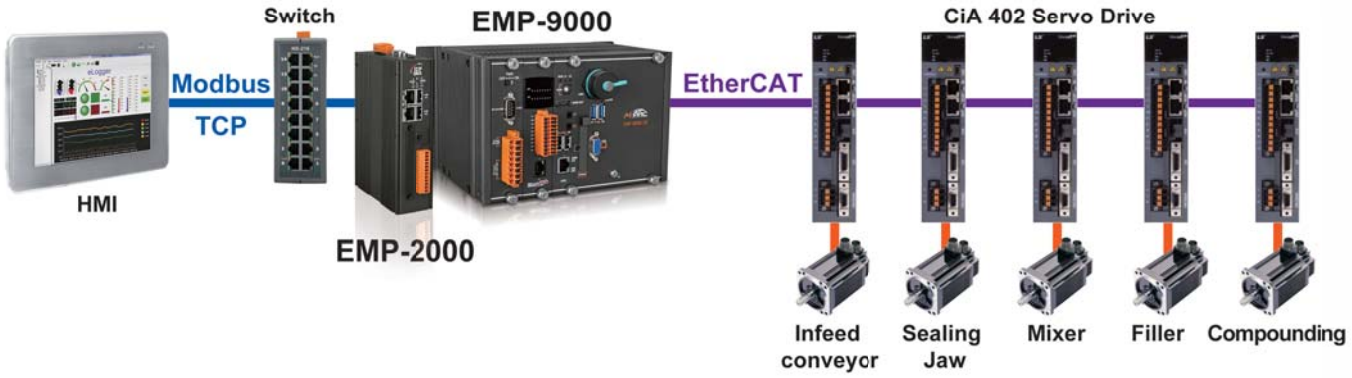
- Supports Cyclic Synchronous Position (CSP) and Cyclic Synchronous Velocity (CSV) modes
  The synchronization cycle time can be customized
- Once the axis is added to the configuration, the axis position is automatically mapped to PDO



