

# Palm-size PACs

High Reliability, PC-Compatibility, RoHS Compliance

$\mu$  PAC -7186 series  
i-7188 series

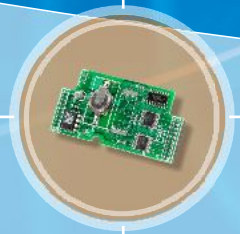
Programmable  
Automation  
Controllers

**RS-485 Serial PAC** with Ethernet  
**ISaGRAF SoftLogic PAC** with Ethernet  
**CAN bus PAC** with Ethernet  
**FRnet PAC** with Ethernet

**Diversified memory selection**  
SRAM, Flash, NAND Flash, FRAM, Micro SD

**Expansion Solutions**  
Expansion Board: X-board series  
Expansion Unit: RU-87Pn series

- Building/Factory Automation
- ITS ■ Remote Monitoring
- Environment Monitoring



[www.icpdas.com](http://www.icpdas.com)





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# 1



## OVERVIEW

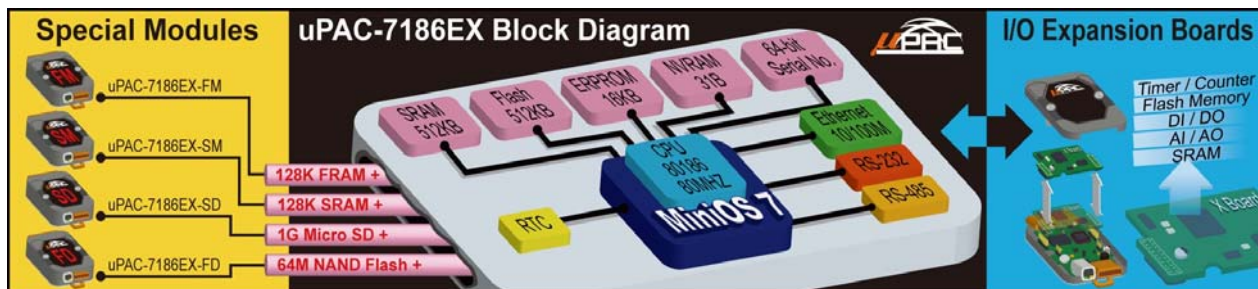
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# μPAC-7186 & i-7188 series Palm-size Programmable Automation Controller



## Top 12 reasons to choose an ICP DAS palm-size PAC

### Introduction

#### The μPAC-7186 & i-7188 series:

- Industrial level palm-size PAC
- Embedded system
- High reliability, reasonable price
- PC-compatibility
- RoHS & WEEE compliance
- Can be integrated into an OEM product as a processor core component

#### Advantages:

- Truly RoHS & WEEE compliance
- Reduce designing time
- Reduce market introduction effort
- Cut development costs
- Minimize technical risks
- Deliver more reliable products

#### 1<sup>st</sup>-generation PAC: i-7188 Series

- i-7188, i-7188XA, i-7188XB, i-7188XC, i-7188XBD-CAN
- i-7188EX, i-7188EA
- i-7188EG, i-7188XG

#### 2<sup>nd</sup>-generation PAC: μPAC-7186 Series

- μPAC-7186EX
- μPAC-7186EX-SM, μPAC-7186EX-FM
- μPAC-7186EX-SD, μPAC-7186EX-FD
- μPAC-7186EXD-CAN
- μPAC-7186EG, μPAC-7186XG
- μPAC-7186XB
- μPAC-7186XB-SM, μPAC-7186XB-FM
- μPAC-7186XB-SD, μPAC-7186XB-FD

#### The major differences between two generation palm-size PACs:

- CPU speed
- Memory combination
- Communication ports
- Digital Input / Output port
- User defined I/O Pins

### 1 Special embedded MiniOS7 -- Antivirus

- DOS-like embedded OS
- Antivirus ability
- With Internet-enabled connectivity
- Provide a mini BIOS
- Provide many equivalent functions of ROM-DOS
- Provide libraries & demo programs for various peripherals, devices and remote I/O modules



#### Compared to ROM-DOS, MiniOS7 is:

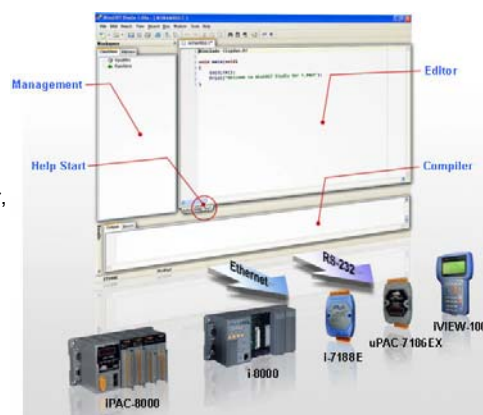
- Shorter booting period
- Smaller memory size
- Faster watchdog response time
- Better efficiency

ICP DAS has developed MiniOS7 for more than 10 years. Up to now, we have delivered about hundred thousand copies with our PACs.

### 2 Free / Easy software -- MiniOS7 Studio

The MiniOS7 studio is a powerful & easy using Software Development Toolkit for PACs with MiniOS7.

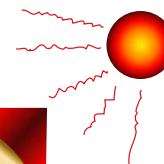
**Included:** Program editor, compiler, linker, I/O setting, communication configuration, utilities, libraries and networking example code...etc.



### 3 Good in harsh environment

All ICP DAS PACs can operate in wide temperature & humidity range, provide high reliability.

- Operating Temperature: -25°C to +75°C
- Storage Temperature: -40°C to +80°C
- Humidity: 5% to 95%, non-condensing





### 4 Built-in WDT -- Watchdog Timer

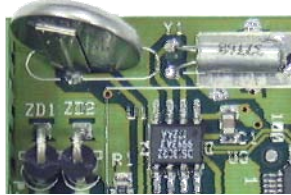
When I-7188 or μPAC-7186 is power-up, the watchdog timer can be enabled. The watchdog timer reset the controller after a short period (about 0.8 seconds) when the running software fails to reset the watchdog.

### 5 Efficient Self-Tuner Chip

The Self-Tuner chip can auto-detect and control the send / receive direction of RS-485 network to improve the RS-485 communication efficiency and relief the loading of software program.

### 6 Built-in RTC -- Real Time Clock

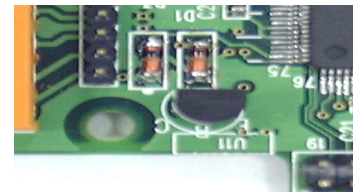
- Give second, minute, hour, date of week, date of month, month & year (1980 to 2079)
- Operate from the main supply
- With on-board battery to power itself
- Valid up to 10 years
- Accurate real time/date while the main power is absent
- Can be used for intermittent power-up with a switching power supply



### 7 64-bit hardware unique serial number protecting your program

All the μPAC-7186 series and most of the i-7188 series equip a 64-bit unique hardware serial number.

Because each hardware serial number is unique, the user can use this chip to protect his application programs.



### 8 Clear 5-digit 7-segment LED Display

The 5-digit 7-segment LED Display is equipped with all Display models, such as i-7188EXD, μPAC-7186XBD...

- Display value
- Display message



### 9 Rich software support

**Programming support:**

- QuickBasic
- MSC
- TC
- MSVC++
- BC++

**Software packages/tools support:**

- ISaGRAF
- Artsoft
- MatLab
- Goodhelp

The operating software can be downloaded from PC to μPAC. Over 100 demo programs are provided.

### 10 Diversified memory selection

**• Memory Configuration:**

Memory	Size	Description
Flash	512K	64KB are reserved for O.S. image. 448KB or more are free for program & data. With write protection & limitation.
SRAM	512K or 640K	512Kbytes is totally free for user. 640Kbytes for μPAC-7186EX -SM, μPAC-7186XB -SM
NVRAM	31B	No write limitation
EEPROM	2K or 16K	1KB is reserved for system. The rest is free for user to store small amounts of non-volatile data. With write protection & limitation.
NAND Flash	64M	For μPAC-7186EX -FD, μPAC-7186XB -FD
FRAM	128K	For μPAC-7186EX -FM, μPAC-7186XB -FM
Micro SD	1G	For μPAC-7186EX -SD, μPAC-7186XB -SD

\* Different models have different size SRAM, FRAM or NAND Flash ... memories. Please refer to the Selection Guide.

**• Expansion memory board (Optional):**

- Flash memory Board



- Battery-backup SRAM Board



**• Memory writing protection & limitation:**

The writing limitation protects EEPROM and Flash memories from the frequently changes of data logging. NVRAM doesn't have write limitation. It is the best choice for temporary data storage, even when power is lost or the system is crashed.



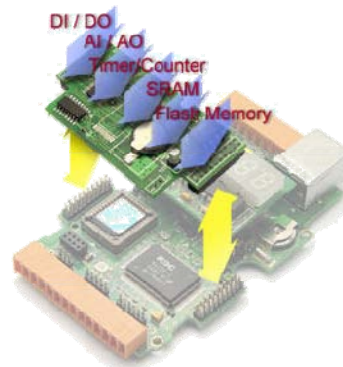
## 11 Extendable local I/Os & hardware functions

Most of the μPAC-7186 and i-7188 series containing an "X" in the model number support an expansion bus. An X-board can be plugged on the Bus to extend I/Os and other hardware functions.

- D/I
- D/O
- A/D
- D/A
- Timer/Counter
- Communications
- Flash memory
- Battery backed SRAM
- Self-test
- Motion control

Various standard X-Boards are available. ICPDAS also provides ODM service. Make your own X-Board is easy according to the detailed explanation that ICPDAS provides.

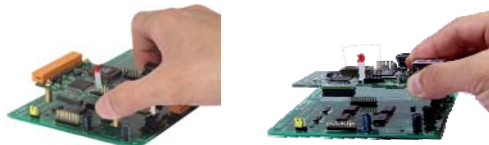
Form-factors of Plug an X-board into a palm-size PAC or Mount a controller on a larger X-Board are flexible for different applications.



- Plug-in an X-board to a palm-size PAC

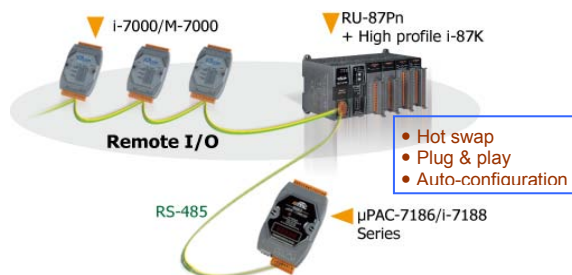


- Mount a controller on a larger X-board

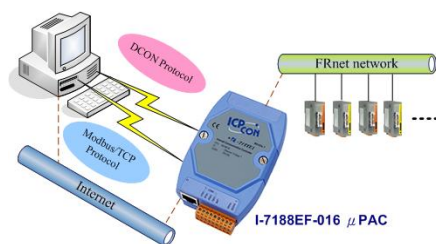


## 12 Multiple remote I/O expansion

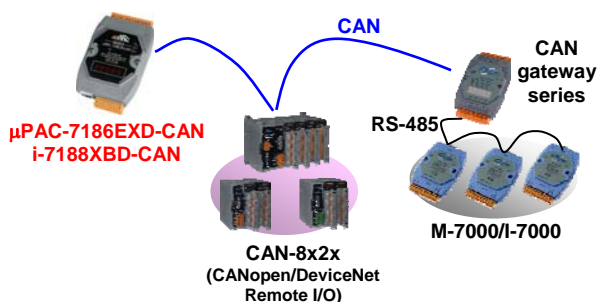
- Connect to remote I/O module & unit



- Connect to FRnet remote I/O



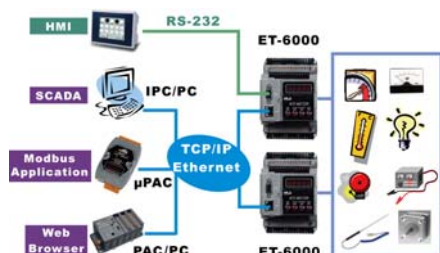
- Connect to CAN bus remote I/O



- Connect to PROFIBUS remote I/O



- Connect to Ethernet I/O (ET-6000)

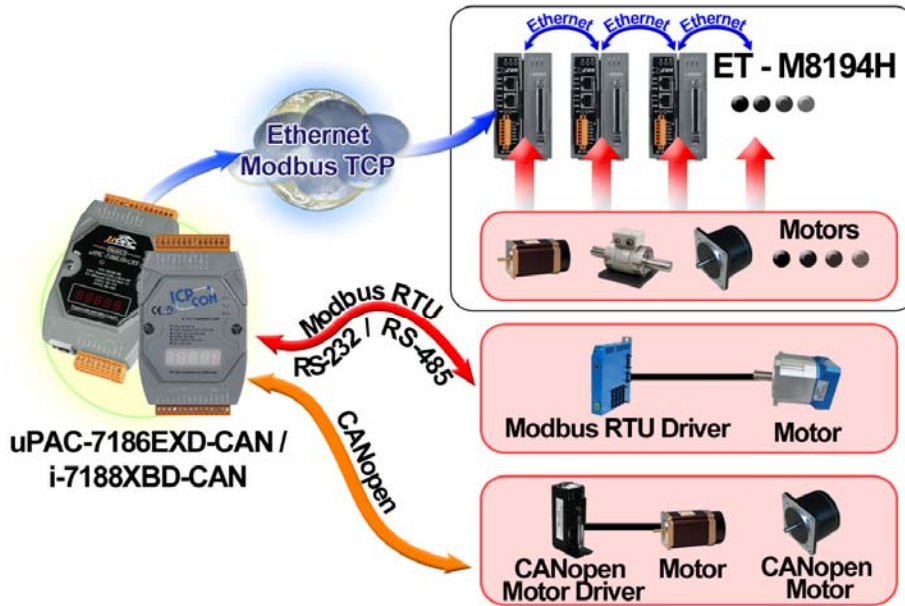


- Connect to Ethernet I/O (ET-7000)

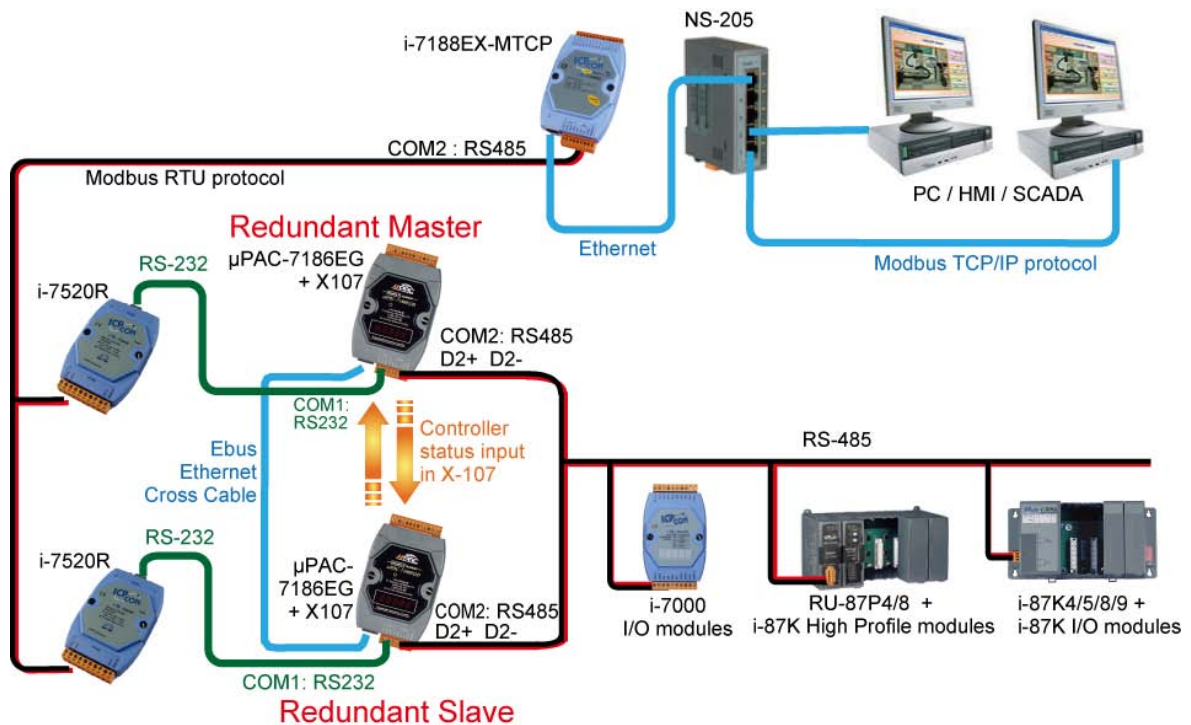


## Applications

- Building Automation
- Factory Automation
- Ship Automation
- Energy Saving
- Remote Maintenance
- Distributed Control System
- **Machine Automation**
- Remote Diagnosis
- Distributed Control Transportation System
- Waste Water Monitor System.
- Semiconductor Equipment Monitor System
- LCD & LED Testing System



### ● Cost Effective Redundant System





## Hardware Information

### General features

- Truly RoHS & WEEE compliant
- 80188-40 CPU: i-7188 series
- 80186-80 CPU: μPAC-7186 series
- Built-in EEPROM
- COM driver support interrupt & 1K QUEUE input buffer
- Built-in watchdog timer for harsh environment
- Built-in power protection circuit
- Built-in RS-485 network protection circuit
- Program download from PC
- BIOS support RTC time & date
- MiniOS7 & ROM DOS support RTC time & date
- Industrial level - special for the harsh environment application

### Common Specifications

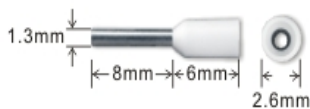
- Communication speed ( bps): 115,200 max.
- EEPROM  
2K bytes : i-7188 series  
16K bytes : μPAC-7186 series
- Accessories: One download cable, one mini screw driver
- Operating Temp.: -25°C to +75°C
- Storage Temp. : -40°C to +80°C
- Power requirement:  
Unregulated 10~30 VDC with protection from power reversals
- Power consumption:  
1.5W for μPAC-7186 series  
2.5W for μPAC-7186 Display series  
2.0W for i-7188 series  
3.0W for i-7188 Display series

### Packing List



## Easy installation

- **Pin terminal:** CE005008 (Red)  
CE007508 (White), CE010008 (Yellow)



Wire Range: 0.5mm/2.2AWG

- **DIN-Railing Mounting & Piggyback Kit Module:** DRS-125/240/360



## Optional Products

- **Power Supply:** KA-52F
- **Wiring Terminal tool:** TLA-2026W
- **IP 66 Industrial Enclosure:** i-3625-ENC



- **Battery Pack:** BP-3400



### Features

- External Battery Pack
- Power on LED & Battery Capacity Indicator
- Multi-Protection: Over Charge, Over Discharge, Over Current, Over Temperature, Short Circuit Protection.

### Specifications

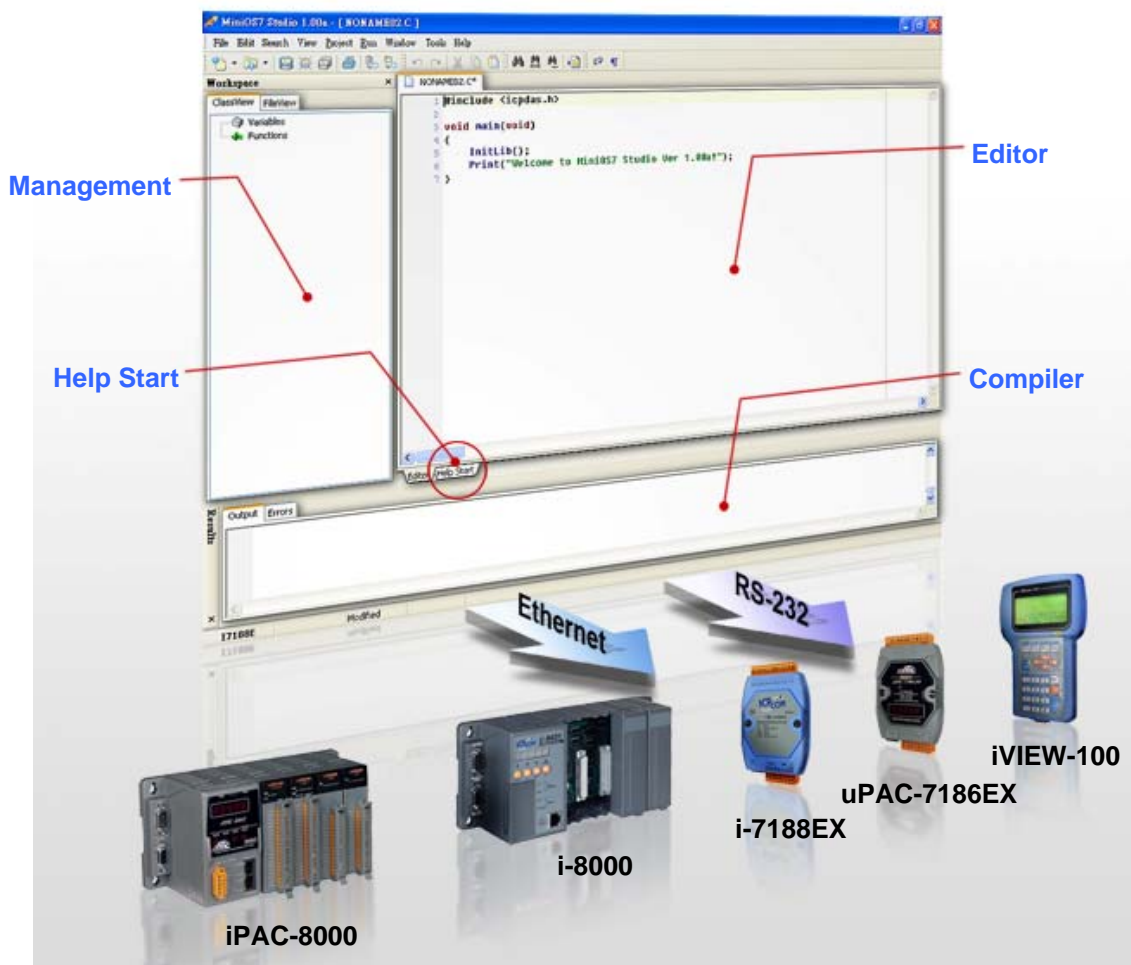
Battery Type : Li-Polymer  
 Battery Capacity : 3450 mAh  
 Output Voltage : DC 12V  
 Output Current : Max 3.5A  
 Input : 19V/3.16A AC adapter  
 Charge Time : Within 4 hours  
 Weight : 450 g  
 Dimensions: 174 x 84 x 23 mm

## Software Environment

### MiniOS7 Studio

ICP DAS's MiniOS7 has been highly praised by the market for its stability, compactness, efficiency and cost-effectiveness applied in PACs (Programmable Automation Controller). Now we release a totally new and cool tool for you to create your own particular applications easily and quickly.

The IDEs of MiniOS7 Studio provides comprehensive set of features, including customizable editor, integral debugging guide, online demo programs support, full source code analyzer, projects manager...etc. to enable you to develop various applications easily and quickly.



#### Features of MiniOS7 Studio:

1. Integrated platform for developing applications.
2. Flexible and customizable plug-ins for rich and easy operating.
3. Full integration with MiniOS7 Utility, making functional coding, compiling, uploading and executing simultaneously.
4. Multi languages compatible.
5. Several C compilers supported.
6. Syntax highlighting supported for easily programming by C, C++ languages.
7. File view and class view supported with listing files, variables and functions in an orderly way to make source code maintenance easy.
8. Web browser embedded to offer most practical solution of enterprise connectivity via the Internet
9. Projects manager offered to easily manage huge projects.
10. Full libraries included to support adaptation of varied controllers.

## Software Environment

### ISaGRAF

ISaGRAF is the most powerful SoftLogic package on the market. ISaGRAF is a PLC-like software running on Windows 95/ 98/ NT/ 2000/ XP. It supports IEC61131-3 standard PLC programming languages - Quick Ladder (LD), Function Block Diagram (FBD), Sequential Function Chart (SFC), Structured Text (ST), Instruction List (IL) plus Flow Chart (FC) and the program can run the application generated by the workbench on any ISaGRAF PACs.

Additionally, for the ultimate in power and flexibility, ISaGRAF supports off-line simulation, on-line debugging, monitoring and control.



#### Features:

**(1) A single design environment :**

ISaGRAF provides a single design environment - ISaGRAF workbench, which can be installed in windows 95, 98, 2000, XP, users can fully use the workbench to design [ISaGRAF PACs](#) which in different types or different platforms, Ex. ICPDAS PACs: I-8XX7, I-7188EG/XG, W-8X47, μPAC-7186EG. That is mean users just need to learn the single software, can run the application in different controller.

**(2) Provide six PLC syntax :**

ISaGRAF is the software that supports five of IEC61131-3 PLC Language, including Sequential Function Chart (SFC) 、 Quick Ladder Diagram (LD) 、 Function Block Diagram (FBD) 、 Structured Text (ST) and Instruction List (IL) five language, it also supports sixth PLC language - Flow Chart (FC) . This flexibility enables users to choose the language that best suits their knowledge, style and the nature of the application.

**(3) Easily integrate to the HMI software and MMI :**

ISaGRAF supports Modbus communication protocol, the user designed application can be easily connected to the various types of HMI software and MMI.



# Transportation Systems

## Distributed Control Intelligent Transportation System (ITS)

ICP DAS integrating μPACs and distributed modules offers the most intelligent solutions in long-distance transportation systems. The μPACs (as the local server) and I/O modules (as the data collectors) perform a distributed control system. All data's collection and conversion are more efficient and flexible through Ethernet or other network. In long distant and large ambit situation, the structure could be expanded to several local systems that can reduce the load of the central computer and improve the system stability.