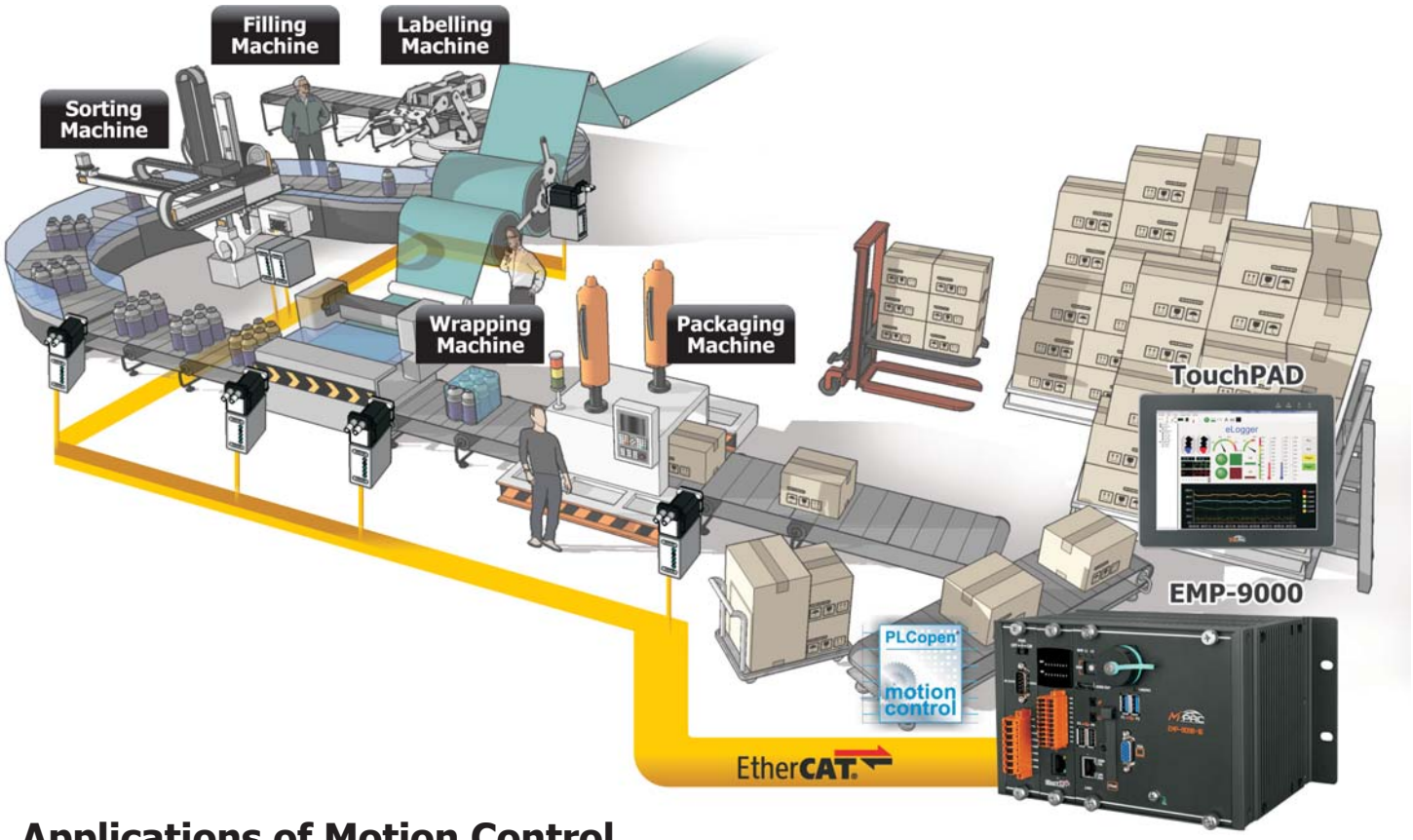


▲The Arc Path





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Applications of Motion Control

★ Access to Parts and Components

- Transfer and stacking device
- Gantry pick and place
- Pick, place, measure, and sort components automatically

★ Conveying System

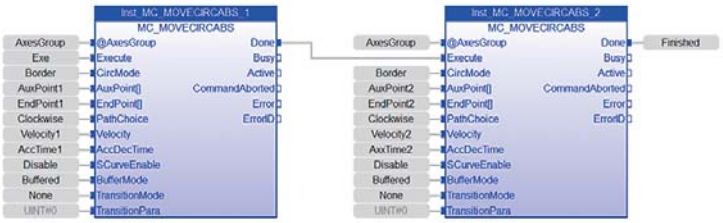
- Positioning of the workpiece on the conveyor
- Handling and transportation equipment
- Product inspection
- Online Pallet Stacker
- Labeling machine

★ Parts Assembly System

- Precision spot welding machine
- Sealing, gluing, joining applications
  - Add glue on the surface to connect parts
  - Sealing: apply sealant on the joint surface of the parts
  - Dispenser: gluing

★ Warehousing

- Automated storage and retrieval system
- Automatically store and retrieve pallets from the storage cabinet



★ Applications of Cutting, Grinding and Pressing

★ Semiconductor Manufacturing

- IC inspection
- IC chip installation and assembly
  - Pick up components and place them on the printed circuit board
- Camera Detection:
  - Check with a mobile camera.
  - Use the camera to conduct multi-point inspections

★ Robot Control

- Control single axis robot
- Control multiple single-axis robots for spraying applications
- Dual drives: synchronize and move two single-axis robots of the same type

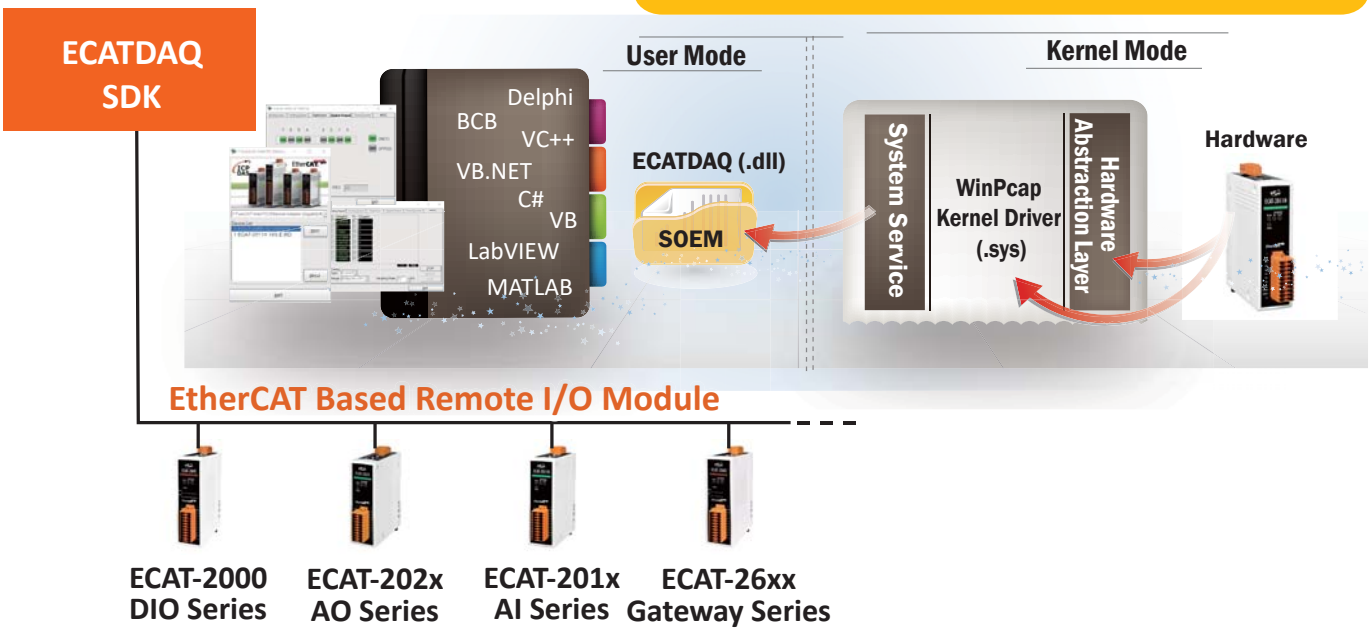
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9.4 ECATDAQ Lightweight EtherCAT Master Library

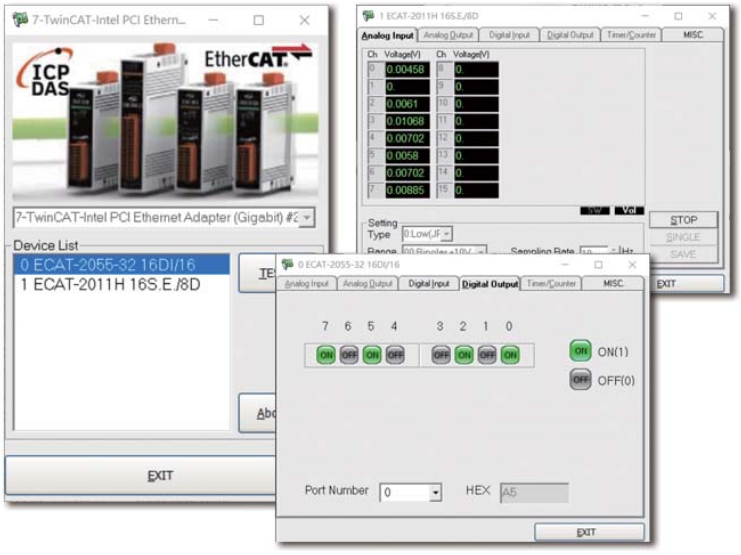
ECATDAQ is a library (DLL function) for developing EtherCAT Master control programs on XP-9K-IoT (Win10-based) programmable automation controllers or PCs. It reduces the complexity of programming EtherCAT Master and thus helps users quickly develop applications for connecting and controlling ECAT-2000 I/O and motion control modules.



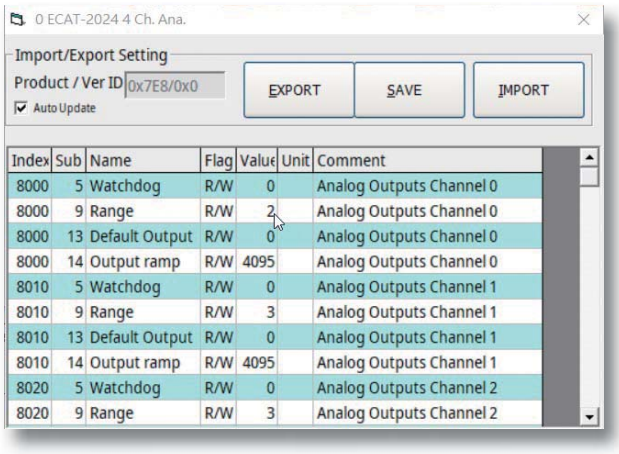
- Can use General network port (EtherCAT master card not required)
- Provides Windows API functions, which can be used in Windows system.
- ESI files are not required
- VC/VB6/C# Example Programs
- Supports ICP DAS slaves (third-party slaves are not supported).
- Lightweight EtherCAT applications
- Supports Free-Run mode
- Control cycle 20ms
- 8-axis (single-axis linear interpolation)
- Slave Stations: 20