The applications in ITS can be segmented into three frameworks:

- - - - Traffic Management System
- - - - Road Environment monitoring System
- - - - Tunnel Environment monitoring System

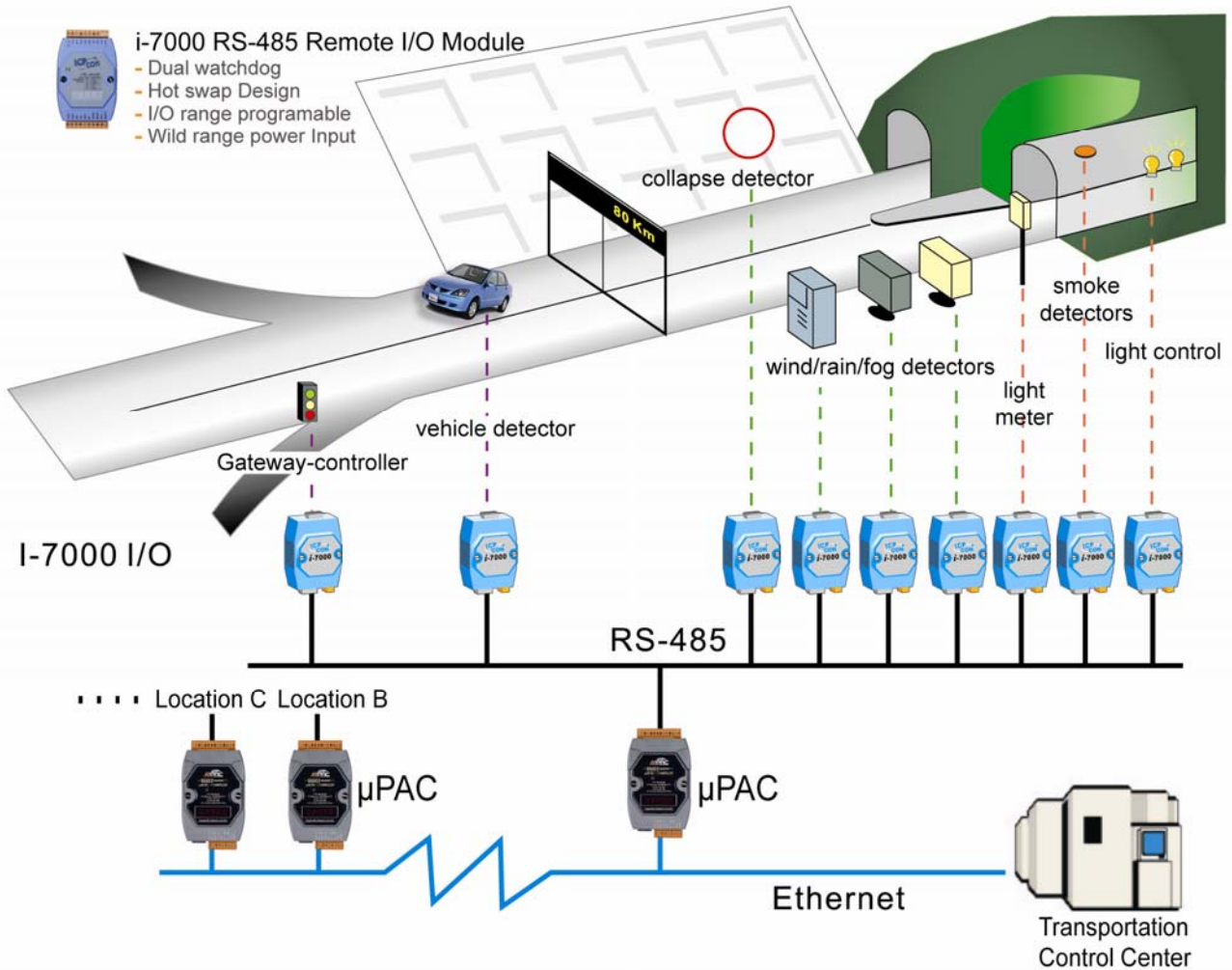
### Products Suggestions



- μPAC-7186EXD Ethernet μPAC**
- 80186-80M CPU
  - 10/100Base-T Ethernet
  - RS-485 / RS-232



- i-7000 RS-485 Remote I/O Module**
- Dual watchdog
  - Hot swap Design
  - I/O range programmable
  - Wild range power Input



# Building Automation

## Building Automation System (BAS)

ICP DAS integrating PACs (μPAC, iPAC, WinPAC...) and distributed I/O modules offers several BA solutions :

- Building Electric Device automation - light control, temperature control ...
- Access & Security Control - door / window security, card reader control ...
- surveillances system
- Video monitor/record automation

### The solutions have been applied to :

- ▶ Department Stores
- ▶ Residential Building / Community
- ▶ Enterprise and branches
- ▶ University campus

### More application areas :

- ▶ Air-condition & Energy Auditing System
- ▶ Emergency Interlock Control & Broadcast System
- ▶ Parking lot Automation System
- ▶ Public Information Inquiry & Subscription System

### Products Suggestions



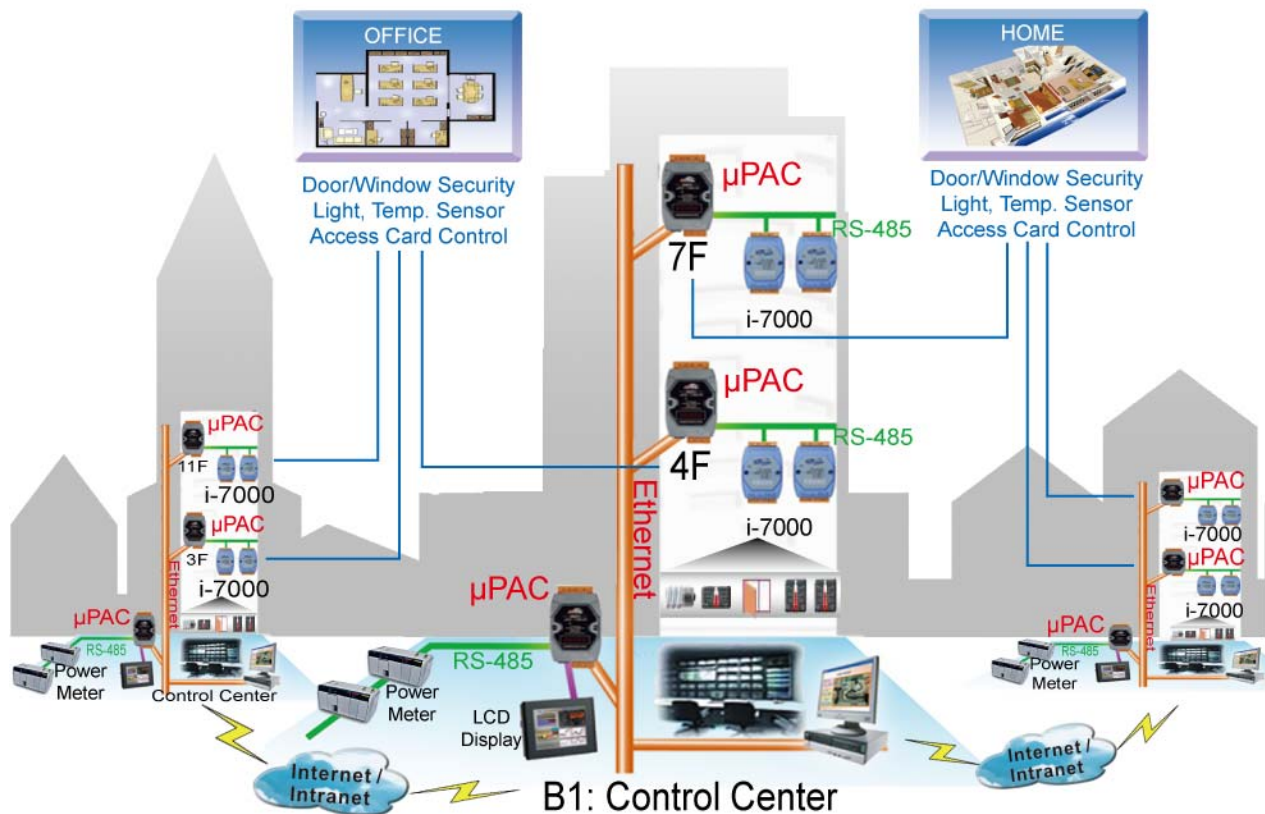
**μPAC-7186 Ethernet μPAC**

- 80186-80M CPU
- 10/100Base-T Ethernet
- RS-485 / RS-232



**i-7000 RS-485 Remote I/O Module**

- Dual watchdog
- Hot swap Design
- I/O range programmable
- Wild range power Input



# 2



## Selection Guide for Palm-size PACs

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# Palm-size PACs Selection Guide

▶ Available soon



Generation		2 <sup>nd</sup> generation : 7186					
Category		7186E					
Series		NEW μPAC-7186EX					
Model Name		μPAC-7186 EX	μPAC-7186 EX-SM	μPAC-7186 EX-FM	μPAC-7186 EX-FD	μPAC-7186 EX-SD	μPAC-7186 EXD-CAN
System	CPU	80186 / 80M					
	OS	MiniOS7					
	SRAM	512K	640K	512K	512K	512K	512K
	Flash Memory	512K					
	FRAM	--	--	128K	--	--	--
	NAND Flash	--	--	--	640K	--	--
	Micro SD	--	--	--	--	1G	--
	EEPROM	16K					
	NVRAM	31Bytes					
	RTC	Yes					
	64-bit Serial Number	Yes					
	Watchdog Timer	Yes					
Communication Interface	Ethernet port	10/100M, 10/100 Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)					
	COM1	RS-232, Non-isolation					
	COM2	RS-485, self-turner ASIC inside, Non-isolation					
	COM3	--					
	COM4	--					
	CAN bus port	--					CAN bus
	Max. Comm. Speed	115.2K bps max for all ports					
D/I/O	D/I channel (3.5V~30V)	0	0	0	0	0	0
	D/O channel(100mA, 30V)	0	0	0	0	0	0
Expansion	Support I/O Expansion board	1	1	1	1	1	0
	User Defined I/O Pins	14	14	14	14	14	0
Programming	Program download port	COM1 or Ethernet					
	Programming language	TC / TC++ / MSC / BC / MSVC					
	System RED LED	Yes, 1					
LED	program LED	--					3
	5-dig 7-seg LED Display	uPAC-7186 EXD	uPAC-7186 EXD-SM	uPAC-7186 EXD-FM	uPAC-7186 EXD-FD	uPAC-7186 EXD-SD	uPAC-7186 EXD-CAN
Power	Required supply Voltage (VDC)	+10~+30 (non-regulated)					
	Power consumption	1.5 W for EX Model 2.5 W for EXD Model					3.0 W
RoHS		Truly RoHS compliance					
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## Palm-size PACs Selection Guide

► Available soon



Generation		2 <sup>nd</sup> generation : 7186				
Category		7186X				
Series		► μPAC-7186XB				
Model Name		μPAC-7186 XB	μPAC-7186 XB-SM	μPAC-7186 XB-FM	μPAC-7186 XB-FD	μPAC-7186 XB-SD
System	CPU	80186 / 80M				
	OS	MiniOS7				
	SRAM	512K	640K	512K	512K	512K
	Flash Memory	512K				
	FRAM	--	--	128K	--	--
	NAND Flash	--	--	--	640K	--
	Micro SD	--	--	--	--	1G
	EEPROM	16K				
	NVRAM	31Bytes				
	RTC	Yes				
	64-bit Serial Number	Yes				
	Watchdog Timer	Yes				
Communication Interface	Ethernet port	--				
	COM1	RS-232, Non-isolation RS-485, self-tuner ASIC inside, Non-isolation				
	COM2	RS-485, self-tuner ASIC inside, Non-isolation				
	COM3	--				
	COM4	--				
	CAN bus port	--				
	Max. Comm. Speed	115.2K bps max for all ports				
D/I/O	D/I channel (3.5V~30V)	1	1	1	1	1
	D/O channel(100mA, 30V)	1	1	1	1	1
Expansion	Support I/O Expansion board	1	1	1	1	1
	User Defined I/O Pins	14	14	14	14	14
Programming	Program download port	COM1				
	Programming language	TC / TC++ / MSC / BC / MSVC				
LED	System RED LED	Yes, 1				
	Program LED	--				
	5-dig 7-seg LED Display	uPAC-7186 XBD	uPAC-7186 XBD-FM	uPAC-7186 XBD-FM	uPAC-7186 XBD-FD	uPAC-7186 XBD-SD
Power	Required supply Voltage (VDC)	+10~+30 (non-regulated)				
	Power consumption	1.5 W for XB Model 2.5 W for XBD Model				
RoHS		Truly RoHS compliance				
Page		3-3-2				

# Palm-size PACs Selection Guide

► Available soon



Generation		1 <sup>st</sup> Generation : 7188							
Category		7188E			7188X				
Series		i-7188E			i-7188X				
Model Name		i-7188 EX	i-7188 EA	i-7188 EF-016	i-7188	i-7188 XA	i-7188 XB	i-7188 XB-CAN	i-7188 XC
System	CPU	80188 / 40M			80188 / 40M				80188/20M
	OS	MiniOS7							
	SRAM	512K			256K	512K	512K	512K	128K
	Flash Memory	512K			512K				
	FRAM	--			--				
	NAND Flash	--			--				
	Micro SD	--			--				
	EEPROM	2K			2K				
	NVRAM	31Bytes			31Bytes				
	RTC	Yes			Yes				No
	64-bit Serial Number	Yes			No	Yes			No
	Watchdog Timer	Yes			Yes				
Communication Interface	Ethernet port	10M / 10 Base-T			--				
	COM1	RS-232, Non-isolation			RS-232 (i-7188 & i-7188XA with modem control) RS-485 (internal self-tuner, except i-7188 with JP1)				
	COM2	RS-485 self-tuner ASIC, non-isolate			RS-485	RS-485 self-tuner, i-7188XA(D) with isolation			
	COM3	--			RS-232	RS-232	--		
	COM4	--			RS-232	RS-232	--		
	CAN bus / FRnet port	--		FRnet	--			CAN bus	--
	Max. Comm. Speed	115.2K bps max for all ports							
D/I/O	D/I channel (3.5V~30V)	0	6	0	0	2	1	1	2
	D/O channel(100mA, 30V)	0	7	0	0	2	1	1	3
Expansion	Support I/O Expansion board	1	0	1	0	1	1	0	1
	User Defined I/O Pins	14	0	14	0	0	14	0	3
Programming	Program download port	COM1 / Ethernet			COM4	COM4	COM1	COM1	COM1
	Programming language	TC / TC++ / MSC / BC / MSVC							
LED	System RED LED	Yes, 1							
	Program LED	--						3	--
	5-dig 7-seg LED Display	i-7188 EXD	i-7188 EAD	i-7188 EFD-016	i-7188D	i-7188 XAD	i-7188 XBD	i-7188 XBD-CAN	i-7188 XCD
Power	Required supply Voltage VDC	+10~+30 (non-regulated)							
	Power consumption	2.0 W for non-display models 3.0 W for with display models							
RoHS		Truly RoHS compliance							
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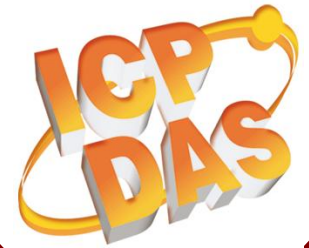
# SoftLogic Palm-size PACs Selection Guide

► Available soon



Generation		2 <sup>nd</sup> generation		1 <sup>st</sup> generation	
Category		ISaGRAF 7186		ISaGRAF 7188	
Series		μPAC-7186E	μPAC-7186X	i-7188E	i-7188X
Model Name		μPAC-7186EG	μPAC-7186XG	i-7188EG	i-7188XG
System	CPU	80186 / 80M		80188 / 40M	
	OS	MiniOS7 with ISaGRAF SoftLogic inside			
	SRAM	640K		512K	
	Flash Memory	512K			
	FRAM	--			
	NAND Flash	--			
	Micro SD	--			
	EEPROM	16K		2K	
	NVRAM	31 bytes			
	RTC	Yes			
	64-bit Serial Number	Yes			
Watchdog Timer	Yes, default 0.8 second				
Communication Interface	Ethernet port	10/100 Base-TX	--	10 Base-T	--
	COM1	RS-232	RS-232 RS-485	RS-232	RS-232 RS-485
	COM2	RS-485, self-turner ASIC inside			
	COM3	--			
	COM4	--			
	CAN bus port	--			
	Max. Comm. Speed	115.2K bps max for all ports			
D/I/O	D/I channel (3.5V~30V)	0	1	0	1
	D/O channel(100mA, 30V)	0	1	0	1
Expansion	Support I/O Expansion board	1	1	1	1
	User Defined I/O Pins	14 (10~23)	14 (15~28)	14 (10~23)	14 (15~28)
Programming	Program download port	COM1 / Ethernet	COM1	COM1 / Ethernet	COM1
	Programming language	ISaGRAF Development Software			
LED	System RED LED	Yes			
	Program LED	--			
	5-dig 7-seg LED Display	μPAC-7186EGD	μPAC-7186XGD	i-7188EGD	i-7188XGD
Power	Required supply Voltage (VDC)	+10~+30 (non-regulated)			
	Power consumption	1.5 W for non-display models 2.5 W for with display models		2.0 W for non-display models 3.0 W for with display models	
RoHS		Truly RoHS compliance			
Page		3-2-6	3-2-10	3-5-4	3-5-6

# 3



## Palm-size Programmable Automation Controllers *μPAC : μPAC-7186 & i-7188 Series*

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# μPAC-7186EX Series

## New Ethernet PAC

The μPAC-7186EX series is our new generation palm-size PAC with 80186-80 MHz high speed CPU and 10/100M base-TX high speed Ethernet port. Compared to the first generation product i-7188EX, μPAC-7186EX is 2 to 4 times faster than before!

## Common Features:

- MiniOS7 inside
- CPU : 80186-80 MHz
- SRAM : 512K Bytes or up
- Flash : 512K Bytes
- EEPROM : 16K Bytes
- NVRAM : 31 Bytes
- Real Time Clock
- 64-bit Serial number
- I/O expandable
- Power / communication indicator LED
- EXD model with 5-dig 7-segment LED
- Ethernet port : 10/100M Base-TX
- RS-232 port
- RS-485 port
- RoHS & WEEE Compliance
- Frame Ground
- Initiate Switch



## Special Models:

- μPAC-7186EX-SM CR : with **640K SRAM**
- μPAC-7186EX-FM CR : with **128K FRAM**
- μPAC-7186EX-FD CR : with **64M NAND FLASH**
- μPAC-7186EX-SD CR : with **1G MICRO SD**
- μPAC-7186EXD-CAN CR: with **CAN bus**

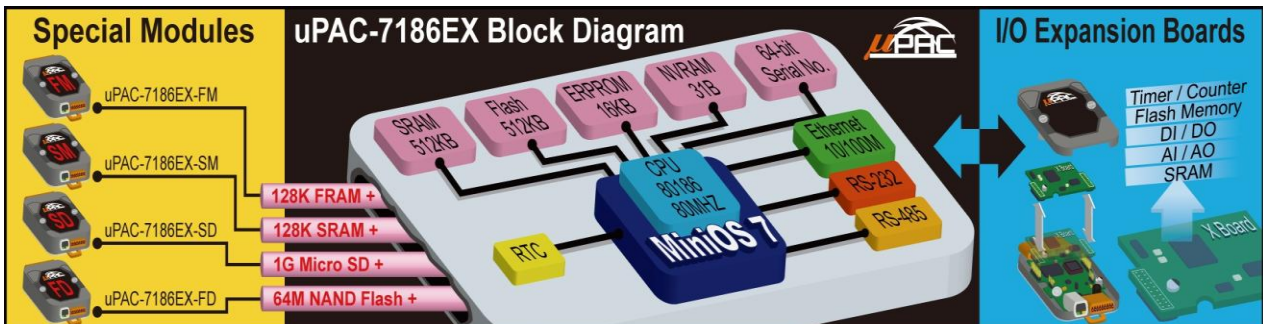
## Comparison

PACs	μPAC-7186EX Series	v.s.	I-7188E Series
CPU	80186 80MHz	★	80188 40MHz
EEPROM	16K	★	2K
Ethernet Port	10/100M Base-TX	★	10M Base-T
	Auto-negotiating Auto_MDIX LED indicator	★	--
Normal running Speed	2 ~ 25ms, 4 times faster	★	5 ~ 100ms
Power consumption	1.5W for EX 2.5W for EXD	★	2.0W for EX 3.0W for EXD



## $\mu$ PAC-7186EX Series Selection Guide

Ethernet $\mu$ PACs	$\mu$ PAC-7186EX / 7186EXD	$\mu$ PAC-7186EX-SM / 7186EXD-SM	$\mu$ PAC-7186EX-FM / 7186EXD-FM	$\mu$ PAC-7186EX-FD / 7186EXD-FD	$\mu$ PAC-7186EX-SD / 7186EXD-SD	$\mu$ PAC-7186EXD-CAN
<b>■ CPU Specification</b>						
CPU	80186-80MHz					
Flash	512K					
SRAM	512K	640K			512K	
FRAM	--	--	128K	--	--	--
NAND Flash	--	--	--	64M	--	--
Micro SD	--	--	--	--	1G	--
EEPROM	16K					
NVRAM	31 Bytes					
OS	MiniOS7					
RTC	Yes					
64-bit hardware serial number	Yes					
Watchdog Timer	Yes					
<b>■ Communication Interface</b>						
Ethernet Port	10/100 Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)					
COM1	RS-232 (TXD, RXD, RTS, CTS, GND), Non-isolation, Speed: 115200 bps max					
COM2	RS-485 (D2+, D2-), self-tuner ASIC inside; Non-isolation, Speed: 115200 bps max					
CAN bus	--					Yes Max. Speed 1.0M
<b>■ LED Display</b>						
System LED	Yes					
Program LED	--					3
5-digit 7-segment LED Display	EX Model : No / EXD model : Yes					
<b>■ Hardware Expansion</b>						
Expansion Bus	Yes					--
User defined I/O Pins	14 Pins					--
<b>■ Operating Environment</b>						
Operating Temperature	-25°C to +75°C					
Storage Temperature	-40°C to +80°C					
Humidity	5% to 90%, non-condensing					
<b>■ Power</b>						
Protection	Power reverse polarity protection					
Frame Ground	Yes (for ESD Protection)					
Required Supply Voltage	+10 to +30VDC (non-regulated)					
Power Consumption	1.5W for EX Model / 2.5W for EXD Model					3.0W
<b>■ Green Status</b>						
RoHS	RoHS Compliance 2002/95/EC					
WEEE	WEEE Compliance					
<b>■ Dimensions</b>						
	123 x 72 x 33 mm					
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## Top 12 reasons to choose the μPAC-7186EX Series :

### 1 High reliability in harsh environment

ICP DAS PACs can operate in wide temperature & humidity range, provide high reliability.

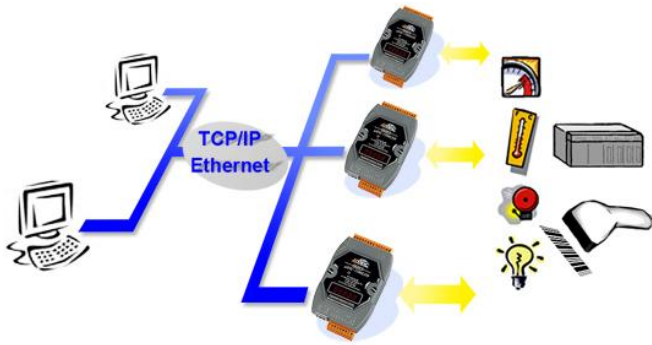
- Operating Temperature : -25°C ~ +75°C ( -13°F to +167°F)
- Storage Temperature : -40°C ~ +80°C ( -40°F to +176°F)
- Humidity : 5% ~ 90%, non-condensing

### 2 Embedded MiniOS7, anti-Virus

Built-in MiniOS7, developed by ICP DAS more than 10 years, have been successfully protecting PACs from virus more than 10 years.

### 3 Built-in watchdog timer (WDT)

The built-in watchdog timer will trigger a system reset if the main program fails.



### 4 Ethernet Protocols

The faster 10/100 Base-TX Ethernet port makes better Internet/Intranet networking. Support TCP, UDP, IP, ICMP, ARP protocols.

### 5 Modbus Protocols

Modbus/TCP/RTU/ASCII slave  
Modbus/TCP/RTU/ASCII master  
Gateway for Modbus/TCP to Modbus/RTU

### 6 FREE easy-to-use Software development toolkits for your applications

Our new MiniOS7 Studio software development toolkit offers full development package version, which can do the programming, compiling, linking, configuring and networking.

The MiniOS7 Studio includes utilities, libraries, example code, etc.

This free software is multi-function in one simple toolkit and still easy-to-use.

If the default firmware does not totally fulfill the user's application needs, custom firmware can be developed for μPAC-7186EX Series using the SDK (Xserver, Modbus library) provided by ICPDAS. (Using C language)

### MiniOS7 Studio





### 7 Expansion Bus Interface

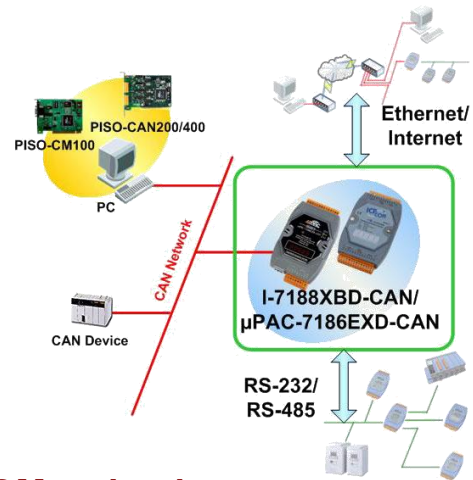
The built-in expansion bus supports one Expansion Board (X-Board). We provide tons of X-Boards to expand more I/Os, COMs, memory functions. Note: CAN  $\mu$ PACs do not have expansion bus.

### 8 Remote Configuration And Remote Maintenance

User can remote configure / maintain  $\mu$ PAC-7186EX series via the Ethernet (TCP/IP or UDP) or RS-232, such as downloading programs, configuration, updating the MiniOS7...

### 9 Web Configuration / Maintenance

Built-in a web server, using standard web browsers (such as IE, Netscape, Firefox,.. etc) can configure its Ethernet and COM ports configurations. (Such as programs download, module configuration, the MiniOS7 updating, etc.)

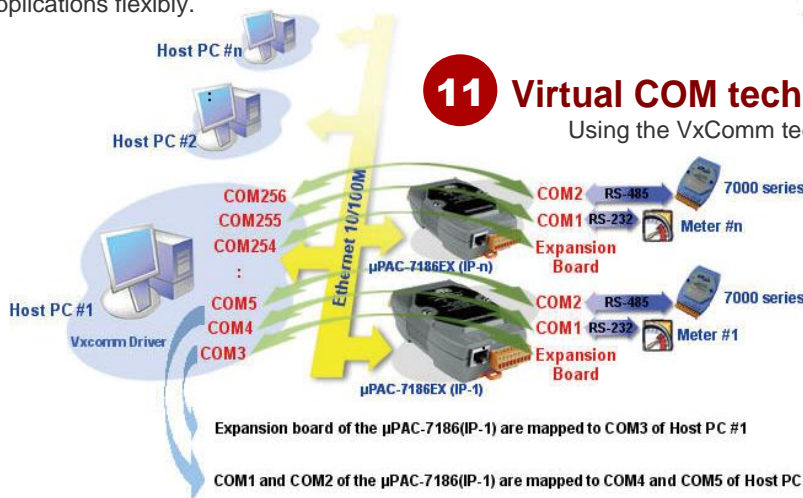


### 10 Support CAN bus application

CAN is a serial communication way, which efficiently supports distributed real-time control with a very high level of security.  $\mu$ PAC-7186EXD-CAN can help users to apply to various CAN applications flexibly.

### 11 Virtual COM technology

Using the VxComm technology, each PC can create up to 256 virtual COM ports to map the RS-232 / RS-485 of the  $\mu$ PAC-7186EX series (including real COM ports), each PC can control up to 256 COM ports. With X-Board, each  $\mu$ PAC can have up to 8 COM ports.



### 12 Diversified Memory Selection

Memory	Size	Memory Configuration & Description
Flash	512K	64KB are reserved for O.S. image. 448KB or more are free for program & data. With write protection & limitation. (*2)
SRAM	512K or 640K	512K/640K bytes is totally free for user. 640Kbytes for $\mu$ PAC-7186EX -SM, $\mu$ PAC-7186XB -SM
NVRAM	31B	No write limitation
EEPROM	16K	1KB is reserved for system. The rest is free for user to store small amounts of non-volatile data. With write protection & limitation. (*2)
NAND Flash	64M	For $\mu$ PAC-7186EX -FD, $\mu$ PAC-7186XB -FD
FRAM	128K	For $\mu$ PAC-7186EX -FM, $\mu$ PAC-7186XB -FM
Micro SD	1G	For $\mu$ PAC-7186EX -SD, $\mu$ PAC-7186XB -SD

\*1 Different models have different size SRAM, FRAM or NAND Flash ... memories. Please refer to the Selection Guide.

\*2 The Flash and EEPROM are with the memory writing protection and limitation functions to protect Flash & EEPROM from the frequently changes of data logging. NVRAM doesn't have write limitation. It is the better choice for temporary data storage, even when power is lost or the system is crashed.

# μPAC-7186EX / EXD

Faster Ethernet μPAC



### Main Features

- 80186 (80MHz) CPU, 512K Flash, 512K SRAM
- Ethernet 10/100M Base-TX, RS-232 / RS-485
- OS: MiniOS7
- Support I/O expansion bus
- Remote maintenance via the Ethernet
- Modbus protocol to SCADA  
Indusoft, DasyLab, Trace Mode, Citect, iFix...
- Easy use software development toolkits :  
MiniOS7 Studio, Xserver, VxComm, Modbus Libs.



### Comparison

New Advantages	μPAC-7186EX	i-7188EX
Faster normal running speed	2~4 times	1
More powerful CPU	80186-80MHz	80188-40MHz
Faster / powerful Ethernet	10/100 Base-TX	10 Base-T
More EEPROM	16K	2K

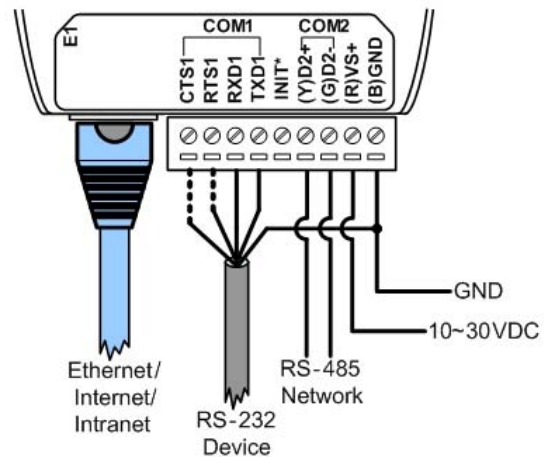
### Features

- High reliability in harsh environment (No. 1 of P.3-1-4)
- Embedded MiniOS7, anti-virus (No. 2 of P.3-1-4)
- Built-in watchdog timer (WDT) (No. 3 of P.3-1-4)
- Ethernet Protocols: TCP, UDP, IP, ICMP, ARP (No. 4 of P.3-1-4)
- Faster 10/100M Ethernet port (No. 4 of P.3-1-4)
- Modbus Protocols (No. 5 of P.3-1-4)
- Free easy-to-use software development toolkits for your applications (No. 6 of P.3-1-4)
- Expansion Bus Interface (No. 7 of P.3-1-5)
- Remote / web Configuration/Maintenance (No. 8, 9 of P.3-1-5)
- Support for Virtual COM technology (No. 11 of P.3-1-5)

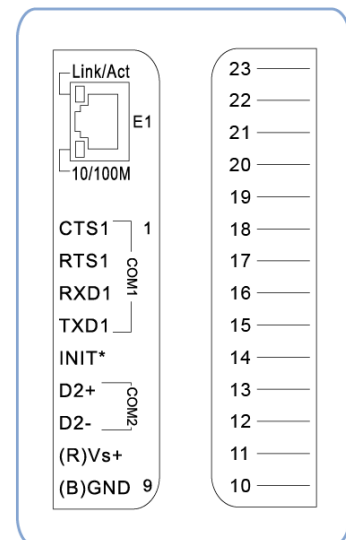
### Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

### Wiring



### Pin Assignments





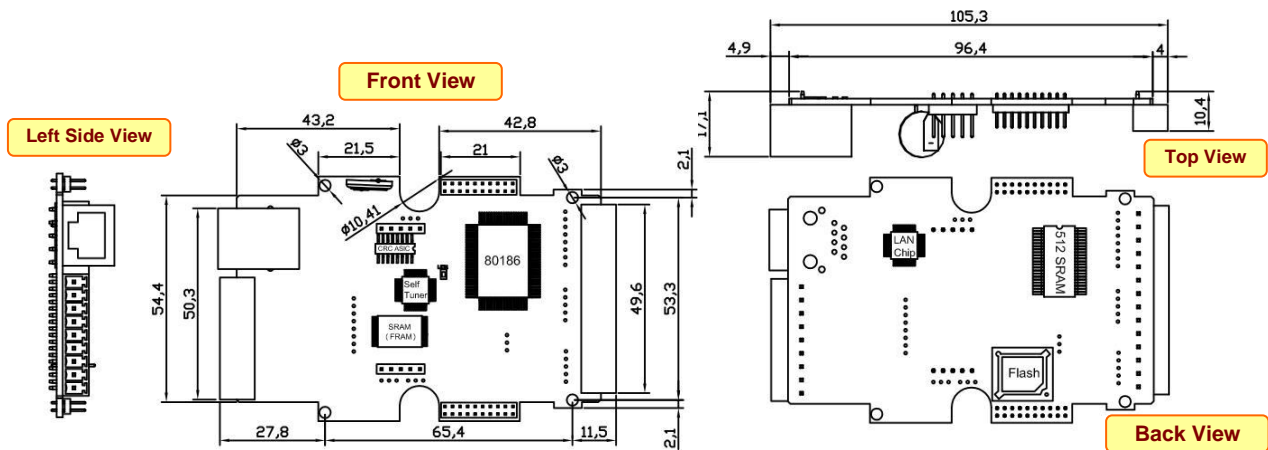
**Specifications**

Series : Palm-size PAC >  $\mu$ PAC-7186 > 86E > 86EX

PACs	$\mu$ PAC-7186EX	$\mu$ PAC-7186EXD
<b>■ CPU Specification</b>		
CPU	80186-80M Hz	
SRAM	512K Bytes	
Flash	512K Bytes	
NAND Flash	--	
FRAM	--	
EEPROM	16K Bytes	
NVRAM	31 Bytes	
OS	MiniOS7	
RTC	Yes	
64-bit hardware serial number	Yes	
Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
Ethernet Port	10/100M Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)	
COM1	RS-232 (TXD, RXD, RTS, CTS, GND), Non-isolation, Speed: 115200 bps max	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside); Non-isolation, Speed: 115200 bps max	
<b>■ LED Display</b>		
System LED	Yes, as power / communication Indicator	
5-digit 7-segment LED Display	No	Yes
<b>■ Hardware Expansion</b>		
I/O Expansion Bus	Yes	
User Defined I/O Pins	14 Pins	
<b>■ Operating Environment</b>		
Operating Temperature	-25° C to +75° C (-13° F to +167° F)	
Storage Temperature	-40° C to +80° C (-40° F to +176° F)	
Humidity	5% to 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Frame Ground	Yes (for ESD Protection)	
Required Supply Voltage	+10 VDC to +30 VDC (non-regulated)	
Power Consumption	1.5 W	2.5 W
<b>■ Green Status</b>		
RoHS	RoHS Compliance 2002/95/EC	
WEEE	WEEE Compliance	
<b>■ Dimensions</b>		
	123 x 72 x 33 mm	

**PAC Views**

Unit: mm



**Ordering Information**

Model Number	Description
$\mu$ PAC-7186EX CR	10/100M Ethernet $\mu$ PAC, 80186-80 CPU, 512K SRAM, 512K Flash (RoHS)
$\mu$ PAC-7186EXD CR	10/100M Ethernet $\mu$ PAC, 80186-80 CPU, 512K SRAM, 512K Flash, LED display (RoHS)
<b>Optional Accessories</b>	
PWR-24/110	Wall-plug power adaptor /110VAC, 60Hz, 3.6W
GPSU06U-6	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W
PWR-24/230	Wall-plug power adaptor /220VAC, 50Hz, 3.6W
<b>Expansion Boards</b>	More than 50 X-boards are available, please check out the Expansion I/O guide

3  
Palm-size PAC -  $\mu$ PAC

- $\mu$ PAC 7186 EX
- $\mu$ PAC 7186 EG
- $\mu$ PAC 7186 XG
- $\mu$ PAC 7186 XB
- i-7188 E
- i-7188 G
- i-7188 X



# μPAC-7186EX-SM

Faster Ethernet μPAC



3 Palm - size PAC - μPAC



μPAC-7186EX-SM

μPAC-7186EXD-SM

### Main Features

- 80186 (80MHz) CPU, 512K Flash, 640K SRAM
- Ethernet 10/100M Base-TX, RS-232 / RS-485
- OS: MiniOS7
- Support I/O expansion bus
- Remote maintenance via the Ethernet
- Modbus protocol to SCADA  
Indusoft, DasyLab, Trace Mode, Citect, iFix...
- Easy use software development toolkits :  
MiniOS7 Studio, Xserver, VxComm, Modbus Libs.



### Comparison

New Advantages	μPAC-7186EX-SM	i-7188EX
More SRAM	<b>640K</b>	512K
Faster normal running speed	<b>2~4 times</b>	1
More powerful CPU	<b>80186-80MHz</b>	80188-40MHz
Faster / powerful Ethernet	<b>10/100 Base-TX</b>	10 Base-T
More EEPROM	<b>16K</b>	2K

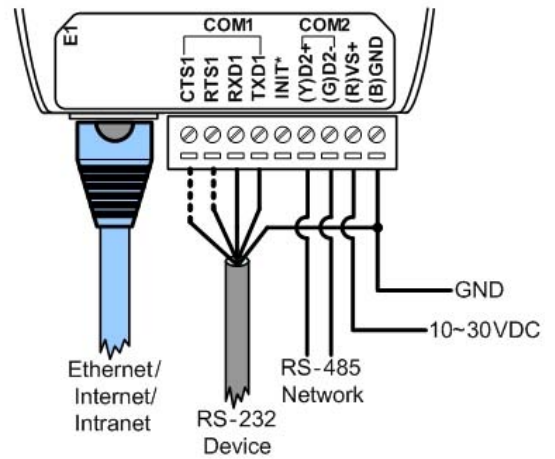
### Features

- High reliability in harsh environment (No. 1 of P.3-1-4)
- Embedded MiniOS7, anti-virus (No. 2 of P.3-1-4)
- Built-in watchdog timer (WDT) (No. 3 of P.3-1-4)
- Ethernet Protocols: TCP, UDP, IP, ICMP, ARP (No. 4 of P.3-1-4)
- Faster 10/100M Ethernet port (No. 4 of P.3-1-4)
- Modbus Protocols (No. 5 of P.3-1-4)
- Free easy-to-use software development toolkits for your applications (No. 6 of P.3-1-4)
- Expansion Bus Interface (No. 7 of P.3-1-5)
- Remote / web Configuration/Maintenance (No. 8, 9 of P.3-1-5)
- Support for Virtual COM technology (No. 11 of P.3-1-5)

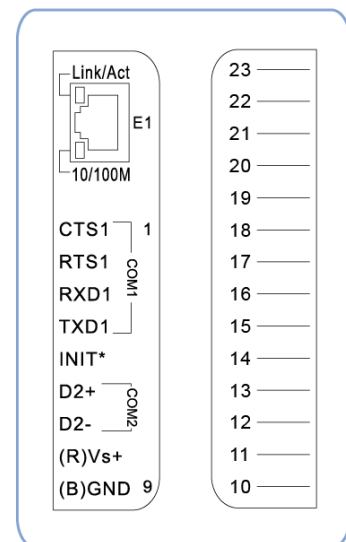
### Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

### Wiring



### Pin Assignments



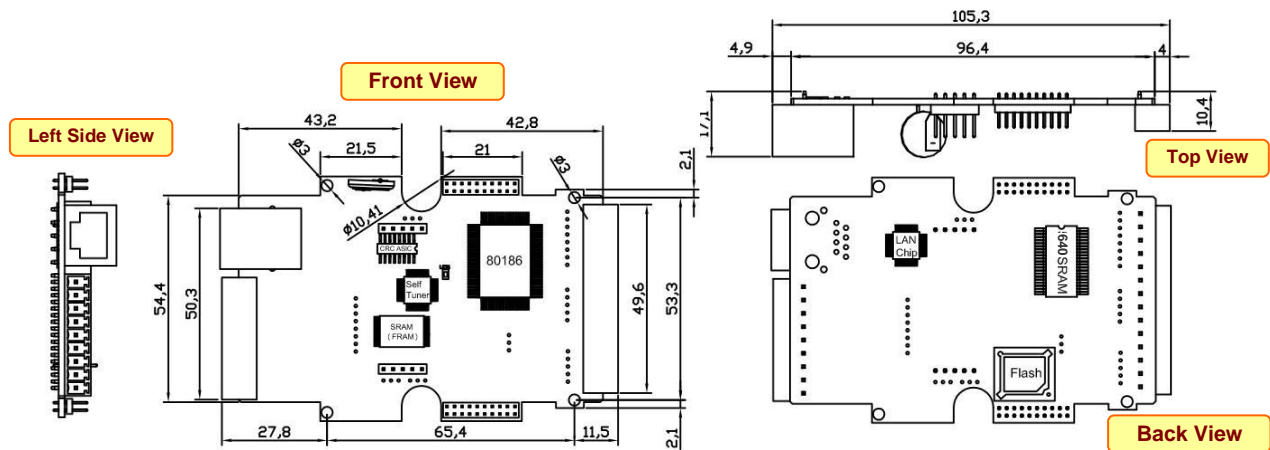
**Specifications**

Series : Palm-size PAC >  $\mu$ PAC-7186 > 86E > 86EX

PACs	$\mu$ PAC-7186EX-SM	$\mu$ PAC-7186EXD-SM
<b>■ CPU Specification</b>		
CPU	80186-80M Hz	
SRAM	640K Bytes	
Flash	512K Bytes	
NAND Flash	--	
FRAM	--	
EEPROM	16K Bytes	
NVRAM	31 Bytes	
OS	MiniOS7	
RTC	Yes	
64-bit hardware serial number	Yes	
Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
Ethernet Port	10/100M Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)	
COM1	RS-232 (TXD, RXD, RTS, CTS, GND), Non-isolation, Speed: 115200 bps max	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside); Non-isolation, Speed: 115200 bps max	
<b>■ LED Display</b>		
System LED	Yes, as power / communication Indicator	
5-digit 7-segment LED Display	No	Yes
<b>■ Hardware Expansion</b>		
I/O Expansion Bus	Yes	
User Defined I/O Pins	14 Pins	
<b>■ Operating Environment</b>		
Operating Temperature	-25° C to +75° C (-13° F to +167° F)	
Storage Temperature	-40° C to +80° C (-40° F to +176° F)	
Humidity	5% to 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Frame Ground	Yes (for ESD Protection)	
Required Supply Voltage	+10 VDC to +30 VDC (non-regulated)	
Power Consumption	1.5 W	2.5 W
<b>■ Green Status</b>		
RoHS	RoHS Compliance 2002/95/EC	
WEEE	WEEE Compliance	
<b>■ Dimensions</b>		
	123 x 72 x 33 mm	

**PAC Views**

Unit: mm



**Ordering Information**

Model Number	Description
$\mu$ PAC-7186EX-SM CR	10/100M Ethernet $\mu$ PAC, 80186-80 CPU, 640K SRAM, 512K Flash (RoHS)
$\mu$ PAC-7186EXD-SM CR	10/100M Ethernet $\mu$ PAC, 80186-80 CPU, 640K SRAM, 512K Flash (RoHS), LED display
<b>Optional Accessories</b>	
PWR-24/110	Wall-plug power adaptor /110VAC, 60Hz, 3.6W
GPSU06U-6	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W
PWR-24/230	Wall-plug power adaptor /220VAC, 50Hz, 3.6W
<b>Expansion Boards</b>	More than 50 X-boards are available, please check out the Expansion I/O guide

3

Palm-size PAC -  $\mu$ PAC

$\mu$ PAC 7186 EX

$\mu$ PAC 7186 EG

$\mu$ PAC 7186 XG

$\mu$ PAC 7186 XB

i-7188 E

i-7188 G

i-7188 X

# μPAC-7186EX-FM

Faster Ethernet μPAC



3 Palm-size PAC - μPAC



μPAC-7186EX-FM

μPAC-7186EXD-FM

### Main Features

- 80186 (80MHz) CPU, 512K Flash, 512K SRAM
- **128K FRAM**
- Ethernet 10/100M Base-TX, RS-232 / RS-485
- OS: MiniOS7
- Support I/O expansion bus
- Remote maintenance via the Ethernet IE, Netscape, FireFox...
- Modbus protocol to SCADA
- Indusoft, DasyLab, Trace Mode, Citect, iFix...



### Comparison

New Advantages	μPAC-7186EX-FM	i-7188EX
<b>More FRAM</b>	<b>128K</b>	--
<b>Faster normal running speed</b>	<b>2~4 times</b>	1
<b>More powerful CPU</b>	<b>80186-80MHz</b>	80188-40MHz
<b>Faster / powerful Ethernet</b>	<b>10/100 Base-TX</b>	10 Base-T
<b>More EEPROM</b>	<b>16K</b>	2K

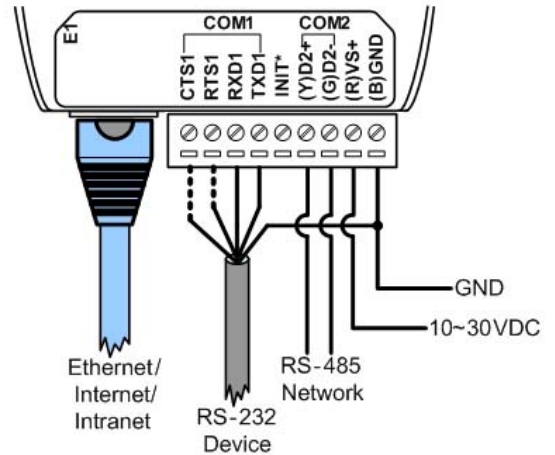
### Features

- High reliability in harsh environment (No. 1 of P.3-1-4)
- Embedded MiniOS7, anti-virus (No. 2 of P.3-1-4)
- Built-in watchdog timer (WDT) (No. 3 of P.3-1-4)
- Ethernet Protocols: TCP, UDP, IP, ICMP, ARP (No. 4 of P.3-1-4)
- Faster 10/100M Ethernet port (No. 4 of P.3-1-4)
- Modbus Protocols (No. 5 of P.3-1-4)
- Free easy-to-use software development toolkits for your applications (No. 6 of P.3-1-4)
- Expansion Bus Interface (No. 7 of P.3-1-5)
- Remote / web Configuration/Maintenance (No. 8, 9 of P.3-1-5)
- Support for Virtual COM technology (No. 11 of P.3-1-5)

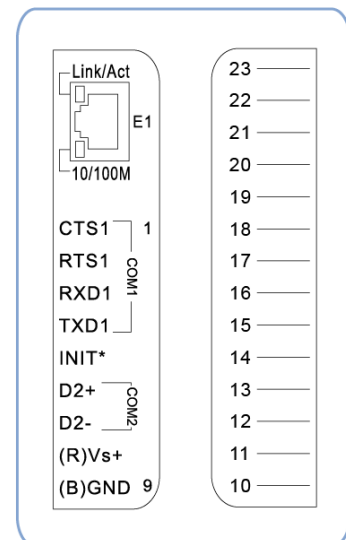
### Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

### Wiring



### Pin Assignments



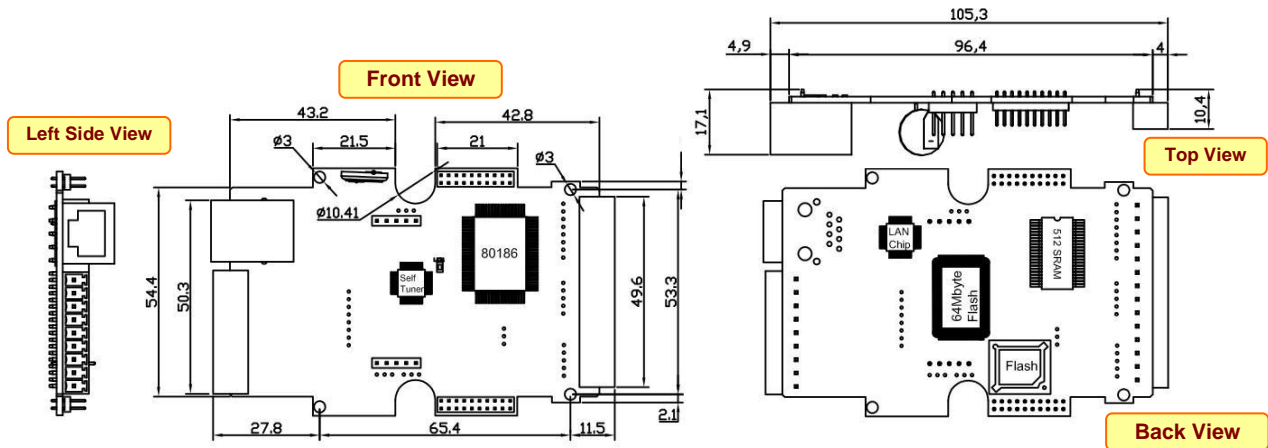
**Specifications**

Series : Palm-size PAC >  $\mu$ PAC-7186 > 86E > 86EX

PACs	$\mu$ PAC-7186EX-FM	$\mu$ PAC-7186EXD-FM
<b>■ CPU Specification</b>		
CPU	80186-80M Hz	
SRAM	512K Bytes	
Flash	512K Bytes	
NAND Flash	--	
FRAM	<b>128K Bytes</b>	
EEPROM	16K Bytes	
NVRAM	31 Bytes	
OS	MiniOS7	
RTC	Yes	
64-bit hardware serial number	Yes	
Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
Ethernet Port	10/100M Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)	
COM1	RS-232 (TXD, RXD, RTS, CTS, GND), Non-isolation, Speed: 115200 bps max	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside); Non-isolation, Speed: 115200 bps max	
<b>■ LED Display</b>		
System LED	Yes, as power / communication Indicator	
5-digit 7-segment LED Display	No	Yes
<b>■ Hardware Expansion</b>		
I/O Expansion Bus	Yes	
User Defined I/O Pins	14 Pins	
<b>■ Operating Environment</b>		
Operating Temperature	-25° C to +75° C (-13° F to +167° F)	
Storage Temperature	-40° C to +80° C (-40° F to +176° F)	
Humidity	5% to 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Frame Ground	Yes (for ESD Protection)	
Required Supply Voltage	+10 VDC to +30 VDC (non-regulated)	
Power Consumption	1.5 W	2.5 W
<b>■ Green Status</b>		
RoHS	RoHS Compliance 2002/95/EC	
WEEE	WEEE Compliance	
<b>■ Dimensions</b>		
	123 x 72 x 33 mm	

**PAC Views**

Unit: mm



**Ordering Information**

Model Number	Description	* All orders include download utility, download cable and manual.
$\mu$ PAC-7186EX-FM CR	10/100M Ethernet $\mu$ PAC, 80186-80, 512K SRAM, 512K Flash, 128K FRAM (RoHS)	
$\mu$ PAC-7186EXD-FM CR	10/100M Ethernet $\mu$ PAC, 80186-80, 512K SRAM, 512K Flash, 128K FRAM (RoHS), LED display	
<b>Optional Accessories</b>		
PWR-24/110	Wall-plug power adaptor /110VAC, 60Hz, 3.6W	
GPSU06U-6	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W	
PWR-24/230	Wall-plug power adaptor /220VAC, 50Hz, 3.6W	
<b>Expansion Boards</b>	More than 50 X-boards are available, please check out the Expansion I/O guide	

3

Palm-size PAC -  $\mu$ PAC

$\mu$ PAC 7186 EX

$\mu$ PAC 7186 EG

$\mu$ PAC 7186 XG

$\mu$ PAC 7186 XB

i-7188 E

i-7188 G

i-7188 X



# μPAC-7186EX-FD

Faster Ethernet μPAC



3

Palm-size PAC - μPAC



μPAC-7186EX-FD

μPAC-7186EXD-FD

### Main Features

- 80186 (80MHz) CPU, 512K Flash, 512K SRAM
- **64M NAND Flash**
- Ethernet 10/100M Base-TX, RS-232 / RS-485
- OS: MiniOS7
- Support I/O expansion bus
- Remote maintenance via the Ethernet IE, Netscape, FireFox...
- Modbus protocol to SCADA
- Indusoft, DasyLab, Trace Mode, Citect, iFix...



### Comparison

New Advantages	μPAC-7186EX-FD	i-7188EX
<b>More NAND Flash</b>	<b>64M</b>	--
<b>Faster normal running speed</b>	<b>2~4 times</b>	1
<b>More powerful CPU</b>	<b>80186-80MHz</b>	80188-40MHz
<b>Faster / powerful Ethernet</b>	<b>10/100 Base-TX</b>	10 Base-T
<b>More EEPROM</b>	<b>16K</b>	2K

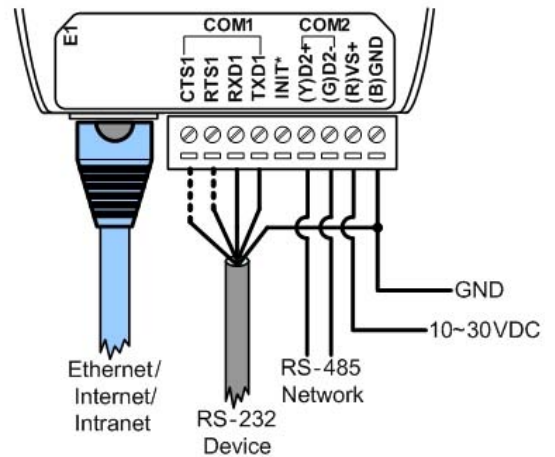
### Features

- High reliability in harsh environment (No. 1 of P.3-1-4)
- Embedded MiniOS7, anti-virus (No. 2 of P.3-1-4)
- Built-in watchdog timer (WDT) (No. 3 of P.3-1-4)
- Ethernet Protocols: TCP, UDP, IP, ICMP, ARP (No. 4 of P.3-1-4)
- Faster 10/100M Ethernet port (No. 4 of P.3-1-4)
- Modbus Protocols (No. 5 of P.3-1-4)
- Free easy-to-use software development toolkits for your applications (No. 6 of P.3-1-4)
- Expansion Bus Interface (No. 7 of P.3-1-5)
- Remote / web Configuration/Maintenance (No. 8, 9 of P.3-1-5)
- Support for Virtual COM technology (No. 11 of P.3-1-5)

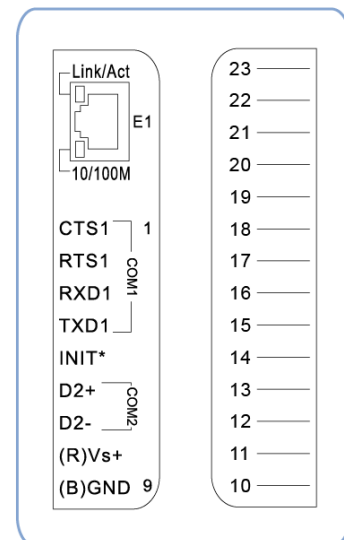
### Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

### Wiring



### Pin Assignments

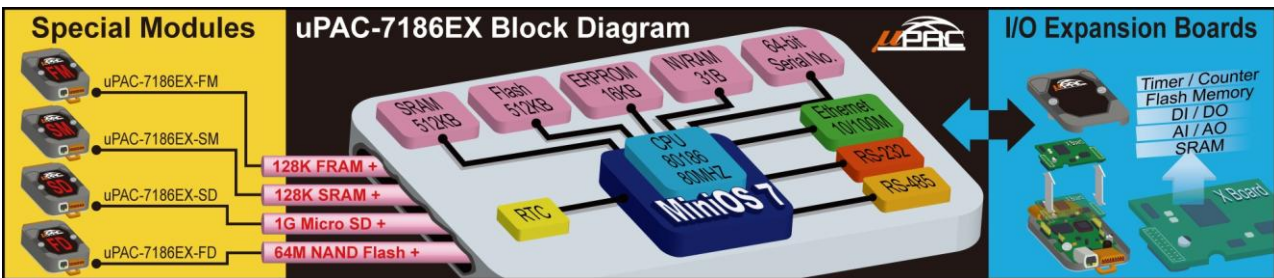


Specifications

Series : Palm-size PAC > μPAC-7186 > 86E > 86EX

PACs	μPAC-7186EX-FD	μPAC-7186EXD-FD
<b>■ CPU Specification</b>		
CPU	80186-80M Hz	
SRAM	512K Bytes	
Flash	512K Bytes	
NAND Flash	<b>64M Bytes</b>	
FRAM	--	
EEPROM	16K Bytes	
NVRAM	31 Bytes	
OS	MiniOS7	
RTC	Yes	
64-bit hardware serial number	Yes	
Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
Ethernet Port	10/100M Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)	
COM1	RS-232 (TXD, RXD, RTS, CTS, GND), Non-isolation, Speed: 115200 bps max	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside); Non-isolation, Speed: 115200 bps max	
<b>■ LED Display</b>		
System LED	Yes, as power / communication Indicator	
5-digit 7-segment LED Display	No	Yes
<b>■ Hardware Expansion</b>		
I/O Expansion Bus	Yes	
User Defined I/O Pins	14 Pins	
<b>■ Operating Environment</b>		
Operating Temperature	-25° C to +75° C (-13° F to +167° F)	
Storage Temperature	-40° C to +80° C (-40° F to +176° F)	
Humidity	5% to 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Frame Ground	Yes (for ESD Protection)	
Required Supply Voltage	+10 VDC to +30 VDC (non-regulated)	
Power Consumption	1.5 W	2.5 W
<b>■ Green Status</b>		
RoHS	RoHS Compliance 2002/95/EC	
WEEE	WEEE Compliance	
<b>■ Dimensions</b>		
	123 x 72 x 33 mm	

Block Diagram



Applications

- Fast Ethernet communication application • Industry automation
- Auto deflection devices • Process monitor & control
- High speed data acquisition system • Laboratory automation
- Communication switching • Factory automation • IO monitor



Ordering Information

Model Number	Description	* All orders include download utility, download cable and manual.
μPAC-7186EX-FD CR	10/100M Ethernet μPAC, 80186-80, 512K SRAM, 512K Flash, 64M NAND Flash (RoHS)	
μPAC-7186EXD-FD CR	10/100M Ethernet μPAC, 80186-80, 512K SRAM, 512K Flash, 64M NAND Flash (RoHS), LED display	
<b>Optional Accessories</b>		
PWR-24/110	Wall-plug power adaptor /110VAC, 60Hz, 3.6W	
GPSU06U-6	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W	
PWR-24/230	Wall-plug power adaptor /220VAC, 50Hz, 3.6W	
Expansion Boards	More than 50 X-boards are available, please check out the Expansion I/O guide	

**3**  
 Palm-size PAC - μPAC  
 μPAC 7186 EX  
 μPAC 7186 EG  
 μPAC 7186 XG  
 μPAC 7186 XB  
 i-7188 E  
 i-7188 G  
 i-7188 X

# μPAC-7186EX-SD

Faster Ethernet μPAC



3 Palm-size PAC - μPAC



μPAC-7186EX-SD

μPAC-7186EXD-SD

## Main Features

- 80186 (80MHz) CPU, 512K Flash, 512K SRAM
- **1G Micro SD**
- Ethernet 10/100M Base-TX, RS-232 / RS-485
- OS: MiniOS7
- Support I/O expansion bus
- Remote maintenance via the Ethernet IE, Netscape, FireFox...
- Modbus protocol to SCADA
- Indusoft, DasyLab, Trace Mode, Citect, iFix...