▲AXP/XP-9000 or general PCs can develop relevant ECAT-2000 applications through the ECATDAQ library.



▲iECAT Utility ICP DAS EtherCAT Module Validation and Debug Tool



Index	Sub	Name	Flag	Value	Unit	Comment
8000	5	Watchdog	R/W	0		Analog Outputs Channel 0
8000	9	Range	R/W	2		Analog Outputs Channel 0
8000	13	Default Output	R/W	0		Analog Outputs Channel 0
8000	14	Output ramp	R/W	4095		Analog Outputs Channel 0
8010	5	Watchdog	R/W	0		Analog Outputs Channel 1
8010	9	Range	R/W	3		Analog Outputs Channel 1
8010	13	Default Output	R/W	0		Analog Outputs Channel 1
8010	14	Output ramp	R/W	4095		Analog Outputs Channel 1
8020	5	Watchdog	R/W	0		Analog Outputs Channel 2
8020	9	Range	R/W	3		Analog Outputs Channel 2

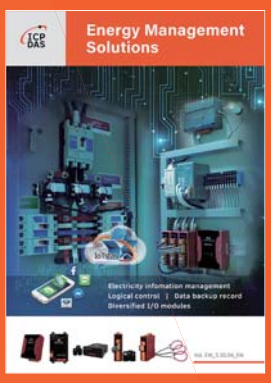
▲Export/Import Module Settings

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IIoT Products

- IIoT Software and Hardware
- Security Identifi cation and Monitoring System
- Environmental Monitoring
- Factory Automation
- Energy Management Soluti
- Vibration Measurement Solution



Energy Management Solution

- Introduction and features
- Applications
- InduSoft
- Power Meter Concentrator
- Smart Power Meter
- True RMS Input Module Voltage Attenuator and
- Current Transformer
- iWSN Solution
- Portable Power Monitoring Suitcase



Intelligent IIoT Edge Controller & I/O Module

- WISE IIoT Edge Controller & I/O Module
- Cloud Management
- Applications
- Product Specifi cation
- Intelligent Surveillance Solution



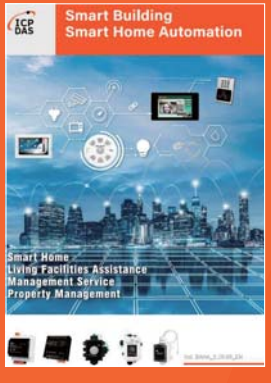
Wireless Solution

- Built-in OPC UA Server Service
- Built-in MQTT Broker Service
- Support Logic Control IFTTT
- Support IoT Cloud Platforms
- Connection and IoTstar Cloud Management
- IIoT Factory Application of MES
- Pumping Station IoT Application
- BA Smart Building IoT Application
- Robotic Arm Co-operation Application



Machine Automation Motion Total Solutions

- PC-Based Remote Motion Solutions
- PC-Based Motion Control Cards
- PAC Solutions
- Accessories



Smart Building, Smart Home Automation

- Video Intercom & Access Control
- Touch HMI - TouchPAD Series
- Smart Lighting Control
- Energy Saving - PM/PMC Series
- Environmental - DL/CL Series
- Motion Detector - PIR Series
- Wi-Fi Wireless - WF Series
- Infrared Wireless - IR Series
- ZigBee Wireless - ZT Series
- IIoT Server & Concentrator
- LED Display - iKAN Series



Touch HMI Solutions - TouchPAD

- Introduction
- Products
- Remote I/O Modules
- Applications



Full Product Catalog

- PAC Products and BoxPC
- Panel Products
- Remote I/O Module and Unit
- IIoT
- Industrial Communication
- Wireless Solution
- Machine Automation
- Energy Management Solution
- DAQ Card
- Accessories

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