## Comparison

New Advantages	μPAC-7186EX-SD	i-7188EX
<b>More Micro SD</b>	<b>1G</b>	--
<b>Faster normal running speed</b>	<b>2~4 times</b>	1
<b>More powerful CPU</b>	<b>80186-80MHz</b>	80188-40MHz
<b>Faster / powerful Ethernet</b>	<b>10/100 Base-TX</b>	10 Base-T
<b>More EEPROM</b>	<b>16K</b>	2K

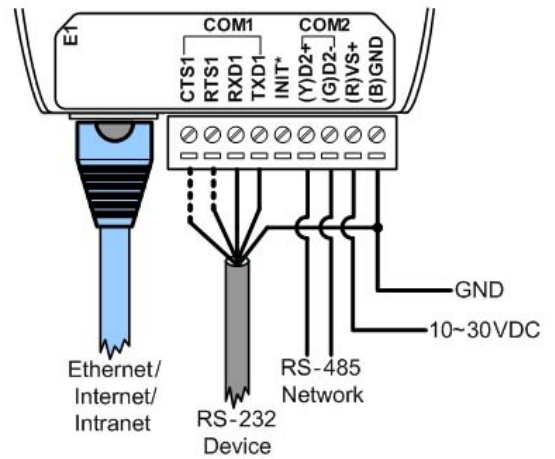
## Features

- High reliability in harsh environment (No. 1 of P.3-1-4)
- Embedded MiniOS7, anti-virus (No. 2 of P.3-1-4)
- Built-in watchdog timer (WDT) (No. 3 of P.3-1-4)
- Ethernet Protocols: TCP, UDP, IP, ICMP, ARP (No. 4 of P.3-1-4)
- Faster 10/100M Ethernet port (No. 4 of P.3-1-4)
- Modbus Protocols (No. 5 of P.3-1-4)
- Free easy-to-use software development toolkits for your applications (No. 6 of P.3-1-4)
- Expansion Bus Interface (No. 7 of P.3-1-5)
- Remote / web Configuration/Maintenance (No. 8, 9 of P.3-1-5)
- Support for Virtual COM technology (No. 11 of P.3-1-5)

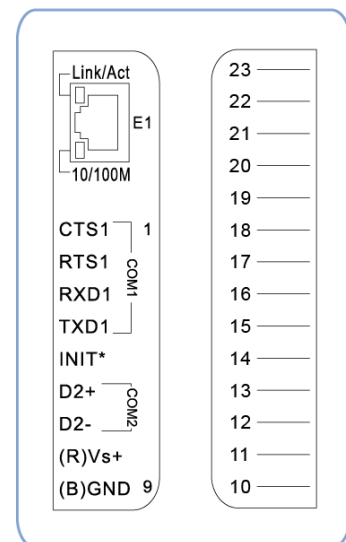
## Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

## Wiring



## Pin Assignments



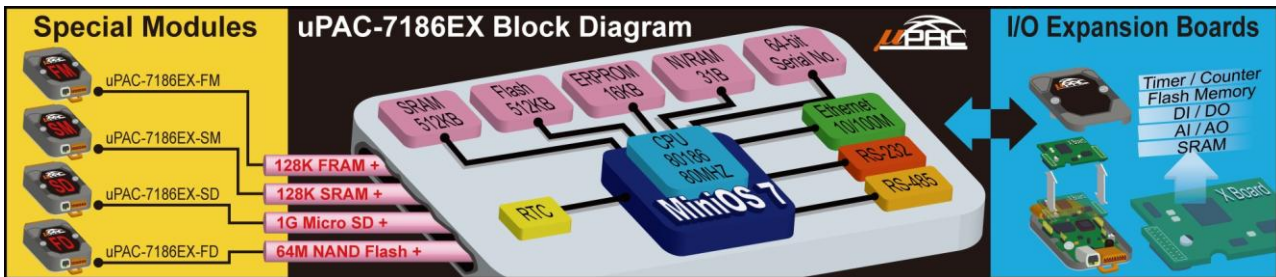


**Specifications**

Series : Palm-size PAC >  $\mu$ PAC-7186 > 86E > 86EX

PACs	$\mu$ PAC-7186EX-SD	$\mu$ PAC-7186EXD-SD
<b>Core Specification</b>		
CPU	80186-80M Hz	
SRAM	512K Bytes	
Flash	512K Bytes	
Micro SD	1G	
EEPROM	16K Bytes	
NVRAM	31 Bytes	
OS	MiniOS7	
RTC	Yes	
64-bit hardware serial number	Yes	
Watchdog Timer	Yes	
<b>Communication Interface</b>		
Ethernet Port	10/100M Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)	
COM1	RS-232 (TXD, RXD, RTS, CTS, GND), Non-isolation, Speed: 115200 bps max	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside); Non-isolation, Speed: 115200 bps max	
<b>LED Display</b>		
System LED	Yes, as power / communication Indicator	
5-digit 7-segment LED Display	No	Yes
<b>Hardware Expansion</b>		
I/O Expansion Bus	Yes	
User Defined I/O Pins	14 Pins	
<b>Operating Environment</b>		
Operating Temperature	-25° C to +75° C (-13° F to +167° F)	
Storage Temperature	-40° C to +80° C (-40° F to +176° F)	
Humidity	5% to 90%, non-condensing	
<b>Power</b>		
Protection	Power reverse polarity protection	
Frame Ground	Yes (for ESD Protection)	
Required Supply Voltage	+10 VDC to +30 VDC (non-regulated)	
Power Consumption	2 W	3 W
<b>Green Status</b>		
RoHS	RoHS Compliance 2002/95/EC	
WEEE	WEEE Compliance	
<b>Dimensions</b>		
	123 x 72 x 33 mm	

**Block Diagram**



**Applications**

- Fast Ethernet communication application • Industry automation
- Auto deflection devices • Process monitor & control
- High speed data acquisition system • Laboratory automation
- Communication switching • Factory automation • IO monitor



**Ordering Information**

Model Number	Description	* All orders include download utility, download cable and manual.
$\mu$ PAC-7186EX-SD CR	10/100M Ethernet $\mu$ PAC, 80186-80, 512K SRAM, 512K Flash, 1G Micro SD (RoHS)	
$\mu$ PAC-7186EXD-SD CR	10/100M Ethernet $\mu$ PAC, 80186-80, 512K SRAM, 512K Flash, 1G Micro SD (RoHS), LED display	
<b>Optional Accessories</b>		
PWR-24/110	Wall-plug power adaptor /110VAC, 60Hz, 3.6W	
GPSU06U-6	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W	
PWR-24/230	Wall-plug power adaptor /220VAC, 50Hz, 3.6W	
Expansion Boards	More than 50 X-boards are available, please check out the Expansion I/O guide	



# μPAC-7186EXD-CAN

Ethernet CAN bus μPAC



3 Palm - size PAC - μPAC



### Main Features

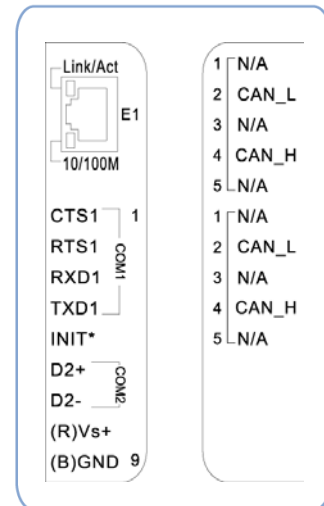
- 80186 (80MHz) CPU, 512K Flash, 512K SRAM
- **Built-in CAN bus port**
- Ethernet 10/100M Base-TX, RS-232 / RS-485
- OS: MiniOS7
- 3 program LEDs: L1, L2, L3
- Remote maintenance via the Ethernet IE, Netscape, FireFox...
- Modbus protocol to SCADA
- Indusoft, DasyLab, Trace Mode, Citect, iFix...



### Comparison

New Advantages	μPAC-7186EXD-CAN	i-7188XBD-CAN
<b>Faster / powerful Ethernet</b>	<b>10/100 Base-TX</b>	--
<b>Faster normal running speed</b>	<b>2~4 times</b>	1
<b>More powerful CPU</b>	<b>80186-80MHz</b>	80188-40MHz
<b>DI, DO</b>	--	1 DI, 1 DO
<b>More EEPROM</b>	<b>16K</b>	2K

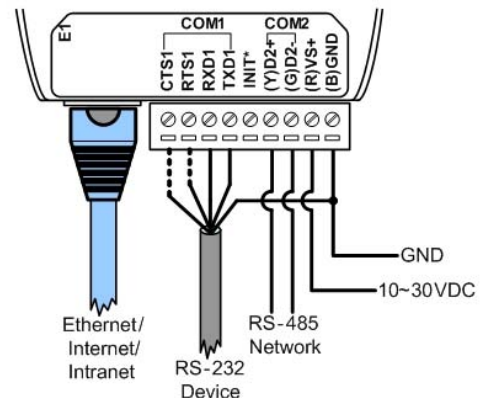
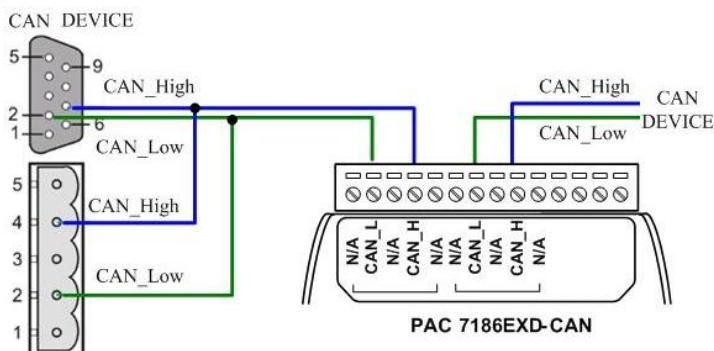
### Pin Assignments



### Features

- High reliability in harsh environment (No. 1 of P.3-1-4)
- Embedded MiniOS7, anti-virus (No. 2 of P.3-1-4)
- Built-in watchdog timer (WDT) (No. 3 of P.3-1-4)
- Ethernet Protocols: TCP, UDP, IP, ICMP, ARP (No. 4 of P.3-1-4)
- Faster 10/100M Ethernet port (No. 4 of P.3-1-4)
- Modbus Protocols (No. 5 of P.3-1-4)
- Expansion Bus Interface (No. 7 of P.3-1-5)
- Remote / web Configuration/Maintenance (No. 8, 9 of P.3-1-5)
- Support for Virtual COM technology (No. 11 of P.3-1-5)
- Free easy-to-use software development toolkits for your applications (No. 6 of P.3-1-4)
- Support CAN bus application (No. 10 of P.3-1-5)
- Support the CAN bus instead of the X-bus, so it can not be add-on any X-board

### Wiring



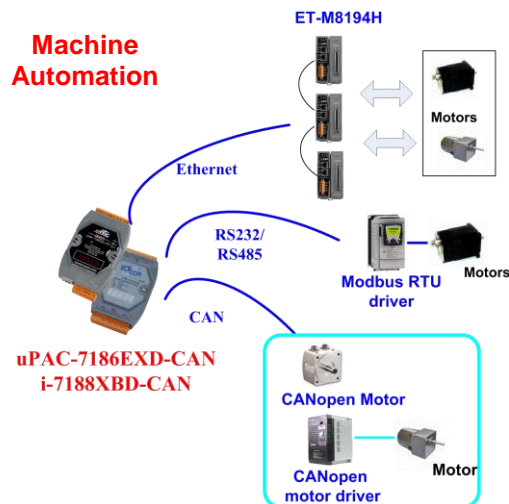
**Specifications**

Series : Palm-size PAC >  $\mu$ PAC-7186 > 86E > 86EX

PACs	$\mu$ PAC-7186EXD-CAN
<b>Core Specification</b>	
CPU	80186-80M Hz
SRAM	512K Bytes
Flash	512K Bytes
EEPROM	16K Bytes
NVRAM	31 Bytes
OS	MiniOS7
RTC	Yes
64-bit hardware serial number	Yes
Watchdog Timer	Yes
<b>Communication Interface</b>	
CAN bus	Yes, Max. Speed 1.0 M
Ethernet Port	10/100M Base-TX (Auto-negotiating, Auto_MDIX, LED indicator)
COM1	RS-232 (TXD, RXD, RTS, CTS, GND), Non-isolation, Speed: 115200 bps max
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside); Non-isolation, Speed: 115200 bps max
<b>LED Display</b>	
Program LED	Yes, 3 : L1, L2, L3
System LED	Yes, as power / communication Indicator
5-digit 7-segment LED Display	Yes
<b>Hardware Expansion</b>	
I/O Expansion Bus	--
User Defined I/O Pins	--
<b>Operating Environment</b>	
Operating Temperature	-25° C to +75° C (-13° F to +167° F)
Storage Temperature	-40° C to +80° C (-40° F to +176° F)
Humidity	5% to 90%, non-condensing
<b>Power</b>	
Protection	Power reverse polarity protection
Frame Ground	Yes (for ESD Protection)
Required Supply Voltage	+10 VDC to +30 VDC (non-regulated)
Power Consumption	3 W
<b>Green Status</b>	
RoHS	RoHS Compliance 2002/95/EC
WEEE	WEEE Compliance
<b>Dimensions</b>	
	123 x 72 x 33 mm

**Applications**

- CAN bus communication application
- Industry automation
- Auto deflection CANopen slave devices
- Process monitor & control
- High speed data acquisition system
- Laboratory automation
- Communication switching
- Factory automation
- IO monitor
- Machine automation



**Ordering Information**

Model Number	Description
$\mu$ PAC-7186EXD-CAN-G	10/100M Ethernet CAN bus $\mu$ PAC, 80186-80, OS:Minios7, 512K SRAM, 512K Flash, one CAN port, one Ethernet port, two series communication ports (RS-232/RS-485), 4 programmable LEDs, 5-digit 7-segment Display (RoHS)
<b>Optional Accessories</b>	
PWR-24/110	Wall-plug power adaptor /110VAC, 60Hz, 3.6W
GPSU06U-6	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W
PWR-24/230	Wall-plug power adaptor /220VAC, 50Hz, 3.6W
CAN-8x2x	CANopen Embedded Device with I/O Expansion

\* All orders include download utility, download cable and manual.

# New ISaGRAF SoftLogic μPAC

## The new generation of ISaGRAF μPAC



The new generation ISaGRAF μPACs are ICP DAS 2<sup>nd</sup> generation palm-size PACs that support ISaGRAF SoftLogic. ISaGRAF PAC can run the programs generated by the most powerful SoftLogic package – ISaGRAF Ver. 3.

### The Models

#### 2<sup>nd</sup> Generation ISaGRAF μPAC

- μPAC-7186EG
- μPAC-7186EGD
- μPAC-7186XG
- μPAC-7186XGD



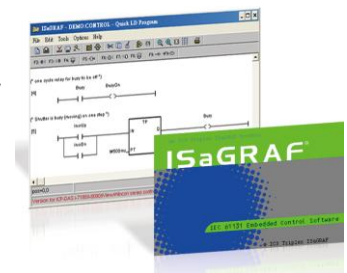
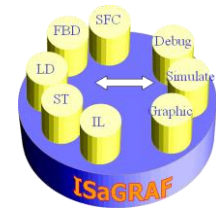
### The Features

- ISaGRAF Ver. 3 SoftLogic inside
- Support IEC 61131-3 Standard Open PLC Programming Languages + FC
- MiniOS7 inside
- 80186-80 MHz CPU **✓ Faster**
- 640K SRAM **✓ Larger**
- 16K EEPROM **✓ Larger**
- 512K Flash
- 31B NVRAM
- Certification: CE, FCC
- Green Status: Truly RoHS compliant

#### The ISaGRAF μPACs

support ISaGRAF Ver.3 Workbench :

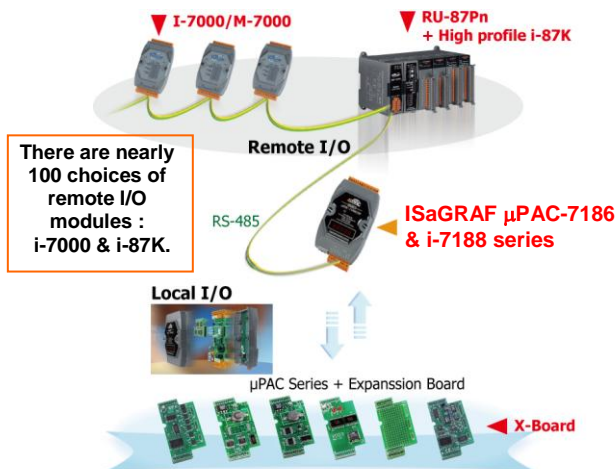
- Support IEC61131-3 Standard Open PLC Programming Languages + Flow Chart Language:
  1. LD
  2. FBD
  3. SFC
  4. ST
  5. IL
  6. FC
- Simulate program even without controller
- Debug on-line
- Control on-line
- Simple graphic HMI



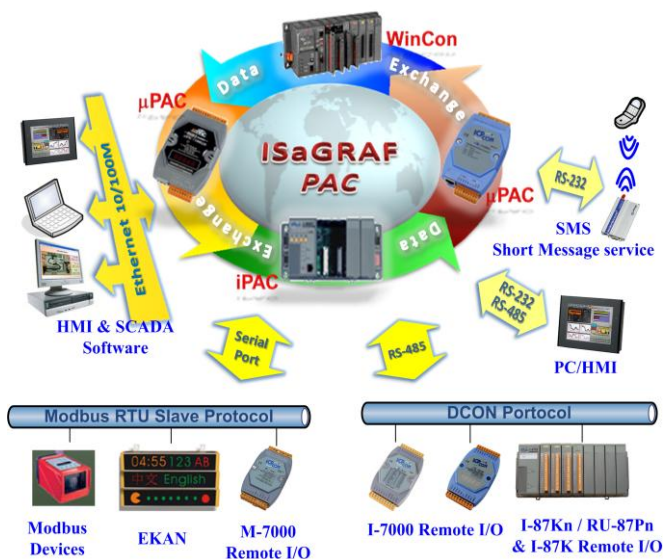
### With I/O Modules

Advantages of using RU-87P4/P8 + high profile i-87K I/O:

- Hot-Swap
- Auto-configuration at run time
- Plug & play at run time




### With PACs & Devices



#### Inserting one X-board in the ISaGRAF μPAC can add :

- More I/O channels: X107, X109, X110, X111, X116, X119, X202, X203, X303, X304, X305, X308, X310
- More RS-232/485, DI/O: X503, X504, X505, X506, X507, X508, X509, X510, X510-128, X511, X518, X560
- More battery backup-SRAM: X607, X608
- Motion control: X702 (2-axis), X703 (3-axis)

## ISaGRAF SoftLogic palm-size PAC Selection Guide

ISaGRAF μPACs	μPAC-7186EG μPAC-7186EGD	i-7188EG i-7188EGD	μPAC-7186XG μPAC-7186XGD	i-7188XG i-7188XGD
<b>System</b>				
CPU	80186 80MHz	80188 40MHz	80186 80MHz	80188 40MHz
OS	MiniOS7			
Watchdog timer	Yes. Default 0.8 second			
Real time clock	Yes. Gives hour, minute, sec, date of week, date of month, month & year (1980 to 2079)			
SRAM	640K bytes	512K bytes	640K bytes	512K bytes
FLASH Memory	512K bytes, Erase unit is 64K bytes, 100,000 erase/write cycles			
NVRAM	31 bytes, battery backup, data valid up to 10 years			
EEPROM	16K bytes	2K bytes	16K bytes	2K bytes
64-bit hardware serial number	Yes			
LED Display	One power / communication indicator LED light. 5-digit 7-Segment Led display on the front of Display series. It can display message & value.			
Expansion I/O bus	One. Support one optional Xxxx series I/O expansion board to be plugged inside the PAC.			
NET ID	Set by software, 1 to 255			
<b>Development Software</b>				
ISaGRAF Version 3	IEC61131-3 standard. Languages: LD, ST, FBD, SFC, IL & FC			
Max. code size	Accepts max. 64K byte ISaGRAF code size (Appli.x8m must < 64K)			
<b>Serial Ports</b>				
COM1	RS-232 (Speed: 115200 bps max.)		RS-232 or RS-485 (Speed: 115200 bps max.)	
COM2	RS-485 (Speed: 115200 bps max. Self-tuner ASIC inside.)			
Ethernet	10/100 Base-TX Auto-negotiating Auto_MDIX, LED indicator	10 Base-T	--	--
<b>Digital Input / Output</b>				
Digital Input	0	0	1	1
Digital Output	0	0	1	1
<b>Protocols / Communications Support</b>				
Modbus RTU / ASCII master protocol	Yes		Yes	
Modbus RTU slave protocol	Yes		Yes	
Modbus TCP/IP slave protocol	Yes		--	
User defined protocol	Yes		Yes	
Remote I/O	Yes		Yes	
Fbus	Yes, COM2		Yes, COM2	
Ebus	Yes		--	
SMS: Short Message Service	Yes		Yes	
Modem Link	Yes		Yes	
MMICON / LCD	Yes		Yes	
<b>Power Supply</b>				
Required Supply Voltage	+10 to +30 VDC (non-regulated)			
Protection	Built-in power protection & network protection circuit			
Frame Ground	Yes (for ESD Protection)		Yes	
Power Consumption	1.5W for EG Model 2.5W for EGD Model	2.0W for EG Model 3.0W for EGD Model	1.5W for XG Model 2.5W for XGD Model	2.0W for XG Model 3.0W for XGD Model
<b>General Environment</b>				
temperature	Operating: -25°C to +75°C ( -13°F to +167°F); Storage : -40°C to +80°C ( -40°F to +176°F)			
Humidity	5% to 95 % (non-condensed)			
<b>Others</b>				
Green Status	RoHS & WEEE Compliant 			
Battery backup SRAM	Support. Optional: X607: 128kbytes, X608: 512kbytes			
Redundancy Solution	Support	--	--	--
Dimensions	123 x 72 x 33 mm			
<b>page</b>	<b>3-2-4</b>	<b>3-5-4</b>	<b>3-2-8</b>	<b>3-5-6</b>

ISaGRAF Product	Description
ISaGRAF-256-E / -C	ISaGRAF Workbench Software Ver.3 (256 I/O Tags), with one English or Chinese application book
ISaGRAF-32-E / -C	ISaGRAF Workbench Software Ver.3 ( 32 I/O Tags), with one English or Chinese application book <b>** Cannot upgrade to 256 I/O Tags anymore.</b>
ISaGRAF Book-E / -C	ISaGRAF application book (E: English; C: Traditional Chinese)



# μPAC-7186EG Series

3

Palm - size PAC - μPAC

## What is it?

The μPAC-7186EG Series is our new generation ISaGRAF palm-size PAC. With:

- ISaGRAF SoftLogic
  - 80186-80 MHz high speed CPU
  - 10/100M high speed Ethernet port
  - More SRAM : Total 640K bytes
- ✓ **Powerful**  
✓ **Faster**  
✓ **Larger**

Compared with the first generation product i-7188EG, the μPAC-7186EG is about 2 to 4 times faster.

## Common Features:

- ISaGRAF Ver.3 SoftLogic inside
- Support IEC 61131-3 Standard
- MiniOS7 inside
- CPU : 80186-80 MHz
- SRAM : 640K Bytes
- Flash : 512K Bytes
- EEPROM : 16K Bytes
- NVRAM : 31 Bytes
- Real Time Clock
- 64-bit Serial number
- 14 user defined I/O Pins(10-23)
- I/O expansion bus inside
- power/communication indicator LED
- μPAC-7186EGD with 5-dig 7-segment LED
- Ethernet port: 10/100M Bps
- RS-232 port
- RS-485 port
- Initial switch
- RoHS & WEEE Compliant
- Frame Ground

### I/O Expansion bus

#### X-board:

- DI / DO
- AI / AO
- Timer
- Counter
- Battery SRAM
- Flash Memory
- COM3 ~ COM8
- SMS Short message service
- Modem Link
- MMICON / LCD



### 14 User Defined I/O Pins(10-23)



### Ethernet Port 10/100 Base-TX

- To PC (Program download)
- Modbus TCP/IP Slave
- UDP delivering string
- E-bus

### COM1 : RS-232

- To PC (Program download)
- Modbus RTU Slave
- or Modbus RTU Master

### COM2 : RS-485

### ISaGRAF Ver.3 SoftLogic

- International Standard: IEC 61131-3
- Support 6 PLC languages
- Easy to design
- Powerful communication ability
- Integration with HMI software and MMI



### Remote I/O module: Expansion I/O Catalog

- I-7000 (DCON Protocol)  
(AI/O, DI/O, Relay, Counter, Frequency...)
- M-7000 (Modbus Protocol)  
(AI/O, DI/O, Relay...)

### I/O Expansion Unit: Expansion I/O Catalog

- RU-87Pn (Hot swap, auto-configuration)  
+ High profile i-87K serial I/O module  
(AI/O, DI/O, Relay, Counter, Frequency)
- I-87Kn  
+ i-87K serial I/O module  
(AI/O, DI/O, Relay, Counter, Frequency)

# Top 12 reasons to choose the $\mu$ PAC-7186EG ISaGRAF PAC

Beside the common features of the  $\mu$ PAC, there are 12 more reasons to choose this  $\mu$ PAC-7186EG series:

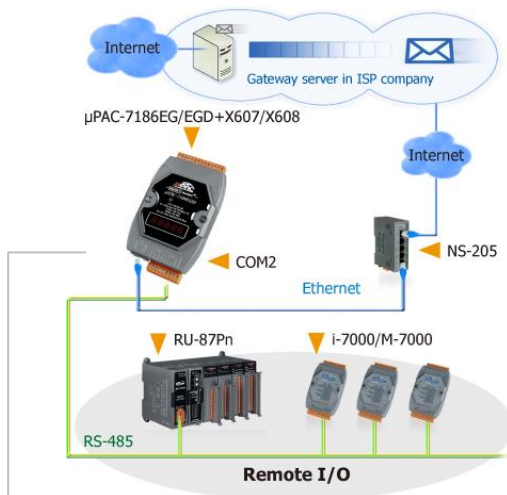
## 1 ISaGRAF SoftLogic inside, easy to design

### Support IEC61131-3 Standard PLC language

Instead of C language, ISaGRAF supports all five IEC61131-3 PLC International Standard languages plus Flow Chart language (FC). Easy to design and easy to debug your application!

## 2 Data Exchange: 10/100M Ethernet & RS-485

Through Ebus: 10/100 Base-Tx Ethernet – faster  
Through Fbus: RS-485  
PAC to PAC



## 7 Send e-mail with one attached data file

Send one e-mail to maximum 10 receivers each time via internet. If applying with an X607/608 X-board, it could send email with one attached file and the maximum file size is about 488K for using X608 or about 112K bytes for using X607.

## 8 SMS for mobile or fixed applications

Provide Short Message Service to send important/emergency message to fixed or mobile equipment such as PC, mobile phone...

## 10 4-level Internet security protection

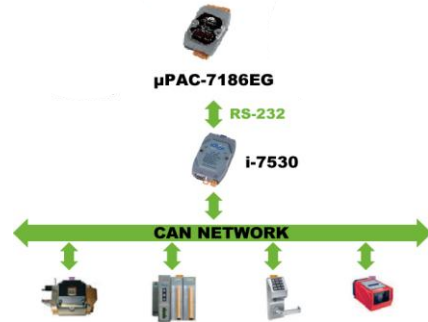
Support auto-report acquisition data & control data to local or remote internet PC/server with 4-level Internet security protection. The data are safe when transmitting. We provide **VIP security!**

## 11 Easy to integrate with HMI & MMI

**HMI software** that supply Modbus RTU or Modbus TCP/IP Protocol: InduSoft, OPC server, Iconics, Intouch, iFIX, Wizcon, Citect, Lablink .....  
**MMI software/hardware:** touch panel (Touch 506/509/510), MMICON/LCD .....

## 12 Redundancy system - Cost effective

Setting up two  $\mu$ PAC-7186EG(D) can provide low-cost & practical redundancy system to make sure the whole system alive all the time. User can also add HMI / PC / SCADA via Ethernet for remote monitor/control requirement.



## 3 CAN BUS integration

$\mu$ PAC-7186EG(D) with RS-232 ports can connect max. 3 RS-232/CAN converters (e.g. i-7530) to link CAN devices or CANopen devices.

## 4 Modbus Protocols: Master & Slave

Modbus Master: RTU, ASCII, RS-232 / 485 / 422  
Modbus Slave: Modbus RTU, Modbus TCP/IP

## 5 Data logger & recorder

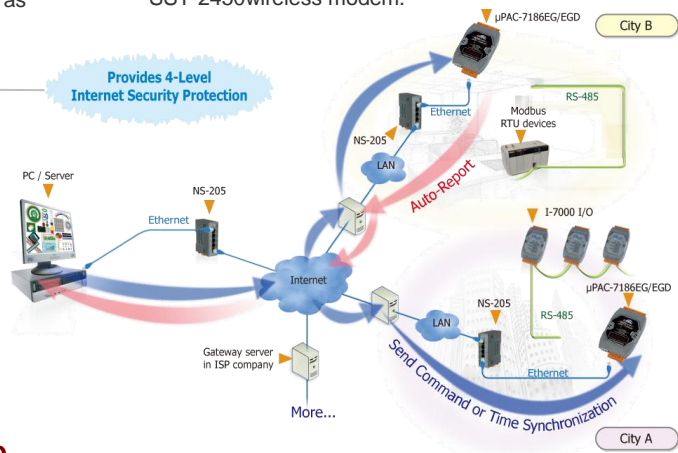
ICP DAS provides a freeware to load the data stored in  $\mu$ PAC-7186EG+X607/608 via RS-232 or Ethernet to PC.

## 6 Powerful communication ability

RS-232 COM: to PC, Modbus RTU Slave or Modbus RTU Master  
RS-485 COM: Modbus network, RS-485 Fbus network, DCON protocol  
Ethernet port: Modbus TCP/IP Slave, UDP delivering string & Ebus internet/Ethernet network

## 9 Wireless Communication

Support Wireless communication via SST-2450 wireless modem.



### The common features of the Palm-size PAC:

- **Good in harsh environment**  
wide operating temperature range(-25°C~+75°C)
- **Truly RoHS & WEEE Compliant**
- **Special MiniOS7, anti-virus**
- **Built-in WDT, RTC, Self-Tuner, 64-bit hardware serial number**
- **Rich software support**
- **Local I/O and Expansion Bus Interface**  
X-board to expand local I/Os. COMs, memories....
- **Remote I/O expansion**  
RS-485 to i-7000, M-7000,  
RU-87P4/P8+i-87K (auto-configuration, hot swap, plug & play)
- **Small in size & powerful in function**

# μPAC-7186EG / EGD

ISaGRAF Ethernet PAC



μPAC-7186EG

μPAC-7186EGD

## Main Features

- ISaGRAF Ver. 3 SoftLogic inside
- Support IEC 61131-3 + FC languages
- OS: MiniOS7, 80186-80 MHz CPU
- 640K SRAM, 512K Flash, 16K EEPROM
- Flash memory hardware protected: Jumper
- Ethernet 10/100 Base-TX  
RS-232, RS-485
- Support expansion bus for adding-on X-board



## Comparison

New Advantages	μPAC-7186EG	i-7188EG
Faster normal running speed	2~4 times	1
More powerful CPU	80186-80MHz	80188-40MHz
Faster / powerful Ethernet	10/100 Base-TX	10 Base-T
More SRAM	640K	512K
More EEPROM	16K	2K

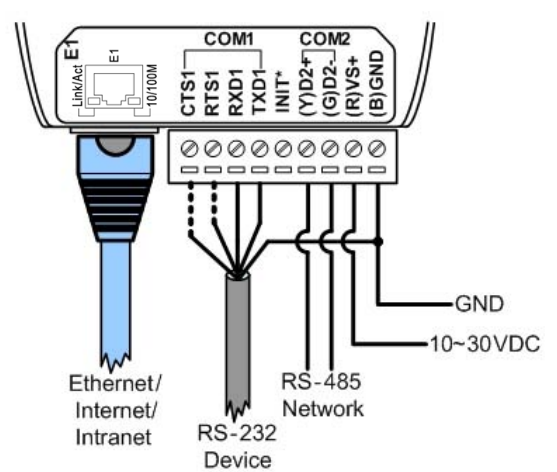
## Features / Applications

- ISaGRAF SoftLogic inside, easy to design (No. 1 of P.3-2-5)  
Support IEC61131-3 International Standard PLC language
- Powerful Communication & Multi-protocols Ability (No. 6 of P.3-2)
- Modbus Protocols: Master & Slave (No. 4 of P.3-2-5)
- Data Exchange: 10/100M Ethernet & RS-485 (No. 2 of P.3-2-5)
- Data logger & recorder (No. 5 of P.3-2-5)
- CAN BUS integration (CAN / CANopen) (No. 3 of P.3-2-5)
- Send e-mail with one attached file (No. 7 of P.3-2-5)
- SMS for mobile or fixed applications (No. 8 of P.3-2-5)
- Wireless Communication (No. 9 of P.3-2-5)
- Auto-report acquisition/control data (No. 10 of P.3-2-5)
- 4-level Internet VIP security protection (No. 10 of P.3-2-5)
- Support cost effective redundancy system (No. 12 of P.3-2-5)
- Easy to integrate with HMI & MMI (No. 11 of P.3-2-5)
- Support EKAN Modbus LED via Modbus Master (No. 4 of P.3-2-5)

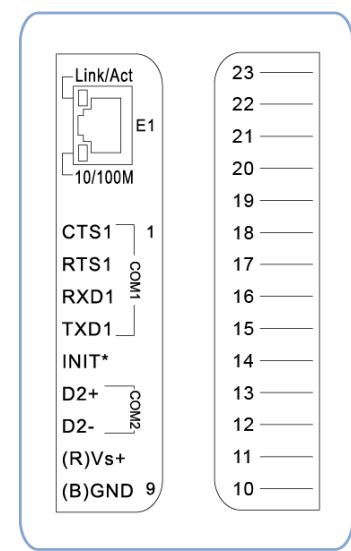
## Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128	X518	
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

## Wiring



## Pin Assignments





## Specifications

Series : Palm-size PAC >  $\mu$ PAC-7186 > ISaGRAF 86 > 86EG

PACs	$\mu$ PAC-7186EG	$\mu$ PAC-7186EGD
<b>Power supply</b>		
Power requirements	10 to 30VDC (unregulated), $\mu$ PAC-7186EG: 2W , $\mu$ PAC-7186EGD: 3W	
Protection	Built-in power protection & network protection circuit	
<b>General environment</b>		
temperature	Operating: -25°C to +75°C ( -13°F to +167°F), Storage : -40°C to +80°C ( -40°F to +176°F)	
Humidity	5% to 95 % (non-condensed)	
<b>System</b>		
CPU	80186 80MHz, or compatible	
Watchdog timer	Yes, default 0.8 second	
Real time clock	Gives hour, minute, sec, date of week, date of month, month & year (1980 to 2079)	
SRAM	640K bytes	
FLASH Memory	512K bytes, Erase unit is 64K bytes, 100,000 erase/write cycles	
NVRAM	31 bytes, battery backup, data valid up to 10 years	
EEPROM	16K bytes, retention > 100 years. 1,000,000 erase/write cycles	
Display for I-7188EGD	5-digit 7-Segment Led display on the front. It can display message & value.	
Expansion I/O bus	One optional Xxxx series I/O board can be plugged inside the $\mu$ PAC-7186EG / 7186EGD.	
NET ID	Set by software, 1 to 255	
<b>Serial ports</b>		
COM1	RS232: TXD, RXD, GND, Speed: 115200 bps max. Program downloads port.	
COM2	RS485: D+, D-, 115200 bps max. Self-tuner ASIC inside. Program downloads port.	
Ethernet	10/100M bps, NE2000 compatible, 10/100 Base-TX. Program download port	
<b>Development software</b>		
ISaGRAF Version 3	IEC61131-3 standard. Languages: LD, ST, FBD, SFC, IL & FC	
Max. code size	$\mu$ PAC-7186EG/EGD accepts max. 64K byte ISaGRAF code size (Appli.x8m must < 64K)	
<b>PWM output</b>		
Pulse Width Modulation output	All Xxxx series D/O boards support PWM output. 8 channels max. for one controller. 500Hz max. for Off=1 & On=1 ms, Output square curve: Off: 1 to 32767 ms, On: 1 to 32767 ms	
<b>Counters</b>		
Parallel D/I counter	All Xxxx series D/I boards support D/I counter. 8 ch. max. for one controller. Counter value: 32 bit, 500Hz max. Min. ON & OFF width must > 1ms	
Remote D/I counter	All remote I-7000 & I-87K D/I modules support counters. 100Hz max. value: 0 to 65535	
Remote high speed counter	Optional i-87082:100kHz max. , 32 bit	
<b>Protocols</b>		
Modbus serial protocol	Up to 2 COM ports (COM1 and COM3-in-X-board) can support Modbus RTU slave protocol for connecting ISaGRAF, PC/HMI/OPC Server & MMI panels.	
Modbus TCP/IP protocol	Ethernet port supports Modbus TCP/IP slave protocol for connecting ISaGRAF & PC/HMI.	
Remote I/O	One of COM2 (or COM3:RS485 if found) supports I-7000 I/O modules & (I-87K base or RU-87P4/8 + I-87K serial I/O boards) as remote I/O. Max. 64 I/O modules for one controller	
Modbus master protocol	Up to 2 COM ports (COM1 ,COM2 and COM3-in-X-board) support Modbus RTU / ASCII master protocol to connect to other Modbus slave I/O devices	
Fbus	Built in COM2 port to exchange data between ICP DAS's ISaGRAF controllers.	
Ebus	To exchange data between ICP DAS's ISaGRAF Ethernet controllers via Ethernet port.	
SMS: Short Message Service	One of (COM3:RS232 or COM4:RS232 if found) can link to a GSM modem to support SMS. User can request data/control the controller by cellular phone. The controller can also send data & alarms to user's cellular phone. Optional GSM modems: M1206 or GM29 (GSM 900/1800 )	
User defined protocol	User can applied own protocol at COM1, COM2 & (COM3 to COM8 if found) by serial communication function blocks.	
Modem Link	Supports PC remotely download & monitor the controller through COM4 of X504.	
MMICON / LCD	One of (COM3:RS232 if found) supports ICP DAS's MMICON. The MMICON is featured with a 240 x 64 dot LCD and a 4 x 4 Keyboard. User can use it to display picture, string, integer, float, and input a character, string, integer and float.	
Redundancy Solution	One is Master, one is slave. Master handles all inputs & outputs at run time. If Master is damaged (or Power off), Slave takes the control of Bus7000b. If Master is alive again, it takes the control of Bus7000b again. The change over time is about 5 seconds. Control data is exchanging via Ebus (if using a cross cable, no need any Ethernet switch). All I/O should be RS-485 I/O except the status I/O in the slot 0: X-107.	
CAN / CANopen	$\mu$ PAC-7186EG can use it's COM1 or COM3 to COM8 (resides at the X-5xx RS-232 expansion board) to connect one i-7530 : the RS-232 to CAN converter to support CAN / CANopen devices/ sensors. One PAC supports max.3 RS-232 port to connect max.3 i-7530. Please refer to <a href="http://www.icpdas.com">www.icpdas.com</a> > FAQ > Software > ISaGRAF Ver.3 (English) > 086	
Battery backup SRAM	$\mu$ PAC-7186EG / EGD can support up to 1024 retain variables with an X607 / X608 plug in the only expansion I/O slot. Data can be stored in X607/X608, and then PC can load these data via COM1 or Ethernet. PC can also download pre-defined data to the X607/X608. Optional: X607: 128kbytes, X608: 512kbytes	

## Ordering Information

Model Number	Description
$\mu$ PAC-7186EG CR	10/100M ISaGRAF Ethernet $\mu$ PAC, 80186-80 CPU, 640K SRAM (RoHS)
$\mu$ PAC-7186EGD CR	10/100M ISaGRAF Ethernet $\mu$ PAC, 80186-80 CPU, 640K SRAM, LED display (RoHS)
<b>Optional Accessories</b>	
NS-205 CR / NS-208 CR	Unmanaged 5-port / 8-Port Industrial 10/100 Base-T Ethernet Switch with Plastic Case (RoHS)

3

Palm-size PAC -  $\mu$ PAC $\mu$ PAC  
7186  
EX $\mu$ PAC  
7186  
EG $\mu$ PAC  
7186  
XG $\mu$ PAC  
7186  
XBi-  
7188  
Ei-  
7188  
Gi-  
7188  
X



# μPAC-7186XG Series

*Available Soon!*

3

Palm - size PAC - μPAC

## What is it?

The μPAC-7186XG Series is our new generation ISaGRAF palm-size PAC. With:

- ISaGRAF SoftLogic
- 80186-80 MHz high speed CPU **✓ Faster**
- More SRAM : Total 640K bytes **✓ Larger**

Compared with the first generation product i-7188XG, the μPAC-7186XG is about 2 to 4 times faster.

## Common Features:

- ISaGRAF Ver.3 SoftLogic inside
- Support IEC 61131-3 Standard
- MiniOS7 inside
- CPU : 80186-80 MHz
- SRAM : 640K Bytes
- Flash : 512K Bytes
- EEPROM : 16K Bytes
- NVRAM : 31 Bytes
- Real Time Clock
- 64-bit Serial number
- 14 user defined I/O Pins(15-28)
- I/O expansion bus inside
- power/communication indicator LED
- μPAC-7186EGD with 5-dig 7-segment LED
- D/O : 1 Channel
- D/I : 1 Channel
- COM1 : RS-232/RS-485 port
- COM2 : RS-485 port
- Initial/Flash Lock Switch
- RoHS & WEEE Compliance
- Frame Ground

### Expansion bus

#### X-board:

- DI / DO
- AI / AO
- Timer
- Counter
- Battery SRAM
- Flash Memory
- COM3 ~ COM8
- SMS Short message service
- Modem Link
- MMICON / LCD



14 User Defined I/O Pins(15-28)



### COM1 : RS-232 / RS-485

- Speed: 115200 bps max.
- Self-tuner ASIC inside
- To PC (Program download)
- Modbus Protocol
- To PC/HMI/OPC Server & MMI panels

### ISaGRAF Ver.3 SoftLogic

- International Standard: IEC 61131-3
- Support 6 PLC languages
- Easy to design
- Powerful communication ability
- Integration with HMI software and MMI

### COM2 : RS-485

Remote I/O module: [Expansion I/O Catalog](#)

- I-7000** (DCON Protocol)  
(AI/O, DI/O, Relay, Counter, Frequency...)
- M-7000** (Modbus Protocol)  
(AI/O, DI/O, Relay...)

I/O Expansion Unit: [Expansion I/O Catalog](#)

- RU-87Pn** (Hot swap, auto-configuration)  
+ High profile i-87K serial I/O module  
(AI/O, DI/O, Relay, Counter, Frequency)
- I-87Kn**  
+ i-87K serial I/O module (Low profile)  
(AI/O, DI/O, Relay, Counter, Frequency)



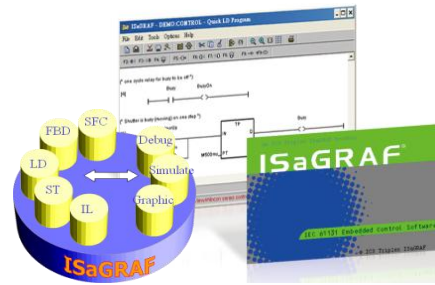
# Top 10 reasons to choose the $\mu$ PAC-7186XG ISaGRAF PAC

Beside the common features of the  $\mu$ PAC, there are 10 more reasons to choose this  $\mu$ PAC-7186XG series:

## 1 ISaGRAF SoftLogic inside, easy to design

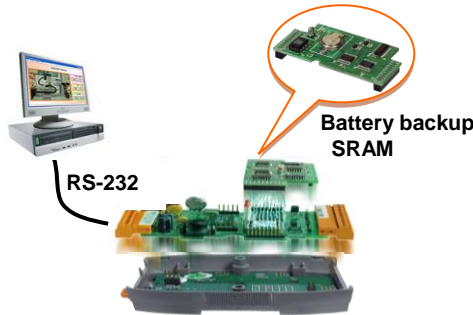
### Support IEC61131-3 Standard PLC language

Instead of C language, ISaGRAF supports all five IEC61131-3 PLC International Standard languages plus Flow Chart language (FC). Easy to design and easy to debug your application!



## 2 Data Exchange: Fbus (RS-485)

Through Fbus: RS-485  
PAC to PAC



## 3 Communication ability: RS-232 / 485

RS-232 : to PC, Modbus RTU Slave or Modbus RTU Master  
RS-485 : Modbus network, RS-485 Fbus network, DCON protocol

## 4 Modbus Protocols: Master / Slave

Modbus Master : RTU, ASCII, RS-232 / 485 / 422  
Modbus RTU Slave

## 5 Data logger & recorder

ICP DAS provides a freeware to load the data stored in  $\mu$ PAC-7186XG+X607/608 via RS-232 to PC.  
X607: 128K bytes; X608: 512K bytes.

## 6 CAN BUS integration

$\mu$ PAC-7186XG(D) with RS-232 ports can connect max. 3 RS-232/CAN converters (e.g. i-7530) to link CAN or CANopen devices.

## 7 SMS for mobile or fixed applications

Provide Short Message Service to send important/emergency message to fixed or mobile equipment such as PC, mobile phone...

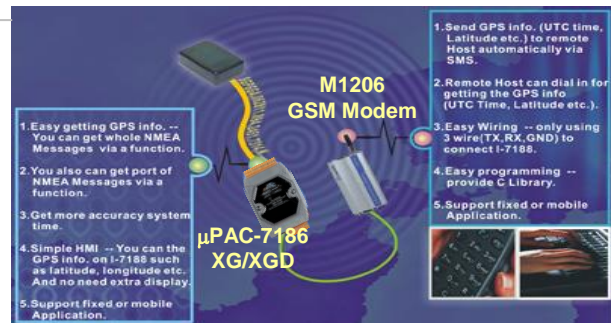
## 8 Wireless communication

Support Wireless communication via SST-2450 wireless modem.

## 9 Easy to integrate with HMI & MMI

**HMI software** that supply Modbus RTU Protocol: InduSoft, OPC server, Iconics, Intouch, iFIX, Wizcon, Citect, Lablink .....

**MMI software/hardware:** touch panel (Touch 506/509/510), MMICON/LCD .....



## 10 Support EKAN Modbus LED

Support Modbus Master protocol to connect to EKAN Modbus LED display.



### The common features of the Palm-size PAC:

- Good in harsh environment  
wide operating temperature range(-25°C~+75°C)
- Truly RoHS & WEEE Compliant
- Special MiniOS7, anti-virus
- Built-in WDT, RTC, Self-Tuner, 64-bit hardware serial number
- Rich software support
- Local I/O and Expansion Bus Interface  
X-board to expand local I/Os. COMs, memories....
- Remote I/O expansion  
RS-485 to i-7000, M-7000, RU-87P4/P8+i-87K (auto-configuration, hot swap, plug & play)
- Small in size & powerful in function

# μPAC-7186XG / XGD

ISaGRAF μPAC

*Available soon!*



μPAC-7186XGD

μPAC-7186XG

## Main Features

- ISaGRAF Ver. 3 SoftLogic inside
- Support IEC 61131-3 + FC languages
- OS: MiniOS7
- 80186-80 MHz CPU
- 640K SRAM, 512K Flash, 16K EEPROM
- RS-232, RS-485  
1 Digital Input & 1 Digital Output
- Support I/O expansion bus



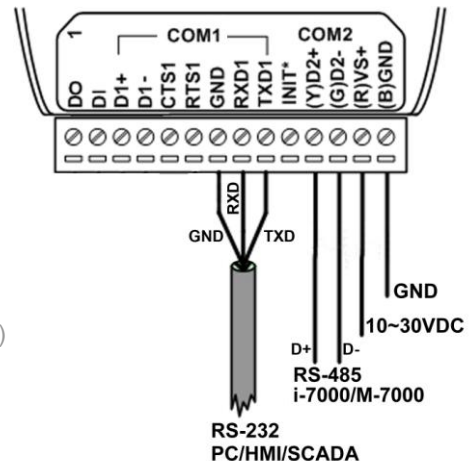
## Comparison

New Advantages	μPAC-7186XG	i-7188XG
Faster normal running speed	2~4 times	1
More powerful CPU	80186-80MHz	80188-40MHz
More SRAM	640K	512K
More EEPROM	16K	2K

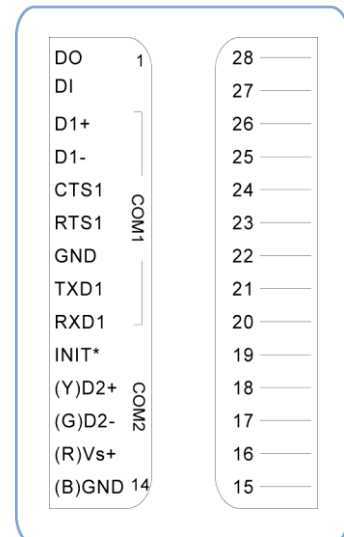
## Features / Applications

- ISaGRAF SoftLogic inside, easy to design (No. 1 of P.3-2-9)  
Support IEC61131-3 International Standard PLC language
- Powerful Communication & Multi-protocols Ability (No. 3 of P.3-2-5)
- Modbus Protocols: Master / Slave (No. 4 of P.3-2-5)
- Data Exchange: Fbus (RS-485) (No. 2 of P.3-2-5)
- Data logger & recorder (No. 5 of P.3-2-5)
- CAN BUS integration (CAN / CANopen) (No. 6 of P.3-2-5)
- SMS for mobile or fixed applications (No. 7 of P.3-2-5)
- Wireless Communication (No. 8 of P.3-2-5)
- Easy to integrate with HMI & MMI (No. 9 of P.3-2-5)
- Support EKAN Modbus LED Display (No. 10 of P.3-2-5)

## Wiring



## Pin Assignments



## Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					



## Specifications

Series : Palm-size PAC &gt; μPAC-7186 &gt; ISaGRAF 86 &gt; 86XG

PACs	μPAC-7186XG	μPAC-7186XGD
<b>■ Power supply</b>		
Power requirements	10 to 30VDC (unregulated), μPAC-7186XG: 2W , μPAC-7186XGD: 3W	
Protection	Built-in power protection & network protection circuit	
<b>■ General environment</b>		
temperature	Operating: -25°C to +75°C ( -13°F to +167°F), Storage : -40°C to +80°C ( -40°F to +176°F)	
Humidity	5% to 95 % (non-condensed)	
<b>■ System</b>		
CPU	80186 80MHz, or compatible	
Watchdog timer	Yes, default 0.8 second	
Real time clock	Gives hour, minute, sec, date of week, date of month, month & year (1980 to 2079)	
SRAM	640K bytes	
FLASH Memory	512K bytes, Erase unit is 64K bytes, 100,000 erase/write cycles	
NVRAM	31 bytes, battery backup, data valid up to 10 years	
EEPROM	16K bytes, retention > 100 years. 1,000,000 erase/write cycles	
Display for I-7188EGD	5-digit 7-Segment Led display on the front. It can display message & value.	
Expansion I/O bus	One optional Xxxx series I/O board can be plugged inside the μPAC-7186EG / 7186EGD.	
NET ID	Set by software, 1 to 255	
<b>■ Serial ports</b>		
COM1	Can be used as RS232 or RS485 , Speed: 115200 bps max. Program downloads port. RS232 TXD,RXD,RTS,CTS,GND RS485: D+, D-, self-tuner inside	
COM2	RS485: D+, D-, 115200 bps max. Self-tuner ASIC inside.	
Ethernet	--	
<b>■ Development software</b>		
ISaGRAF Version 3	IEC61131-3 standard. Languages: LD, ST, FBD, SFC, IL & FC	
Max. code size	Accept max. 64K byte ISaGRAF code size (Appli.x8m must < 64K)	
<b>■ PWM output</b>		
Pulse Width Modulation output	All Xxxx series D/O boards support PWM output. 8 channels max. for one controller. 500Hz max. for Off=1 & On=1 ms, Output square curve: Off: 1 to 32767 ms, On: 1 to 32767 ms	
<b>■ Counters</b>		
Parallel D/I counter	All Xxxx series D/I boards support D/I counter. 8 ch. max. for one controller. Counter value: 32 bit, 500Hz max. Min. ON & OFF width must > 1ms	
Remote D/I counter	All remote I-7000 & I-87K D/I modules support counters. 100Hz max. value: 0 to 65535	
Remote high speed counter	Optional i-87082:100kHz max. , 32 bit	
<b>■ Protocols</b>		
Modbus serial protocol	Up to 2 COM ports (COM1 and COM3-in-X-board) can support Modbus RTU slave protocol for connecting ISaGRAF, PC/HMI/OPC Server & MMI panels.	
Remote I/O	One of COM2 (or COM3:RS485 if found) supports I-7000 I/O modules & (I-87K base or RU-87P4/P8 + I-87K serial I/O boards) as remote I/O. Max. 64 I/O modules for one controller	
Modbus master protocol	Up to 2 COM ports (COM2 and COM3-in-X-board) support Modbus RTU / ASCII master protocol to connect to other Modbus slave I/O devices	
Fbus	Built in COM2 port to exchange data between ICP DAS's ISaGRAF controllers.	
Ebus	To exchange data between ICP DAS's ISaGRAF Ethernet controllers via Ethernet port.	
SMS: Short Message Service	One of (COM3:RS232 or COM4:RS232 if found) can link to a GSM modem to support SMS. User can request data/control the controller by cellular phone. The controller can also send data & alarms to user's cellular phone. Optional GSM modems: M1206 or GM29 (GSM 900/1800 )	
User defined protocol	User can applied own protocol at COM1, COM2 & (COM3 to COM8 if found) by serial communication function blocks.	
Modem Link	Supports PC remotely download & monitor the controller through COM4 of X504.	
MMICON / LCD	One of (COM3:RS232 if found) supports ICP DAS's MMICON. The MMICON is featured with a 240 x 64 dot LCD and a 4 x 4 Keyboard. User can use it to display picture, string, integer, float, and input a character, string, integer and float.	
CAN / CANopen	μPAC-7186EG can use it's COM1 or COM3 to COM8 (resides at the X-5xx RS-232 expansion board) to connect one i-7530 : the RS-232 to CAN converter to support CAN / CANopen devices/ sensors. One PAC supports max.3 RS-232 port to connect max.3 i-7530. Please refer to www.icpdas.com > FAQ > Software > ISaGRAF Ver.3 (English) > 086	
Battery backup SRAM	μPAC-7186EG / EGD can support up to 1024 retain variables with an X607 / X608 plug in the only expansion I/O slot. Data can be stored in X607/X608, and then PC can load these data via COM1 or Ethernet. PC can also download pre-defined data to the X607/X608. Optional: X607: 128kbytes, X608: 512kbytes	

## Ordering Information

Model Number	Description	* All orders include download utility, download cable and manual.
μPAC-7186XG CR	ISaGRAF μPAC, 80186-80 CPU, 640K SRAM, 1 D/I, 1 D/O (RoHS)	▶ Available soon
μPAC-7186XGD CR	ISaGRAF μPAC, 80186-80 CPU, 640K SRAM, 1 D/I, 1 D/O, LED display (RoHS)	▶ Available soon
<b>Optional Accessories</b>		
X607 CR / X608 CR	128K / 512K bytes battery backup SRAM (RoHS)	
SST-2450	Wireless Modem Module RS-232/RS-485 Interface	
EKAN-ME122M	LED Display, 16x96 pixel, 64x384mm, 48W@24VDC, char size: 8x6 or 16x8 pixel	
EKAN-ME124M	LED Display, 16x192 pixel, 64x768mm, 90W@24VDC, char size: 8x6 or 16x8 pixel	

3

Palm-size PAC - μPAC

μPAC  
7186  
EXμPAC  
7186  
EGμPAC  
7186  
XGμPAC  
7186  
XBi-  
7188  
Ei-  
7188  
Gi-  
7188  
X



# μPAC-7186XB Series

*Available Soon!*

3 Palm size PAC - μPAC

## New Faster μPAC

The μPAC-7186XB series is our new generation palm-size PAC with 80186-80 MHz high speed CPU and larger size memory. Compared to the first generation product i-7188X series, μPAC-7186XB is 2 to 4 times faster than before and provide 4 more choices in storage memory.

## Common Features:

- MiniOS7 inside
- CPU : 80186-80 MHz
- SRAM : 512K Bytes or up
- Flash : 512K Bytes
- EEPROM : 16K Bytes
- NVRAM : 31 Bytes
- Real Time Clock
- 64-bit Serial number
- I/O expandable
- Power / communication indicator LED
- EXD model with 5-dig 7-segment LED
- 1 Digital Input / 1 Digital Output
- RS-232 port
- RS-485 port
- RoHS & WEEE Compliance
- Frame Ground
- Initiate/Flash Lock switch



## Special Models:

- μPAC-7186XB-SM CR : with **640K SRAM**
- μPAC-7186XB-FM CR : with **128K FRAM**
- μPAC-7186XB-FD CR : with **64M NAND FLASH**
- μPAC-7186XB-SD CR : with **1G MICRO SD**

## Comparison

PACs	μPAC-7186XB Series	V.S.	i-7188X Series
CPU	80186 80MHz	★	80188 40MHz
EEPROM	16K	★	2K
Memory Selection	SRAM: 512K/640K Flash FRAM NAND Flash Micro SD	★	SRAM: 512K Flash
Normal running Speed	2 ~ 25ms, 4 times faster	★	5 ~ 100ms
Power consumption	1.5W for XB 2.5W for XBD	★	2.0W for XB 3.0W for XBD



## $\mu$ PAC-7186XB Series Selection Guide

<b>XB Series <math>\mu</math>PACs</b>	<b><math>\mu</math>PAC- 7186XB / 7186XBD</b>	<b><math>\mu</math>PAC- 7186XB-SM / 7186XBD-SM</b>	<b><math>\mu</math>PAC- 7186XB-FM / 7186XBD-FM</b>	<b><math>\mu</math>PAC- 7186XB-FD / 7186XBD-FD</b>	<b><math>\mu</math>PAC- 7186XB-SD / 7186XBD-SD</b>
<b>■ Core specifications</b>					
CPU	80186 CPU (80MHz)				
SRAM	512K Bytes	<b>640K Bytes</b>	512K Bytes	512K Bytes	512K Bytes
FRAM	--	--	<b>128K Bytes</b>	--	--
NAND Flash	--	--	--	<b>64M Bytes</b>	--
Micro SD	--	--	--	--	<b>1G</b>
Flash	512K Bytes; Erase unit is one sector (64K bytes); 100,000 erase/write cycles.				
EEPROM	16K bytes; Data retention:40 years; 1,000,000 erase/write cycles				
NVRAM	31 Bytes (battery backup, data valid up to 10 year)				
RTC (real time clock)	Year-2000 compliance; seconds, minutes, hours, date of the month; month, year, valid up from 1980 to 2079				
64-bit Hardware Serial Number	Yes				
Built-in Watchdog Timer	Yes				
<b>■ Communication Interface</b>					
COM1	RS-485 (D1+, D1-; self-tuner ASIC inside)/RS-232 (TXD, RXD, CTS, RTS and GND); Non-isolation				
COM2	RS-485 (D2+, D2-; self-tuner ASIC inside); Non-isolation				
<b>■ Digital Output</b>					
Output Channel	<b>1</b>				
Output Type	Open-Collector (NPN)				
Load Voltage	30VDC, Max				
Load Current	100mA, Max				
Isolation Voltage	Non-isolation				
<b>■ Digital Input</b>					
Input Channel	<b>1</b>				
Input Type	Sink				
Off Voltage Level	+1V max.				
On Voltage Level	+3.5V ~ +30V				
Isolation Voltage	Non-isolation				
<b>■ LED Display</b>					
5-Digit 7 Segment LED Display	Yes (for $\mu$ PAC-7186XBD/-SM/-FM/-FD/-SD only)				
System LED Indicator	Yes				
<b>■ Hardware Expansion</b>					
I/O expansion bus	Yes				
User defined I/O pins	14 pins				
<b>■ Dimensions</b>					
L x W x H	123 x 72 x 33 mm				
<b>■ Operating Environment</b>					
Operating Temperature	-25°C to +75°C				
Storage Temperature	-40°C to +80°C				
Relative Humidity	10% to 90% Non-condensing				
<b>■ Power</b>					
Protection	Power reverse polarity protection				
Required Supply Voltage	+10 to +30VDC (non-regulated)				
Power consumption	1.5W for $\mu$ PAC-7186XB series / 2.5W for $\mu$ PAC-7186XBD series				
<b>■ Green Status</b>					
RoHS	RoHS Compliance 2002/95/EC				
WEEE	WEEE Compliance				

## Top 9 reasons to choose the μPAC-7186XB Series :

### 1 High reliability in harsh environment

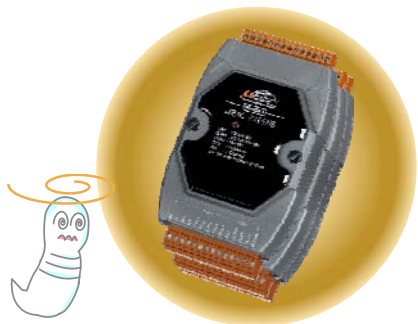
ICP DAS PACs can operate in wide temperature & humidity range, and provide high reliability.

- Operating Temperature : -25°C ~ +75°C ( -13°F to +167°F)
- Storage Temperature : -40°C ~ +80°C ( -40°F to +176°F)
- Humidity : 5% ~ 90%, non-condensing



### 2 Embedded MiniOS7 — anti-Virus

Built-in MiniOS7, developed by ICP DAS more than 10 years, have been successfully protecting PACs from virus more than 10 years.



### 3 Built-in watchdog timer (WDT)

The built-in watchdog timer can trigger a system reset if the main program fails.

### 4 Modbus Protocols

Modbus/TCP/RTU/ASCII slave  
Modbus/TCP/RTU/ASCII master  
Gateway for Modbus/TCP to Modbus/RTU

### 5 FREE easy-to-use Software development toolkits for your applications

Our new MiniOS7 Studio software development toolkit offers full development package version, which can do the programming, compiling, linking, configuring and networking.

The MiniOS7 Studio includes utilities, libraries, example code, etc.

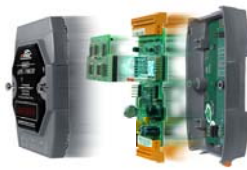
This free software is multi-function in one simple toolkit and still easy-to-use.

If the default firmware does not totally fulfill the user's application needs, custom firmware can be developed for μPAC-7186XB Series using the SDK (Xserver, Modbus library) provided by ICPDAS. (Using C language)

### MiniOS7 Studio







### 6 Expansion Bus Interface

The built-in expansion bus supports one Expansion Board (X-Board). We provide tons of X-Boards to expand more I/Os, COMs, memory functions.

#### Local I/O



μPAC Series + Expansion Board



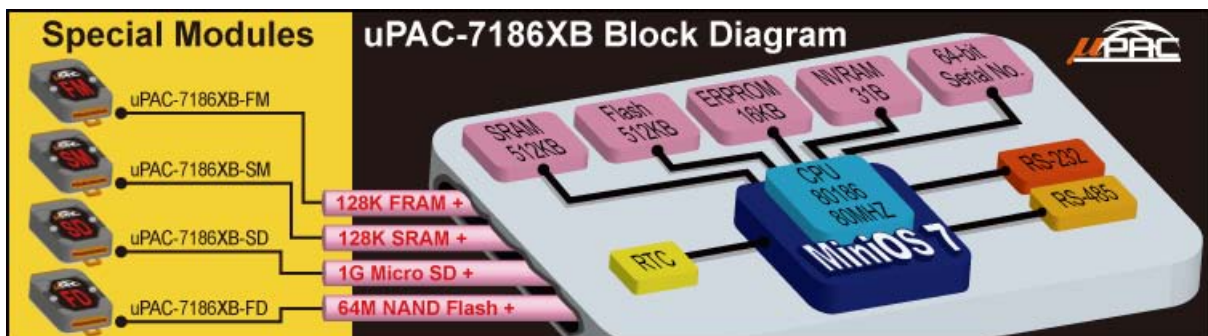
### 7 Remote Configuration And Remote Maintenance

User can remote configure / maintain μPAC-7186XB series via RS-232, such as downloading programs, configuration, updating the MiniOS7...

### 8 Diversified Memory Selection

Memory	Size	Memory Configuration & Description
Flash	512K	64KB are reserved for O.S. image. 448KB or more are free for program & data. With write protection & limitation.
SRAM	512K or 640K	512K/640K bytes is totally free for user. 640Kbytes for μPAC-7186EX -SM, μPAC-7186XB -SM
NVRAM	31B	No write limitation
EEPROM	16K	1KB is reserved for system. The rest is free for user to store small amounts of non-volatile data. With write protection & limitation.
NAND Flash	64M	For μPAC-7186EX -FD, μPAC-7186XB -FD
FRAM	128K	For μPAC-7186EX -FM, μPAC-7186XB -FM
Micro SD	1G	For μPAC-7186EX -SD, μPAC-7186XB -SD

\* Different models have different size SRAM, FRAM or NAND Flash ... memories. Please refer to the Selection Guide.



### 9 Memory writing protection

The Flash and EEPROM are with the memory writing protection and limitation functions. The writing limitation protects EEPROM and Flash memories from the frequently changes of data logging. NVRAM doesn't have write limitation. It is the better choice for temporary data storage, even when power is lost or the system is crashed.

μPAC 7186 EX

μPAC 7186 EG

μPAC 7186 XG

μPAC 7186 XB

i-7188 E

i-7188 G

i-7188 X



# i-7188E Series

## The 1<sup>st</sup> generation of Ethernet Palm-size PAC

The i-7188E series is the 1<sup>st</sup> generation Ethernet palm-size PACs with one 10M Ethernet port for connecting to Internet / Ethernet network.

### The Models

#### 1<sup>st</sup> Generation Ethernet μPAC

- i-7188EX(D)
- i-7188EA(D)
- i-7188EF(D)-016



#### 2<sup>nd</sup> Generation Ethernet μPAC

- μPAC-7186EX(D)
- μPAC-7186EX(D)-SM
- μPAC-7186EX(D)-FM
- μPAC-7186EX(D)-FD
- μPAC-7186EX(D)-SD



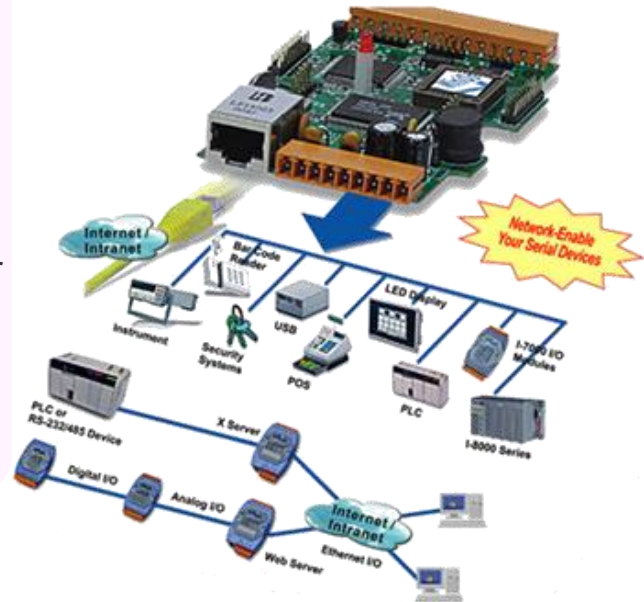
### The Features



- Special MiniOS7 inside, anti-virus
- 80188 40 MHz embedded CPU
- 10 Base-T Ethernet port, NE2000 compatible
- TCP/IP : TCP, UCP, IP, ICMP, ARP
- 512K SRAM, 512K Flash
- 2K EEPROM, 31Bytes NVRAM
- Built-in RTC, NVRAM, EEPROM
- 64-bit hardware unique serial number inside
- 14 user defined I/O lines via X-board
- COM port: COM1, COM2
- COM driver support interrupt & 1K QUEUE I/O buffer
- Re-loadable OS, software & programs, downloaded from COM1 or Ethernet Port
- Built-in self-tuner ASIC controller on RS-485 port
- Remote Configuration / Diagnostics
- Certification: CE, FCC
- Green Status: Truly RoHS compliant

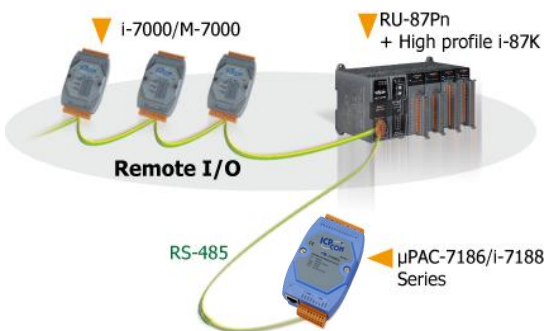
### Ethernet solutions

The Ethernet port provides more solutions for Industrial control system through internet or intranet network beside the original RS-485/232 ports.



## RS-485 Remote I/O Solutions

There are nearly 100 choices of remote I/O modules : i-7000 & i-87K Series .



The advantages of using RU-87P4/P8 + i-87K I/O modules:

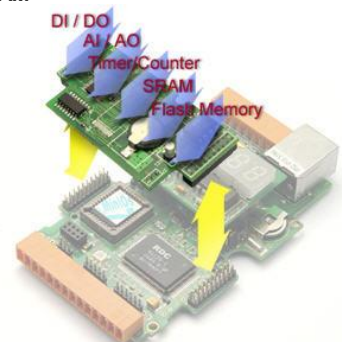
- Hot-Swap
- Auto-configuration at run time
- Plug & play at run time
- Support only High profile i-87K I/O modules

## X-Board Solutions

The X-Board is the expansion board for palm-size PAC except model i-7188EA(D).

X-board series can expand :

- I/O channels, timer/counter, PWM
- Flash ROM, battery backup SRAM
- RS-232/422/485 channels
- Prototype, testing board
- Motion control encoder



More than 50 choices

**The common features of the Palm-size PAC:**

- **Good in harsh environment**  
wide operating temperature range(-25°C~+75°C)
- **Truly RoHS & WEEE Compliant**
- **Special MiniOS7, anti-virus**
- **Built-in WDT, RTC, Self-Tuner, 64-bit hard ware serial number**
- **Rich software support**
- **Local I/O and Expansion Bus Interface**  
most of μPACs support X-board to expand local I/Os. COMs, memories....
- **Remote I/O expansion**  
RS-485 to i-7000, M-7000, RU-87P4/P8+i-87K (auto-configuration, hot swap, plug & play)
- **Small in size & powerful in function**

**More Features & Applications for i-7188E Series**

**1 Internet / Ethernet Communication Ability**

The 10M Ethernet port of i-7188E Series provides the powerful ability to communicate with Internet & Ethernet.

**2 TCP/IP & FRnet Networks**

TCP/IP (TCP, IP, UDP, CMP, ARP) & isolated FRnet

**3 Modbus Master/Slave Protocols:**

Modbus TCP/RTU/ASCII Master  
Modbus TCP/RTU/ASCII Slave  
Gateway for Modbus TCP to Modbus RTU

**4 Powerful communication ability**

**COM1:RS-232** - to PC, Modbus RTU Slave or Master  
**COM2:RS-485** - Modbus, RS-485, DCON protocol  
**Ethernet** - Modbus, TCP, IP, UDP, ICMP, ARP, internet  
**FRnet** – High speed, real I/O synchronization, 2 wire cabling

**5 Built-in Web Server**

Built-in web server for configuration, its Ethernet and COM ports can be configured via standard web browsers (such as IE, Netscape, Firefox,..etc).

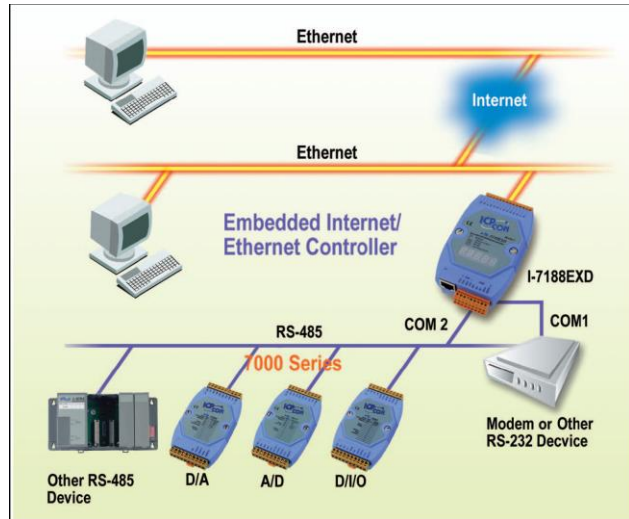


**9 Wireless Communication**

Support Wireless communication via SST-2450 wireless modem.

**10 Support EKAN Modbus LED**

Support Modbus Master protocol to connect to EKAN Modbus LED display.



**6 Easy to integrate with HMI & MMI**

**HMI software** – via Modbus RTU or Modbus TCP/IP - InduSoft, OPC server, Iconics, Intouch, iFIX, Wizcon, Citect, Lablink .....  
**MMI software/hardware** - touch panel (Touch 506/509/510), MMICON/LCD .....

**7 Remote Configuration/Maintenance**

It can be operated via the Ethernet (TCP/IP or UDP) or RS-232, to allow tasks such as downloading programs, configuration, updating the MiniOS7, etc...

**8 SMS for mobile or fixed applications**

Provide Short Message Service to send important / emergency message to PC, mobile phone, PDA...

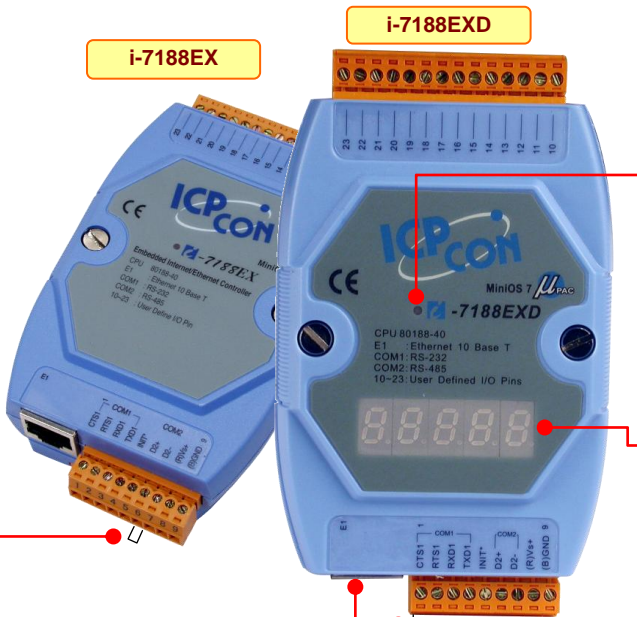


**Comparison Table for i-7188E Series**

Model	CPU	SRAM	Flash	EEPROM	Expansion bus	64-bit hardware serial number	RTC	DI	DO	Ethernet Port	COM1	COM2
<b>i-7188EX</b>	40M Hz	512K	512K	2K	Yes	Yes	Yes	-	-	10 Base-T	RS-232	RS-485
<b>i-7188EXD</b>												
<b>i-7188EA</b>	40M Hz	512K	512K	2K	No (DI/DO)	Yes	Yes	6	7	10 Base-T	RS-232	RS-485
<b>i-7188EAD</b>												
<b>i-7188EF-016</b>	40M Hz	512K	512K	2K	No (FRnet)	Yes	Yes	-	-	10 Base-T	RS-232	RS-485
<b>i-7188EFD-016</b>												

# i-7188EX / i-7188EXD

## Ethernet PAC – with I/O expansion bus



**Main Features**

- 80188-40 embedded CPU
- 10BASE-T NE2000 compatible Ethernet
- OS: MiniOS7
- 512K SRAM, 512K Flash, 2K EEPROM
- Built-in RTC, NVRAM, EEPROM
- COM port : RS-232, RS-485
- Built-in I/O expansion bus to insert an X-Board
- Power / Communication Indicator LED
- 5-digit 7-segment LED Display

**Ethernet Port : 10 Base-T**  
To PC (Program download)  
Modbus TCP/RTU/ASCII  
TCP, UDP, IP, ICMP, ARP

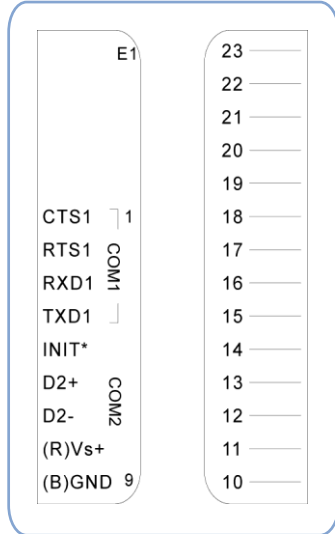
**COM1 : RS-232**  
To PC (Program download)  
Modbus TCP/RTU/ASCII

**COM2 : RS-485** (D/A, A/D, DI/O, Relay, Counter, Frequency)

Remote I/O module: **I-7000** (DCON Protocol)  
**M-7000** (Modbus Protocol)

I/O Expansion Unit: **RU-87Pn + i-87K I/O module** (High profile)  
**I-87Kn + i-87K I/O module** (Low profile)

### Pin Assignments



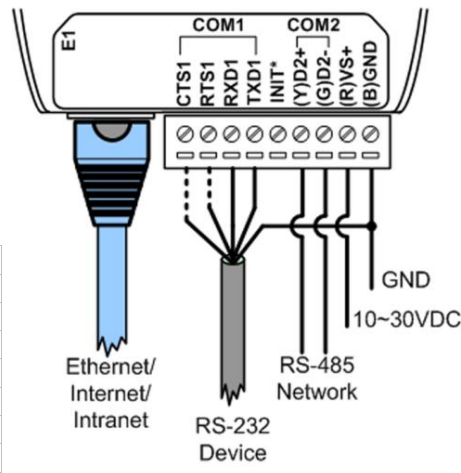
### Features / Applications

- Supports a variety of TCP/IP features, including TCP, UDP, IP, ICMP, ARP (No. 2 of P.3-4-3)
- Re-loadable OS, software, application programs (P.3-4-2)
- Remote Configuration / Maintenance (No. 7 of P.3-4-3)
- Diagnostics (No. 10 of P.3-4-3)
- 64-bit hardware unique serial number inside (P.3-4-3)
- COM driver support interrupt & 1K QUEUE Input & Output buffer
- 14 user defined I/O lines via X-board (P.3-4-2)
- Built-in self-tuner ASIC controller on RS-485 port (P.3-4-3)
- Program download port: COM1 or Ethernet Port (No. 7 of P.3-4-3)

### Expansion Board Selection Guide

Category:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

### Wiring



## Specifications

Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188E > i-7188EX/EXD

PACs	i-7188EX	i-7188EXD
<b>■ CPU</b>		
CPU	80188, 40MHz or compatible	
SRAM	512K bytes	
Flash Memory	512K bytes	
EEPROM	2K Bytes	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes	
64-bit Hardware Serial Number	Yes	
Built-in Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
COM1	RS-232 (TXD, RXD, RTS, CTS, GND); Non-isolation	
COM2	RS-485 (D2+, D2-); self-tuner ASIC inside; Non-isolation	
Ethernet Port	10BASE-T NE2000 compatible Ethernet Controller	
<b>■ COM Port Formats</b>		
Baud rate	115200 bps Max.	
Data bit	7, 8	
Parity	Even, Odd, None	
Stop bit	1	
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	--	Yes
System LED Indicator	Yes	
<b>■ Hardware Expansion</b>		
I/O expansion bus	Yes	
User defined I/O pins	14 pins	
<b>■ Dimensions</b>		
L x H x D	123mm x 72mm x 33mm	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C	
Storage Temperature	-40°C to +80°C	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30V/DC (non-regulated)	
Power consumption	2W	3W

## Ordering Information

Model Number	Description
<b>I-7188EX CR</b>	10M Ethernet palm-size PAC, 80188-40 CPU, MiniOS7, 512K SRAM (RoHS)
<b>I-7188EXD CR</b>	10M Ethernet palm-size PAC, 80188-40 CPU, 512K SRAM, LED display (RoHS)
<b>Optional Accessories</b>	
<b>PWR-24/110</b>	Wall-plug power Adapter / 110VAC, 60Hz, 4.8W
<b>GPSU06U-6</b>	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W
<b>DIN-KA52F</b>	1.05 Amp. DIN-Rail Mounting Power supply
<b>X002 / X005 / X006 CR</b>	Add on X-Board, Prototype Board (RoHS)
<b>X600 CR / X601 CR</b>	4 Mega / 8 Mega Bytes NAND Flash memory expansion Board
<b>X607 CR / X608 CR</b>	X-Board SRAM, 128K / 512K battery backup SRAM (RoHS)
<b>I/O Expansion Boards</b>	Other add-on expansion boards refer to expansion board selection guide
<b>RU-87P1 / 2 / 4 / 8</b>	1 / 2 / 4 / 8 slots I/O expansion unit
<b>NS-208 CR / NS-205 CR</b>	Industrial Ethernet Switch, unmanaged 8-Port / 5-port, 10/100 Base-T with Plastic Case (RoHS)

3

Palm-size PAC - μPAC

μPAC  
7186  
EXμPAC  
7186  
EGμPAC  
7186  
XGμPAC  
7186  
XBi-  
7188  
Ei-  
7188  
Gi-  
7188  
X

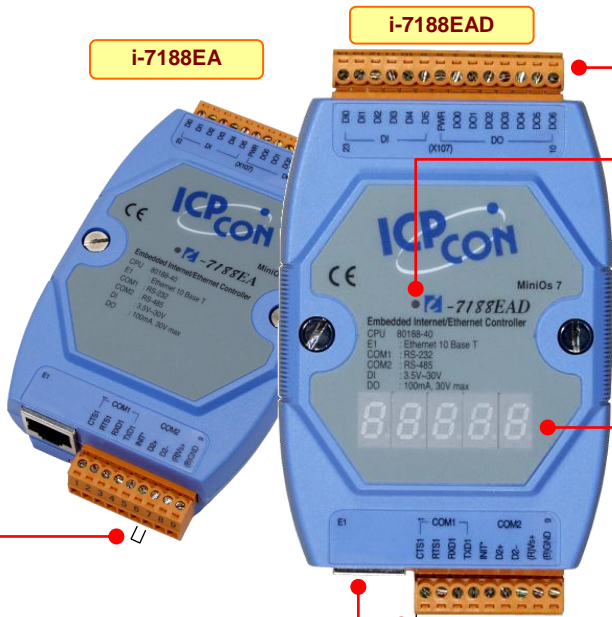


# i-7188EA / i-7188EAD

## Ethernet PAC – with DI/DO

3

Palm-size PAC - µPAC



### Main Features

- 80188-40 embedded CPU
- 10BASE-T NE2000 compatible Ethernet
- OS: MiniOS7
- 512K SRAM, 512K Flash, 2K EEPROM
- Built-in RTC, NVRAM, EEPROM
- COM port : RS-232, RS-485
- Built-in 6 DI & 7 DO channels
- Power / Communication Indicator LED
- 5-digit 7-segment LED Display



### Ethernet Port : 10 Base-T

To PC (Program download)  
Modbus TCP/RTU/ASCII  
TCP, UDP, IP, ICMP, ARP

### COM1 : RS-232

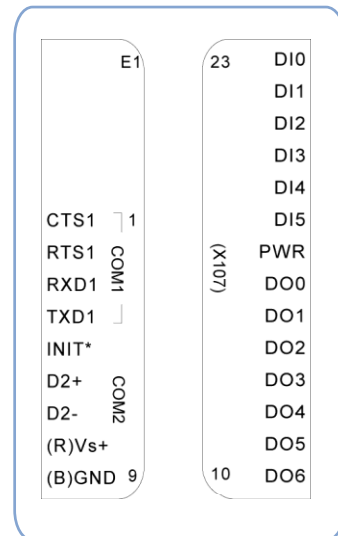
To PC (Program download)  
Modbus TCP/RTU/ASCII

### COM2 : RS-485

(D/A, A/D, DI/O, Relay, Counter, Frequency)

- Remote I/O module: **I-7000** (DCON Protocol)  
**M-7000** (Modbus Protocol)
- I/O Expansion Unit: **RU-87Pn + i-87K I/O module** (High profile)  
**I-87Kn + i-87K I/O module** (Low profile)

### Pin Assignments



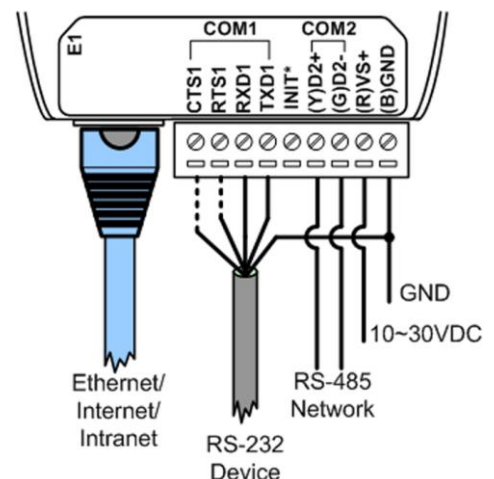
### Features / Applications

- Supports a variety of TCP/IP features, including TCP, UDP, IP, ICMP, ARP (No. 2 of P.3-4-3)
- Re-loadable OS, software, application programs (P.3-4-2)
- Remote Configuration / Maintenance (No. 7 of P.3-4-3)
- Diagnostics (No. 10 of P.3-4-3)
- 64-bit hardware unique serial number inside (P.3-4-3)
- COM driver support interrupt & 1K QUEUE Input & Output buffer
- Built-in 6 digital input channels & 7 open-collector output channels
- Built-in self-tuner ASIC controller on RS-485 port (P.3-4-3)
- Program download port: COM1 or Ethernet Port (No. 7 of P.3-4-3)

### Expansion Board Selection Guide

**Note:** i-7188EA/EAD is built-in with an X-107 board (6 DI & 7 DO channels), so it does not support any other I/O expansion board.

### Wiring



## Specifications

Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188E > i-7188EA/EAD

PACs	i-7188EA	i-7188EAD
<b>■ CPU</b>		
CPU	80188, 40MHz or compatible	
SRAM	512K bytes	
Flash Memory	512K bytes	
EEPROM	2K Bytes	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes	
64-bit Hardware Serial Number	Yes	
Built-in Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
COM1	RS-232 (TXD, RXD, RTS, CTS, GND); Non-isolation	
COM2	RS-485 (D2+, D2-); self-tuner ASIC inside; Non-isolation	
Ethernet Port	10BASE-T NE2000 compatible Ethernet Controller	
<b>■ COM Port Formats</b>		
Baud rate	115200 bps Max.	
Data bit	7, 8	
Parity	Even, Odd, None	
Stop bit	1	
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	--	Yes
System LED Indicator	Yes	
<b>■ Digital Input</b>		
Output Channels	6	
On Voltage Level	+3.5V/DC to +30V/DC Max. (-20°C to +70°C); +3.5V/DC to +25V/DC Max. (-20°C to +75°C)	
Off Voltage Level	+1V/DC Max. (Connect to GND)	
<b>■ Digital Output</b>		
Input Channels	7	
Output Type	Open-collector	
Max Load Current	100mA	
Load Voltage	+30V/DC Max.	
<b>■ Dimensions</b>		
L x H x D	123mm x 72mm x 33mm	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C	
Storage Temperature	-40°C to +80°C	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30V/DC (non-regulated)	
Power consumption	2W	3W

3

Palm-size PAC - μPAC

μPAC  
7186  
EXμPAC  
7186  
EGμPAC  
7186  
XGμPAC  
7186  
XBi-  
7188  
Ei-  
7188  
Gi-  
7188  
X

## Ordering Information

Model Number	Description	* All orders include download utility, download cable and manual.
<b>I-7188EA CR</b>	10M Ethernet palm-size PAC, 80188-40 CPU, MiniOS7, 512K SRAM, 6 DI, 7 DO (RoHS)	
<b>I-7188EAD CR</b>	10M Ethernet palm-size PAC, 80188-40 CPU, 512K SRAM, 6 DI, 7 DO, LED display (RoHS)	
<b>Optional Accessories</b>		
<b>PWR-24/110</b>	Wall-plug power Adapter / 110VAC, 60Hz, 4.8W	
<b>GPSU06U-6</b>	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W	
<b>DIN-KA52F</b>	1.05 Amp. DIN-Rail Mounting Power supply	
<b>RU-87P1 / 2 / 4 / 8</b>	1 / 2 / 4 / 8 slots I/O expansion unit	
<b>NS-208 CR / NS-205 CR</b>	Industrial Ethernet Switch, unmanaged 8-Port / 5-port, 10/100 Base-T with Plastic Case (RoHS)	

# i-7188EF(D)-016

## Ethernet PAC – with FRnet

3 Palm - size PAC - µPAC



### Main Features

- 80188-40 embedded CPU
- 10 BASE-T NE2000 compatible Ethernet
- OS: MiniOS7
- 512K SRAM, 512K Flash, 2K EEPROM
- Built-in RTC, NVRAM, EEPROM
- COM port : RS-232, RS-485
- FRnet port : isolated, high speed
- Power / Communication Indicator LED
- 5-digit 7-segment LED Display



### Ethernet Port : 10 Base-T

To PC (Program download)  
Modbus TCP/RTU/ASCII  
TCP, UDP, IP, ICMP, ARP

### COM1 : RS-232

To PC (Program download)  
Modbus TCP/RTU/ASCII

### COM2 : RS-485 (D/A, A/D, DI/O, Relay, Counter, Frequency)

Remote I/O module: **I-7000** (DCON Protocol), **M-7000** (Modbus Protocol)  
Expansion Unit: **RU-87Pn + i-87K I/O module** (High profile)  
**I-87Kn + i-87K I/O module** (Low profile)

### FRnet Port: (D/A, A/D, DI/O, Relay, Terminal connector)

Distributed I/O Module: **FR-2000 series**  
MagicWire Module: **MA series, FRnet for PLC I/O Link**  
FR I/O Module: **FR-16/32 series**

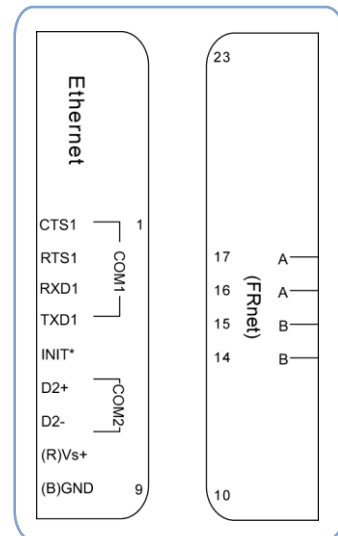
### Features

- Supports FRnet & TCP/IP (TCP, UDP, IP, ICMP, ARP) networks (No. 2 of P.3-4-3)
- Re-loadable OS, software, application programs (P.3-4-2)
- Remote Configuration / Maintenance (No. 7 of P.3-4-3)
- Diagnostics (No. 10 of P.3-4-3)
- 64-bit hardware unique serial number inside (P.3-4-3)
- COM driver support interrupt & 1K QUEUE Input & Output buffer
- Built-in self-tuner ASIC controller on RS-485 port (P.3-4-3)
- Program download port: COM1 or Ethernet Port (No. 7 of P.3-4-3)

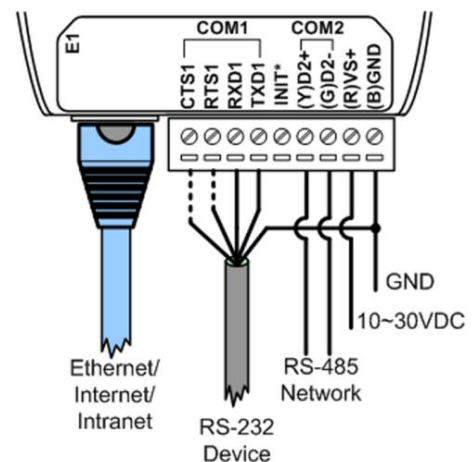
### FRnet Features

- An innovative industrial field bus
- High speed deterministic I/O control
- Real I/O synchronization capability
- Non-protocol communication
- Easy used memory-mapping I/O programming
- One FRnet port to expand distributed I/O module
- Two wire cabling

### Pin Assignments



### Wiring



## Specifications

Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188E > i-7188EF(D)-016

PACs	i-7188EF-016	i-7188EFD-016
<b>■ CPU</b>		
CPU	80188, 40MHz or compatible	
SRAM	512K bytes	
Flash Memory	512K bytes; Erase unit is one sector (64Kb), 100,000 erase/write cycles	
EEPROM	2K Bytes (8 blocks, each block contains 256 bytes); Data retention > 100 years; 1,000,000 erase/write cycle	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes; Displays seconds, minutes, hours, date of the month, month and year from 1980 to 2079	
64-bit Hardware Serial Number	Yes	
Built-in Watchdog Timer	Yes (0.8 seconds)	
<b>■ Communication Interface</b>		
COM1	RS-232 (CTS, RTS, RXD, TXD, GND); Non-isolation, download port	
COM2	RS-485 (D2+, D2-); self-tuner ASIC inside; Non-isolation	
Ethernet Port	10 BASE-T, RJ-45 port, NE2000 compatible Ethernet Controller	
FRnet Port	<ul style="list-style-type: none"> <li>• Communication speed : 250Kbps</li> <li>• Scan time : 128 input / 128 output points @ 2.88 mS (i-7188EF-016L)</li> <li>• Communication distance : Max. 400m (i-7188EF-016L)</li> <li>• Cable: CPEV 0.9 (2P Twisted-pair wire)</li> <li>• Distributed I/O modules: Max. 8 SA modules, FR-2053T (16 DI) Max. 8 RA modules, FR-2057T (16 DO)</li> <li>• Each module of FR-2053T/FR-2057T module is one group.</li> </ul>	
<b>■ COM Port Formats</b>		
Baud rate	115200 bps Max.	
Data bit	7, 8	
Parity	Even, Odd, None	
Stop bit	1	
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	--	Yes
System LED Indicator	Yes	
<b>■ Mechanical</b>		
Dimensions (W x H x D)	123mm x 72mm x 33mm	
Installation	DIN-Rail, Stack Mounting	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C	
Storage Temperature	-40°C to +80°C	
Humidity	Operating humidity: 10% ~90% RH, non-condensing Storage humidity : 5%~95% RH, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30V/DC (non-regulated)	
Power consumption	2W	3W

## Applications

- Factory automation
- Building automation
- Energy management
- Agriculture automation



## Ordering Information

Model Number	Description
<b>I-7188EF-016 CR</b>	10M Ethernet FRnet palm-size PAC, 80188-40 CPU, MiniOS7, 512K SRAM (RoHS)
<b>I-7188EFD-016 CR</b>	10M Ethernet FRnet palm-size PAC, 80188-40 CPU, MiniOS7, 512K SRAM, LED display (RoHS)
<b>Optional Accessories</b>	
<b>FR-2053/2053T/2053S</b>	FR-2000 series; Distributed I/O Module, 16-channel Isolated Sink Digital Input Module
<b>MA-11/12/21/22</b>	MagicWire Module; FRnet for PLC I/O link
<b>FR-32P</b>	FR I/O Module; 32-channel Isolated Digital Input Module
<b>FR-16/32R</b>	FR I/O Module; 16/32-channel Relay Output Module
<b>DIN-KA52F</b>	1.05 Amp. DIN-Rail Mounting Power supply
<b>NS-208 CR / NS-205 CR</b>	Industrial Ethernet Switch, unmanaged 8-Port / 5-port, 10/100 Base-T with Plastic Case (RoHS)

\* All orders include download utility, download cable and manual.



# ISaGRAF i-7188 Series

## The 1<sup>st</sup> generation of ISaGRAF Palm-size PAC

The i-7188EG & i-7188XG are our 1<sup>st</sup> generation palm-size PACs that support ISaGRAF SoftLogic. ISaGRAF PAC can run the programs generated by the most powerful SoftLogic package – ISaGRAF Ver. 3.

### The Models

#### 1<sup>st</sup> Generation ISaGRAF μPAC

- i-7188EG
- i-7188EGD
- i-7188XG
- i-7188XGD



#### 2<sup>nd</sup> Generation ISaGRAF μPAC

- μPAC-7186EG
- μPAC-7186EGD
- μPAC-7186XG
- μPAC-7186XGD



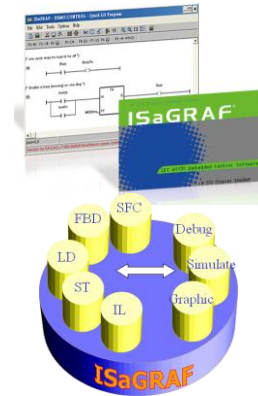
### The Features

- ISaGRAF Ver. 3 SoftLogic inside
- Support IEC 61131-3 Standard Open PLC Programming Languages + FC
- MiniOS7 inside
- 80188-40 MHz CPU
- 512K SRAM
- 2K EEPROM
- 512K Flash
- 31B NVRAM
- Certification: CE, FCC
- Green Status: Truly RoHS compliant



The ISaGRAF μPACs support ISaGRAF Ver.3 Workbench :

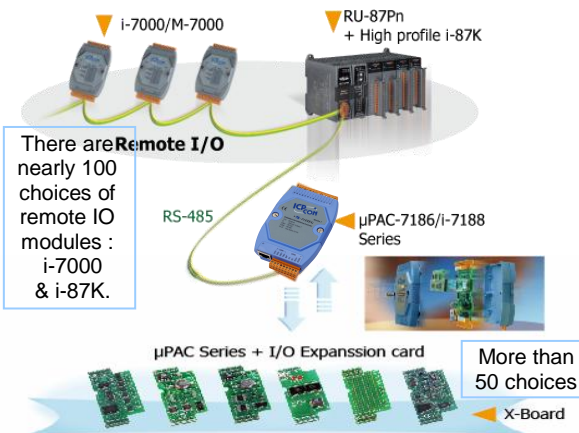
- Support IEC61131-3 Standard Open PLC Programming Languages + Flow Chart Language:
  1. LD
  2. FBD
  3. SFC
  4. ST
  5. IL
  6. FC
- Simulate program even without controller
- Debug on-line
- Control on-line
- Simple graphic HMI



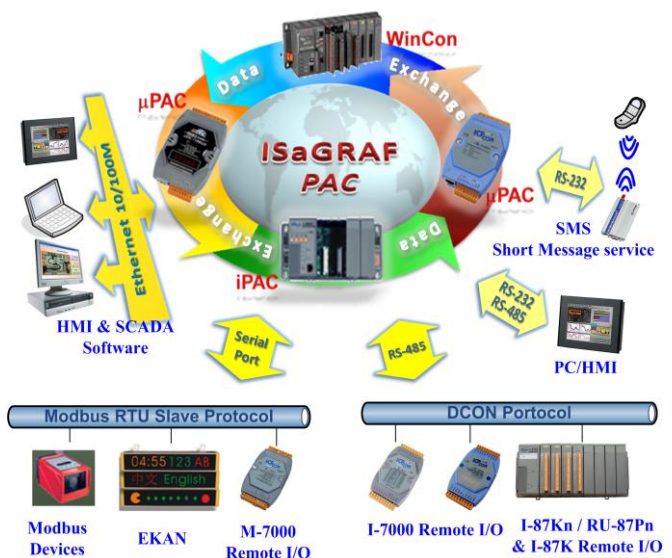
### With I/O Modules

Advantages of using RU-87P4/P8 + i-87K I/O modules:

- Hot-Swap
- Auto-configuration at run time
- Plug & play at run time
- Support only High profile i-87K I/O



### With PACs & Devices



Inserting one X-board in the ISaGRAF μPAC can add :

- More I/O channels: X107, X109, X110, X111, X116, X119, X202, X203, X303, X304, X305, X308, X310
- More RS-232/485, DI/O: X503, X504, X505, X506, X507, X508, X509, X510, X510-128, X511, X518
- More battery backup-SRAM: X607, X608
- Motion control: X702 (2-axis), X703 (3-axis)

**The common features of the Palm-size PAC:**

- **Good in harsh environment**  
wide operating temperature range(-25°C~+75°C)
- **Truly RoHS & WEEE Compliant**
- **Special MiniOS7, anti-virus**
- **Built-in WDT, RTC, Self-Tuner, 64-bit hard ware serial number**
- **Rich software support**
- **Local I/O and Expansion Bus Interface**  
X-board to expand local I/Os. COMs, memories....
- **Remote I/O expansion**  
RS-485 to i-7000, M-7000,  
RU-87P4/P8+i-87K (auto-configuration, hot swap, plug & play)
- **Small in size & powerful in function**

**More Features & Applications for i-7188EG/XG**

**1 ISaGRAF SoftLogic inside, easy to design**  
**Support IEC61131-3 Standard PLC language**

Instead of C language, ISaGRAF supports all five IEC61131-3 PLC International Standard languages plus Flow Chart language (FC). Easy to design and easy to debug your application!

**2 SMS for mobile or fixed applications**

Provide Short Message Service to send important / emergency message to fixed or mobile equipment such as PC, mobile phone...



**3 Wireless Communication**

Support Wireless communication via SST-2450 wireless modem.

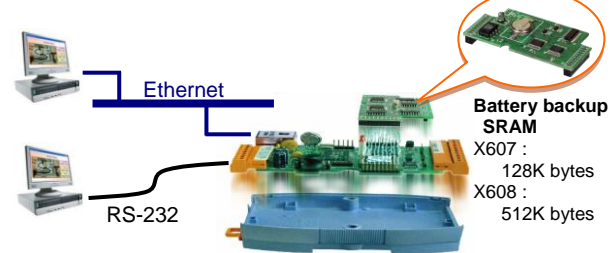
**4 Support EKAN Modbus LED**

Support Modbus Master protocol to connect to EKAN Modbus LED display.



**5 Easy to integrate with HMI / MMI**

**HMI software** that supply Modbus RTU or Modbus TCP/IP Protocol: InduSoft, OPC server, Iconics, Intouch, iFIX, Wizcon, Citect, Lablink .....  
**MMI software/hardware:** touch panel (Touch 506/509/510), MMICON/LCD .....



**6 Data Exchange: 10M Ethernet / RS-485**

Through Ebus: 10 Base-T Ethernet (For i-7188EG only)  
Through Fbus: RS-485 (For both i-7188EG/XG)  
PAC to PAC (For both i-7188EG/XG)

**7 Powerful communication ability**

**i-7188EG: COM1:RS-232, COM2:RS-485, Ethernet port**  
**i-7188XG: COM1:RS-232/RS-485, COM2:RS-485**  
RS-232 : to PC, Modbus RTU Slave or Modbus RTU Master  
RS-485 : Modbus network, RS-485 Fbus network, DCON protocol  
Ethernet port : Modbus TCP/IP Slave, UDP delivering string, Ebus, internet/Ethernet network

**8 Data logger & recorder**

ICP DAS provides a freeware to load the data stored in **i-7188EG+X607/608** via RS-232 or Ethernet to PC (or in **i-7188XG+X607/608** via RS-232 to PC).

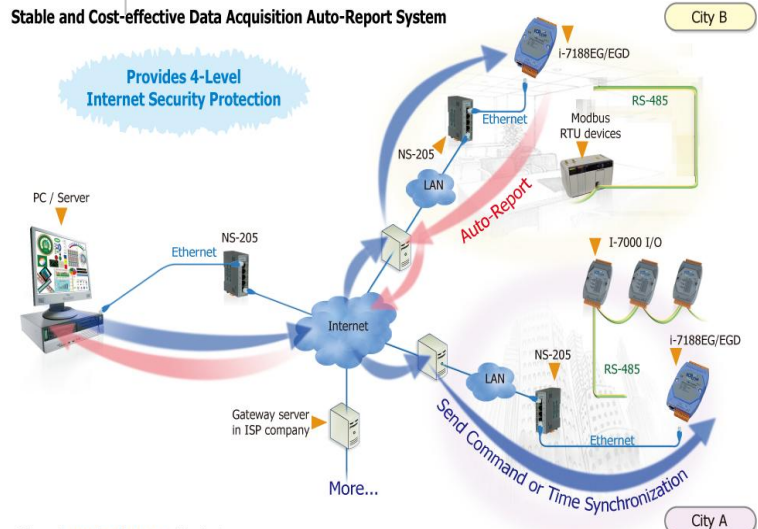
**9 Modbus Protocols: Master & Slave**

Modbus Master: RTU, ASCII, RS-232 / 485 / 422 (Both)  
Modbus Slave: Modbus RTU (both)  
Modbus TCP/IP (i-7188EG only)

**10 Auto-report acquisition/control data**

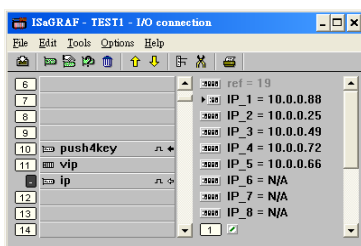
Support auto-report acquisition data & control data to local or remote internet PC/server with 4-level Internet security protection. The data are safe when transmitting. (Not for i-7188XG)

Stable and Cost-effective Data Acquisition Auto-Report System



**11 VIP Communication Security**

Set VIP (Very important IP No.) for Modbus TCP/IP security. (Not for i-7188XG)



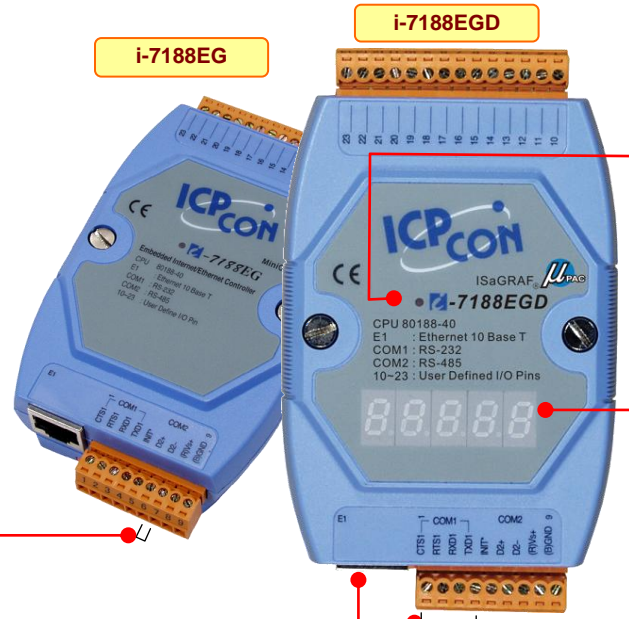
More at [www.icpdas.com](http://www.icpdas.com) > Products

**3**  
Palm-size PAC - μPAC

- μPAC 7186 EX
- μPAC 7186 EG
- μPAC 7186 XG
- μPAC 7186 XB
- i-7188 E
- i-7188 G
- i-7188 X

# i-7188EG / i-7188EGD

## ISaGRAF Ethernet PAC



### Main Features

- ISaGRAF Ver. 3 SoftLogic inside
- Support IEC 61131-3 + FC languages
- OS: MiniOS7
- 80188-40 MHz CPU
- 512K SRAM, 512K Flash, 2K EEPROM
- Ethernet 10 Base-T, RS-232, RS-485
- Support I/O expansion bus
- Power / Communication Indicator LED
- 5-digit 7-segment LED Display

CE FC RoHS

**Ethernet Port : 10 Base-T**  
 To PC (Program download)  
 Modbus TCP/IP Slave  
 UDP delivering string  
 E-bus

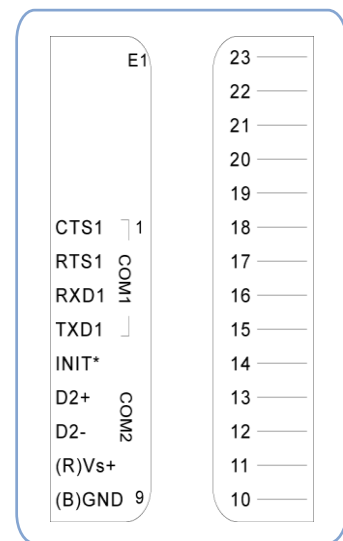
**COM1 : RS-232**  
 To PC (Program download)  
 Modbus RTU Slave  
 or Modbus RTU Master

**COM2 : RS-485** (D/A, A/D, DI/O, Relay, Counter, Frequency)

Remote I/O module: **I-7000** (DCON Protocol)  
**M-7000** (Modbus Protocol)

I/O Expansion Unit: **RU-87Pn + i-87K I/O module** (High profile)  
**I-87Kn + i-87K I/O module** (Low profile)

### Pin Assignments



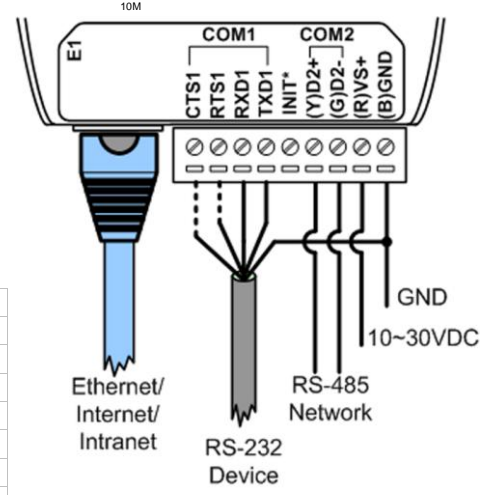
### Features / Applications

- ISaGRAF SoftLogic inside, easy to design (No. 1 of P.3-5-3)  
Support IEC61131-3 International Standard PLC language
- Auto-report acquisition data & control data (No. 10 of P.3-5-3)
- VIP Communication Security (No. 11 of P.3-5-3)
- SMS for mobile or fixed applications (No. 2 of P.3-5-3)
- Wireless Communication via wireless modem (No. 3 of P.3-5-3)
- Support EKAN Modbus LED (No. 4 of P.3-5-3)
- Easy to integrate with HMI & MMI (No. 5 of P.3-5-3)
- Data Exchange: 10/100M Ethernet and RS-485 (No. 6 of P.3-5-3)
- Powerful communication ability (No. 7 of P.3-5-3)
- Data logger & recorder (No. 8 of P.3-5-3)
- Modbus Protocols: Master & Slave (No. 9 of P.3-5-3)

### Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

### Wiring





## Specifications

Series : Palm-size PAC > i-7188 > ISaGRAF 88 > 88EG

PACs	i-7188EG	i-7188EGD
<b>Power supply</b>		
Power requirements	10 to 30VDC (unregulated), i-7188EG: 2W , i-7188EGD: 3W	
Protection	Built-in power protection & network protection circuit	
<b>General environment</b>		
temperature	Operating: -25°C to +75°C ( -13°F to +167°F), Storage : -40°C to +80°C ( -40°F to +176°F)	
Humidity	5% to 95 % (non-condensed)	
<b>System</b>		
CPU	80188 40MHz, or compatible	
Watchdog timer	Yes, default 0.8 second	
Real time clock	Gives hour, minute, sec, date of week, date of month, month & year (1980 to 2079)	
SRAM	512K bytes	
FLASH Memory	512K bytes, Erase unit is 64K bytes, 100,000 erase/write cycles	
NVRAM	31 bytes, battery backup, data valid up to 10 years	
EEPROM	2048 bytes, retention > 100 years. 1,000,000 erase/write cycles	
Display for I-7188EGD	5-digit 7-Segment Led display on the front. It can display message & value.	
Expansion I/O bus	One optional Xxxx series I/O board can be plugged inside the palm-size PAC	
NET ID	Set by software, 1 to 255	
<b>Serial ports</b>		
COM1	RS232: TXD, RXD, GND, Speed: 115200 bps max. Program downloads port.	
COM2	RS485: D+, D-, 115200 bps max. Self-tuner ASIC inside.	
Ethernet	10/M bps, NE2000 compatible, 10 Base-T. Program download port	
<b>Development software</b>		
ISaGRAF Version 3	IEC61131-3 standard. Languages: LD, ST, FBD, SFC, IL & FC	
Max. code size	Accept max. 64K byte ISaGRAF code size (Appli.x8m must < 64K)	
<b>PWM output</b>		
Pulse Width Modulation output	All Xxxx series D/O boards support PWM output. 8 channels max. for one controller. 500Hz max. for Off=1 & On=1 ms, Output square curve: Off: 1 to 32767 ms, On: 1 to 32767 ms	
<b>Counters</b>		
Parallel D/I counter	All Xxxx series D/I boards support D/I counter. 8 ch. max. for one controller. Counter value: 32 bit, 500Hz max. Min. ON & OFF width must > 1ms	
Remote D/I counter	All remote I-7000 & I-87K D/I modules support counters. 100Hz max. value: 0 to 65535	
Remote high speed counter	Optional i-87082:100kHz max. , 32 bit	
<b>Protocols</b>		
Modbus serial protocol	Up to 2 COM ports (COM1 and COM3-in-X-board) can support Modbus RTU slave protocol for connecting ISaGRAF, PC/HMI/OPC Server & MMI panels.	
Modbus TCP/IP protocol	Ethernet port supports Modbus TCP/IP slave protocol for connecting ISaGRAF & PC/HMI.	
Remote I/O	One of COM2 (or COM3:RS485 if found) supports I-7000 I/O modules & (I-87K base or RU-87P4/8 + I-87K serial I/O boards) as remote I/O. Max. 64 I/O modules for one controller	
Modbus master protocol	Up to 2 COM ports (COM1 ,COM2 and COM3-in-X-board) support Modbus RTU / ASCII master protocol to connect to other Modbus slave I/O devices	
Fbus	Built in COM2 port to exchange data between ICP DAS's ISaGRAF controllers.	
Ebus	To exchange data between ICP DAS's ISaGRAF Ethernet controllers via Ethernet port.	
SMS: Short Message Service	One of (COM3:RS232 or COM4:RS232 if found) can link to a GSM modem to support SMS. User can request data/control the controller by cellular phone. The controller can also send data & alarms to user's cellular phone. Optional GSM modems: M1206 or GM29 (GSM 900/1800 )	
User defined protocol	User can applied own protocol at COM1, COM2 & (COM3 to COM8 if found) by serial communication function blocks.	
Modem Link	Supports PC remotely download & monitor the controller through COM4 of X504.	
MMICON / LCD	One of (COM3:RS232 if found) supports ICP DAS's MMICON. The MMICON is featured with a 240 x 64 dot LCD and a 4 x 4 Keyboard. User can use it to display picture, string, integer, float, and input a character, string, integer and float.	
Battery backup SRAM	Support up to 1024 retain variables with an X607 / X608 plug in the only expansion I/O slot. Data can be stored in X607/X608, and then PC can load these data via COM1 or Ethernet. PC can also download pre-defined data to the X607/X608. Optional: X607: 128kbytes, X608: 512kbytes	

## Ordering Information

Model Number	Description
<b>I-7188EG CR</b>	ISaGRAF 10M Ethernet palm-size PAC, 80188-40 CPU, 512K SRAM (RoHS)
<b>I-7188EGD CR</b>	ISaGRAF 10M Ethernet palm-size PAC, 80188-40 CPU, 512K SRAM, LED display (RoHS)
<b>Optional Accessories</b>	
<b>X607 CR / X608 CR</b>	X-Board SRAM, 128K / 512K battery backup SRAM (RoHS)
<b>NS-208 CR / NS-205 CR</b>	Industrial Ethernet Switch, unmanaged 8-Port / 5-port, 10/100 Base-T with Plastic Case (RoHS)
<b>EKAN-ME124M</b>	LED Display, 12x192 pixel, 64x768mm, 90W@24VDC, char size: 8x6 or 16x8 pixel
<b>EKAN-ME122M</b>	LED Display, 12x96 pixel, 64x384mm, 48W@24VDC, char size: 8x6 or 16x8 pixel

3

Palm-size PAC - μPAC

μPAC  
7186  
EXμPAC  
7186  
EGμPAC  
7186  
XGμPAC  
7186  
XBi-  
7188  
Ei-  
7188  
Gi-  
7188  
X



# e-7188XG / e-7188XGD

## ISaGRAF Palm-size PAC

3

Palm-size PAC - µPAC



### Main Features

- ISaGRAF Ver. 3 SoftLogic inside
- Support IEC 61131-3 + FC languages
- OS: MiniOS7
- 80188-40 MHz CPU
- 512K SRAM, 512K Flash, 2K EEPROM
- Power / Communication Indicator LED
- 5-digit 7-segment LED Display
- 1 Digital Input & 1 Digital Output
- COM1:RS-232/RS-485, COM2:RS-485



### RS-232

(Program download)  
To PC  
Modbus RTU Slave  
or Modbus RTU Master

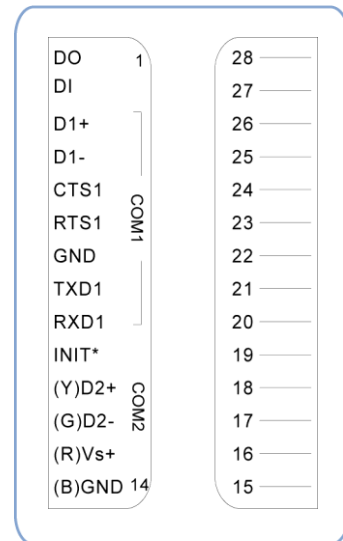
**Note:**  
COM1:RS-232/RS-485  
COM2:RS-485

### RS-485

(D/A, A/D, DI/O, Relay, Counter, Frequency)

- Remote I/O module:
- I-7000 (DCON Protocol)
  - M-7000 (Modbus Protocol)
- I/O Expansion Unit:
- RU-87Pn + i-87K I/O module (High profile)
  - I-87Kn + i-87K I/O module (Low profile)

### Pin Assignments



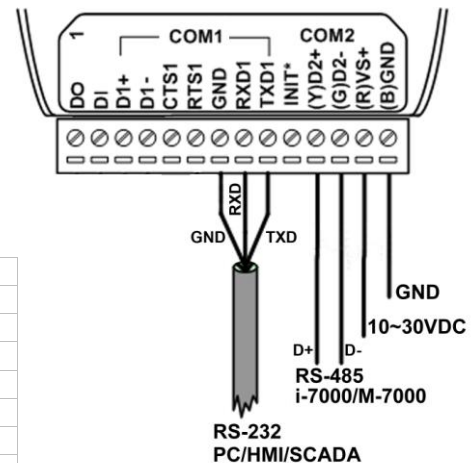
### Features / Applications

- ISaGRAF SoftLogic inside, easy to design (No. 1 of P.3-5-3)  
Support IEC61131-3 International Standard PLC language
- Short Message Service for mobile or fixed applications (No. 2 of P.3-5-3)
- Wireless Communication via SST-2450 wireless modem (No. 3 of P.3-5-3)
- Support EKAN Modbus LED (No. 4 of P.3-5-3)
- Easy to integrate with HMI & MMI (No. 5 of P.3-5-3)
- Data Exchange: 10/100M Ethernet and RS-485 (No. 6 of P.3-5-3)
- Powerful communication ability (No. 7 of P.3-5-3)
- Data logger & recorder (No. 8 of P.3-5-3)
- Modbus Protocols: Master & Slave (No. 9 of P.3-5-3)

### Expansion Board Selection Guide

For:	X-Boards:						
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
Prototype, Testing	X002	X004	X005	X006			
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128		X518
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

### Wiring



## Specifications

Series : Palm-size PAC &gt; i-7188 &gt; ISaGRAF 88 &gt; 88XG

PACs	i-7188XG	i-7188XGD
<b>■ Power supply</b>		
Power requirements	10 to 30VDC (unregulated), i-7188XG: 2W , i-7188XGD: 3W	
Protection	Built-in power protection & network protection circuit	
<b>■ General environment</b>		
temperature	Operating: -25°C to +75°C ( -13°F to +167°F), Storage : -40°C to +80°C ( -40°F to +176°F)	
Humidity	5% to 95 % (non-condensed)	
<b>■ System</b>		
CPU	80188 40MHz, or compatible	
Watchdog timer	Yes, default 0.8 second	
Real time clock	Gives hour, minute, sec, date of week, date of month, month & year (1980 to 2079)	
SRAM	512K bytes	
FLASH Memory	512K bytes, Erase unit is 64K bytes, 100,000 erase/write cycles	
NVRAM	31 bytes, battery backup, data valid up to 10 years	
EEPROM	2048 bytes, retention > 100 years. 1,000,000 erase/write cycles	
Display for I-7188EGD	5-digit 7-Segment Led display on the front. It can display message & value.	
Expansion I/O bus	One optional Xxxx series I/O board can be plugged inside the palm-size PAC.	
NET ID	Set by software, 1 to 255	
<b>■ Serial ports</b>		
COM1	Can be used as RS232 or RS485 , Speed: 115200 bps max. Program downloads port. RS232 TXD,RXD,RTS,CTS,GND RS485: D+, D-, self-tuner inside	
COM2	RS485: D+, D-, 115200 bps max. Self-tuner ASIC inside.	
Ethernet	--	
<b>■ Development software</b>		
ISaGRAF Version 3	IEC61131-3 standard. Languages: LD, ST, FBD, SFC, IL & FC	
Max. code size	Accept max. 64K byte ISaGRAF code size (Appli.x8m must < 64K)	
<b>■ PWM output</b>		
Pulse Width Modulation output	All Xxxx series D/O boards support PWM output. 8 channels max. for one controller. 500Hz max. for Off=1 & On=1 ms, Output square curve: Off: 1 to 32767 ms, On: 1 to 32767 ms	
<b>■ Counters</b>		
Parallel D/I counter	All Xxxx series D/I boards support D/I counter. 8 ch. max. for one controller. Counter value: 32 bit, 500Hz max. Min. ON & OFF width must > 1ms	
Remote D/I counter	All remote I-7000 & I-87K D/I modules support counters. 100Hz max. value: 0 to 65535	
Remote high speed counter	Optional i-87082:100kHz max. , 32 bit	
<b>■ Protocols</b>		
Modbus serial protocol	Up to 2 COM ports (COM1 and COM3-in-X-board) can support Modbus RTU slave protocol for connecting ISaGRAF, PC/HMI/OPC Server & MMI panels.	
Remote I/O	One of COM2 (or COM3:RS485 if found) supports I-7000 I/O modules & (I-87K base or RU-87P4/P8 + I-87K serial I/O boards) as remote I/O. Max. 64 I/O modules for one controller	
Modbus master protocol	Up to 2 COM ports (COM2 and COM3-in-X-board) support Modbus RTU / ASCII master protocol to connect to other Modbus slave I/O devices	
Fbus	Built in COM2 port to exchange data between ICP DAS's ISaGRAF controllers.	
SMS: Short Message Service	One of (COM3:RS232 or COM4:RS232 if found) can link to a GSM modem to support SMS. User can request data/control the controller by cellular phone. The controller can also send data & alarms to user's cellular phone. Optional GSM modems: M1206 or GM29 (GSM 900/1800 )	
User defined protocol	User can applied own protocol at COM2 & (COM3 to COM8 if found) by serial communication function blocks.	
Modem Link	Supports PC remotely download & monitor the controller through COM4 of X504.	
MMICON / LCD	One of (COM3:RS232 if found) supports ICP DAS's MMICON. The MMICON is featured with a 240 x 64 dot LCD and a 4 x 4 Keyboard. User can use it to display picture, string, integer, float, and input a character, string, integer and float.	
Battery backup SRAM	Support up to 1024 retain variables with an X607 / X608 plug in the only expansion I/O slot. Data can be stored in X607/X608, and then PC can load these data via COM1. PC can also download pre-defined data to the X607/X608. Optional: X607: 128kbytes, X608: 512kbytes	

## Ordering Information

Model Number	Description
<b>I-7188XG CR</b>	ISaGRAF palm-size PAC, 80188-40 CPU, 512K SRAM, 1 D/I, 1 D/O (RoHS)
<b>I-7188XGD CR</b>	ISaGRAF palm-size PAC, 80188-40 CPU, 512K SRAM, 1 D/I, 1 D/O, LED display (RoHS)
<b>Optional Accessories</b>	
<b>X607 CR / X608 CR</b>	128K / 512K bytes battery backup SRAM (RoHS)
<b>SST-2450</b>	Wireless Modem Module RS-232/RS-485 Interface
<b>EKAN-ME122M</b>	LED Display, 16x96 pixel, 64x384mm, 48W@24VDC, char size: 8x6 or 16x8 pixel
<b>EKAN-ME124M</b>	LED Display, 16x192 pixel, 64x768mm, 90W@24VDC, char size: 8x6 or 16x8 pixel

3

Palm-size PAC - μPAC

μPAC  
7188  
EXμPAC  
7188  
EGμPAC  
7188  
XGμPAC  
7188  
XBi-  
7188  
Ei-  
7188  
Gi-  
7188  
X

# i-7188X Series

## The Best Selling Palm-size PAC

The i-7188X series is the 1<sup>st</sup> generation palm-size PAC with embedded OS- MiniOS7. Being our first designed product, i-7188X series is the best selling palm-size PAC. For some special requirements such as embedded ROM-DOS OS or others, please ask us for OEM or ODM supporting to meet your need.

### The Models

#### 1<sup>st</sup> Generation 7188 μPAC

- i-7188(D)
- i-7188XA(D)
- i-7188XB(D)
- i-7188XC(D)
- i-7188XBD-CAN



#### 2<sup>nd</sup> Generation 7186 μPAC

- μPAC-7186XB(D)
- μPAC-7186XB(D)-FM
- μPAC-7186XB(D)-FD



### The Features

- Special MiniOS7 inside, anti-virus
- 80188 40 MHz embedded CPU
- 512K Flash, 128~256K SRAM
- 2K EEPROM, 31B NVRAM
- Built-in RTC, NVRAM, EEPROM
- 64-bit hardware unique serial number inside
- 14 user defined I/O lines via X-board
- COM port: COM1, COM2
- COM driver support interrupt & 1K QUEUE I/O buffer
- Built-in self-tuner ASIC controller on RS-485 port
- Re-loadable OS, software and application programs
- Program download port: COM1(7188XB/XC) COM4(7188/XA)
- Remote Configuration / Diagnostics
- Green Status: Truly RoHS compliant
- Certification: CE, FCC



## Comparison Table for i-7188X Series

Model	i-7188(D)	i-7188XA(D)	i-7188XB(D)	i-7188XC(D)	i-7188XBD-CAN
CPU clock	80188, 40MHz	80188, 40MHz	80188, 40MHz	80188, 20MHz	80188, 40MHz
SRAM	256K	512K	512K	128K	512K
Flash Memory	512K	512K	512K	512K	512K
COM1	RS-232 with modem control or RS-485	RS-232 with modem control or RS-485 with internal self-tuner	RS-232 or RS-485 with internal self-tuner	RS-232 or RS-485 with internal self-tuner	RS-232 or RS-485 with internal self-tuner
COM2	RS-485	RS-485 with internal self-tuner, 3000V isolation	RS-485 with self-tuner inside	RS-485 with self-tuner inside	RS-485 with self-tuner inside
COM3	RS-232(TxD, RxD)	RS-232(TxD, RxD)	No COM	No COM	No COM
COM4	RS-232(TxD, RxD)	RS-232(TxD, RxD)	No COM	No COM	No COM
CAN bus	No	No	No	No	Yes
Expansion bus	No	Yes	Yes	Yes	No
User defined pins	0	0	14	3	0
RTC	Yes	Yes	Yes	No	Yes
64-bit hardware unique serial number	No	Yes	Yes	No	Yes
EEPROM	2K bytes	2K bytes	2K bytes	2K bytes	2K bytes
D/I (3.5V~30V)	0	2 channels	1 channel	2 channels	1 channel
D/O (100mA, 30V)	0	2 channels	1 channel	3 channels	1 channel
Support for ASIC Key	No	Yes	Yes	Yes	Yes
Operating system	MiniOS7	MiniOS7	MiniOS7	MiniOS7	MiniOS7
Programming language	TC/TC++/BC/MSC/MSVC				
Program download port	COM4	COM4	COM1	COM1	COM1
Modem control port	COM1	COM1	No	No	No
Page	3-6-4	3-6-6	3-6-8	3-6-10	3-6-12

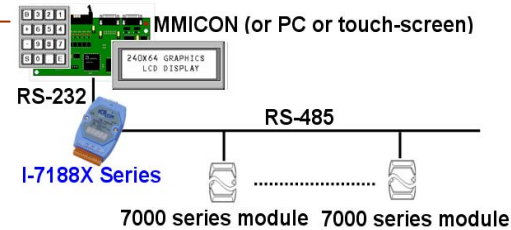
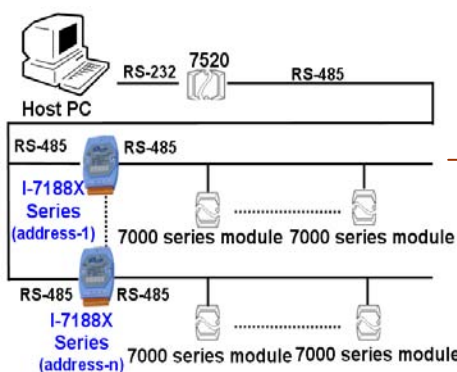
**The common features of the Palm-size PAC:**

- **Good in harsh environment**  
wide operating temperature range(-25°C~+75°C)
- **Truly RoHS & WEEE Compliant**
- **Special MiniOS7, anti-virus**
- **Most of the μPACs have built-in WDT, RTC, Self-Tuner, 64-bit hardware serial number**
- **Rich software support**
- **Local I/O and Expansion Bus Interface**  
most of μPACs support X-board to expand local I/Os. COMs, memories, UART....
- **Remote I/O expansion**  
RS-485 to i-7000, M-7000, RU-87P4/P8+i-87K (auto-configuration, hot swap, plug & play)
- **Small in size & powerful in function**

**More Features & Applications**

**1 Used as an Embedded Controller**

- PC-Based controller replacement
- PLC replacement
- Special controller replacement



**2 Local Real Time Controller (RTC)**

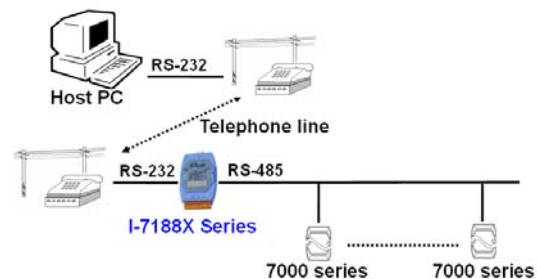
- PC can handle thousands of i-7000 modules with 7188X series
- Some control functions are timing critical. The local 7188X series can real time handle these functions without PC.

**3 Remote Local Controller**

- The PC can access the remote 7188X for:
  - query & record the remote system status
  - download the control arguments to remote 7188X
- The remote 7188X can communicate to PC for:
  - emergency events call back
  - remote system status send back

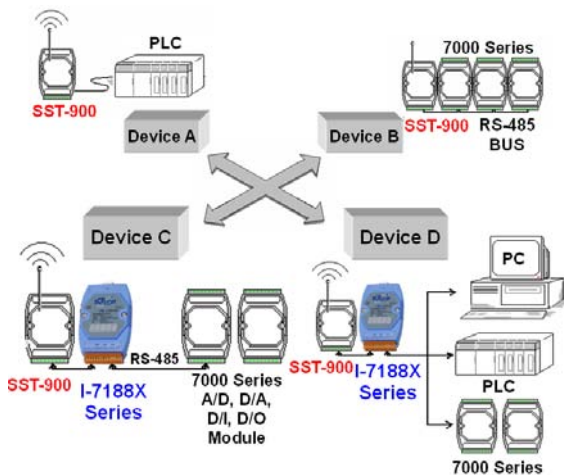
**4 I/O Extension of PLC application**

The I-7188X Series can use the PLC MMI interface to construct a bridge between a PLC and the 7000 series modules.



**5 Radio Modem Application**

Using SST-900/SST-2400 radio modem



**6 Use All 4 COM Ports Application**

- COM1: Links to the remote Host PC
- COM2: Directly controls the 7000 series input/output modules
- COM3: The TOUCH screen is used as the local MMI
- COM4: The Card reader is used as a standard input device.



**7 Support CAN bus application**

CAN is a serial communication way, which efficiently supports distributed real-time control with a very high level of security. i-7188XBD-CAN can help users to apply to various CAN applications flexibly



# i-7188 / i-7188D

## Palm-size PAC



### Main Features

- 80188-40 embedded CPU
- OS: MiniOS7
- 256K SRAM, 512K Flash
- 2048 Bytes EEPROM
- Built-in RTC, 31Bytes NVRAM
- Built-in 4 channels of COM port
- COM : RS-232, RS-485
- Power / Communication Indicator red LED
- 5-digit 7-segment LED Display

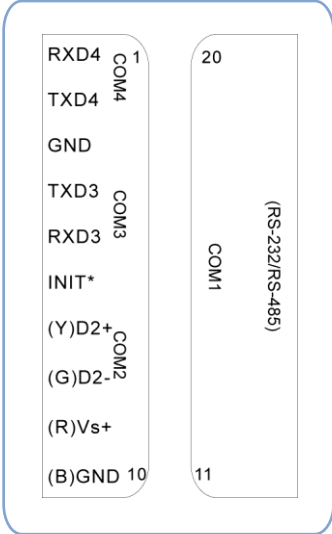
**COM1 : RS-232 / RS-485**  
 RS-232: TXD, RXD, RTS, CTS, DTR, DSR, DCD, RI, GND  
 RS-485: D1+, D1-  
 Default is RS-232, jumper select.  
 16 bytes FIFO

**COM2 : RS-485**  
 RS-485: D2+, D2-  
 16 bytes FIFO

**COM3 : RS-232**  
 RS-232: TXD3, RXD3, GND  
 1 byte FIFO

**COM4 : RS-232**  
 RS-232: TXD4, RXD4, GND  
 Program download port  
 1 byte FIFO

### Pin Assignments



### Features

- Built-in Watch dog timer for harsh environment
- Built-in power protection circuit
- Built-in RS-485 network protection circuit
- Support Modem Control: COM1
- Program language : TC/TC++/BC/MSC/MSVC
- Easy use software development toolkits

### Applications

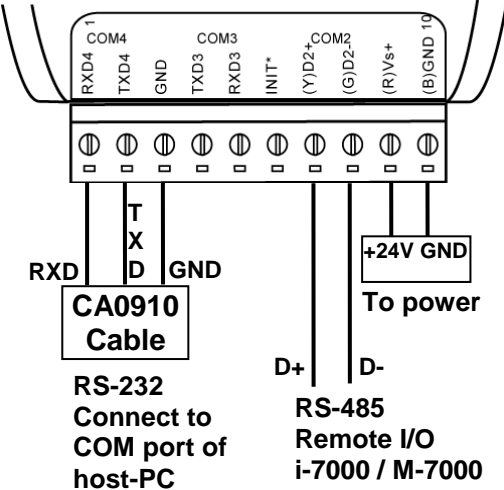
- Factory Automation
- Protocol Converter
- Building Automation



### Expansion Board Selection Guide

Note: i-7188(D) does not support I/O expansion board.

### Wiring



Specifications

Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188X > i-7188/7188D

PACs	i-7188	i-7188D
<b>■ CPU</b>		
CPU	80188, 40MHz or compatible	
SRAM	256K bytes	
Flash Memory	512K bytes; Erase unit is one sector (64K bytes); 100,000 erase/write cycles.	
EEPROM	2048 Bytes (8 block, each block contains 256byte) Data retention > 100 years; 1,000,000 erase/write cycles	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes; Seconds, minutes, hours, date of the month; month, year, valid up from 1980 to 2079	
64-bit Hardware Serial Number	No	
Built-in Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
COM1	RS-232 or RS-485 ( jumper select(JP1), default is RS-232) RS-232 (TXD, RXD, RTS, CTS, DTR, DSR, DCD, RI, GND) RS-485 (D1+, D1-) 16 bytes FIFO	
COM2	RS-485 (D2+, D2-), 16 bytes FIFO	
COM3	RS-232 (TXD3, RXD3, GND), 1 byte FIFO	
COM4	RS-232 (TXD4, RXD4, GND); Program download port; Can be used as general purpose RS-232 port, 1 byte FIFO	
<b>■ COM Port Formats</b>		
Communication Speed	115200bps max. for all ports	
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	--	Yes
System LED Indicator	Yes, one red LED	
<b>■ Hardware Expansion</b>		
I/O expansion bus	No	
User defined I/O pins	No	
<b>■ Dimensions</b>		
L x H x D (mm)	119 x 72 x 33	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C (-13° F to +167° F)	
Storage Temperature	-40°C to +80°C (-40° F to +176° F)	
Humidity	5% ~ 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30VDC (non-regulated)	
Power consumption	2W	3W



Ordering Information

Model Number	Description
<b>I-7188/512 CR</b>	Palm-size PAC, 512K flash, MiniOS7 (RoHS)
<b>I-7188D/512 CR</b>	Palm-size PAC, 512K flash, MiniOS7, 5-Digit 7-Segment LED display (RoHS)
<b>OEM Version</b>	
<b>I-7188/DOS/512 CR</b>	OEM Palm-size PAC, 512K flash, ROM-DOS (RoHS)
<b>I-7188D/DOS/512 CR</b>	OEM Palm-size PAC, 512K flash, ROM-DOS, 5-Digit 7 Segment LED display (RoHS)
<b>Optional Accessories</b>	
<b>PWR-24/110</b>	AC 110V input, flat type power adaptor
<b>GPSU06U-6</b>	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W
<b>PWR-24/230R</b>	AC 230V input, round type power adaptor
<b>DIN-KA52F</b>	24V/2.5A 5V/0.5A DIN-Rail Mounting Power supply
<b>RU-87P1 / 2 / 4 / 8</b>	1 / 2 / 4 / 8 slots I/O expansion unit

3  
Palm-size PAC - μPAC

μPAC 7186 EX

μPAC 7186 EG

μPAC 7186 XG

μPAC 7186 XB

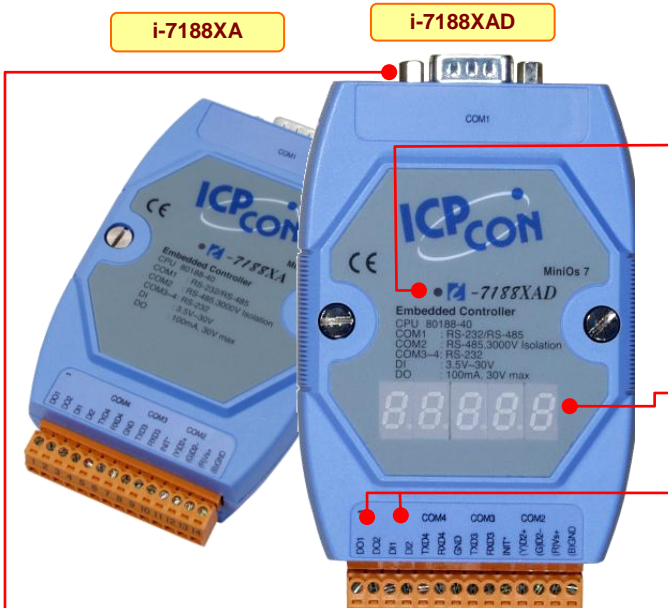
i-7188 E

i-7188 G

i-7188 X

# i-7188XA / i-7188XAD

**Palm-size PAC – with 2 DI / 2 DO**



**Main Features**

- 80188-40 embedded CPU
- OS: MiniOS7
- 512K SRAM, 512K Flash
- Built-in RTC, 31B NVRAM, 2048B EEPROM
- 4 COM ports : RS-232, RS-485
- 3000V isolated RS-485
- Power / Communication Indicator Red LED
- 5-digit 7-segment LED Display
- Built-in 2 DI & 2 DO channels

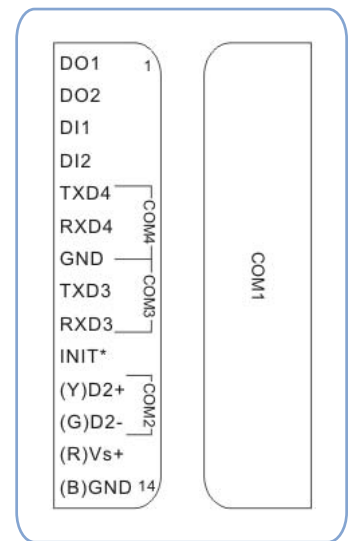
**COM1 : RS-232 / RS-485**  
 RS-232: TXD, RXD, RTS, CTS, DTR, DSR, DCD, RI, GND  
 RS-485: D1+, D1-  
 Default is RS-232, jumper select.  
 16 bytes FIFO

**COM2 : RS-485**  
 RS-485: D2+, D2-  
 Self-tuner ASIC  
 Isolation voltage: 3000V  
 16 bytes FIFO

**COM4 : RS-232**  
 RS-232: TXD4, RXD4, GND  
 Program download port  
 1 byte FIFO

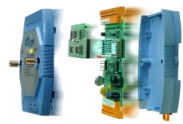
**COM3 : RS-232**  
 RS-232: TXD3, RXD3, GND  
 1 byte FIFO

### Pin Assignments



### Features

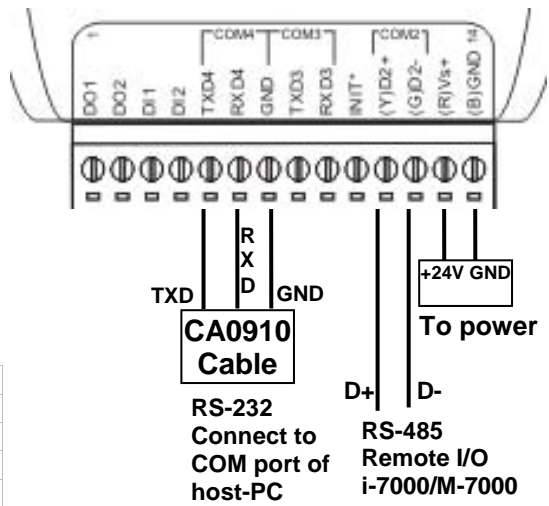
- Built-in Watch dog timer & 64-bit hardware unique serial number
- Built-in power protection circuit & RS-485 network protection circuit
- Can directly control 7000 series up to 256 modules (thousand of I/Os)
- Easy use software development toolkits
- COM driver support interrupt & 1K QUEUE Input / Output buffer
- Built-in 2 digital input channels & 2 open-collector output channels
- Built-in self-tuner ASIC controller on RS-485 port
- Program language : TC/ TC++/BC/MSC/MSVC
- Program download port: COM4
- Modem control port:: COM1
- Re-loadable OS, software & programs
- built-in one expansion bus to add-on an expansion board



### Expansion Board Selection Guide

Category:	X-Boards:			
Prototype	X000	X001		
Testing	X003			
RS-232/485	X500			
Flash ROM	X600	X601		
Battery Backup SRAM	X607	X608		

### Wiring



**Specifications**

Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188X > i-7188XA/XAD

PACs	i-7188XA	i-7188XAD
<b>■ CPU</b>		
CPU	80188, 40MHz or compatible	
SRAM	512K bytes	
Flash Memory	512K bytes; Erase unit is one sector (64K bytes); 100,000 erase/write cycles.	
EEPROM	2048 Bytes (8 block, each block contains 256byte) Data retention > 100 years; 1,000,000 erase/write cycles	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes; Seconds, minutes, hours, date of the month; month, year, valid up from 1980 to 2079	
64-bit Hardware Serial Number	Yes	
Built-in Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
COM1	RS-232 or RS-485 ( jumper select(JP6), default is RS-232), 16 bytes FIFO RS-232 (TXD, RXD, RTS, CTS, DTR, DSR, DCD, RI, GND) RS-485 (D1+, D1-, self-tuner ASIC inside)	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside), 16 bytes FIFO, Isolation voltage : 3000V	
COM3	RS-232 (TXD3, RXD3, GND), 1 byte FIFO	
COM4	RS-232 (TXD4, RXD4, GND); Program download port; Can be used as general purpose RS-232 port, 1 byte FIFO	
<b>■ COM Port Formats</b>		
Communication Speed	115200 bps max. for all ports	
<b>■ Digital Input/Output</b>		
Digital Input	Channels : 2 Input type : non-isolated On voltage level : +1VDCmax (Connect to GND) Off voltage level : +3.5V~30VDC(Open)	
Digital Output	Channels : 2 Output type : Open-collector Output current : 100mA Max load voltage : +30VDC	
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	--	Yes
System LED Indicator	Yes, one red LED	
<b>■ Hardware Expansion</b>		
I/O expansion bus	Yes	
User defined I/O pins	No	
<b>■ Dimensions</b>		
L x H x D (mm)	119 x 72 x 33	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C ( -13° F to +167° F)	
Storage Temperature	-40°C to +80°C ( -40° F to +176° F)	
Humidity	5% ~ 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30VDC	
Power consumption	2.0 W	3.0 W

**Ordering Information**

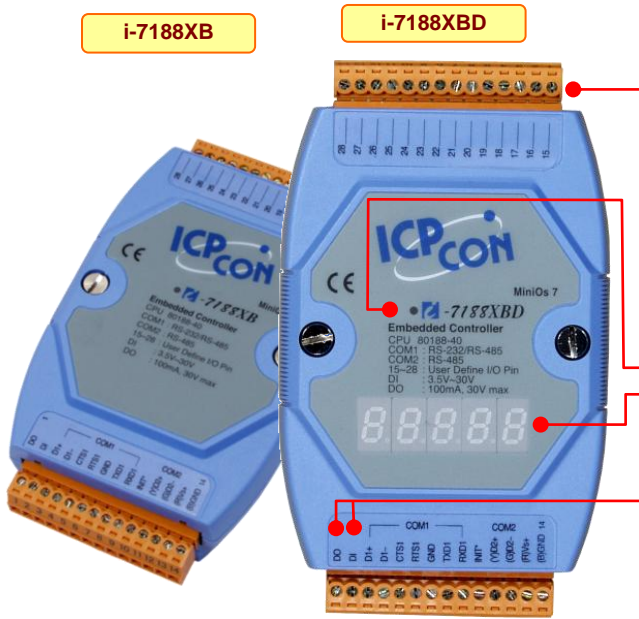
Model Number	Description	* All orders include download utility, download cable and manual.
<b>I-7188XA CR</b>	Palm-size PAC, 80188-40 CPU, 512K Flash, 4 COM ports, 3000V isolated RS-485 (RoHS)	
<b>I-7188XAD CR</b>	Palm-size PAC, 80188-40 CPU, 512K Flash, 4 COM ports, 3000V isolated RS-485, LED display (RoHS)	
<b>OEM Version</b>		
<b>I-7188XA-DW CR</b>	OEM Palm-size PAC; same as i-7188XA CR, but the pin-header of local bus is in the up side down direction, and without plastic box (RoHS)	
<b>I-7188XAD-DW CR</b>	OEM Palm-size PAC; same as i-7188XA-DW CR with 5-digit 7-segment LED Display (RoHS)	
<b>Options &amp; Accessories</b>		
<b>GPSU06U-6</b>	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W	
<b>DIN-540A/DIN-KA52F</b>	Power supply; DIN-540A: 42Amp / DIN-KA52F: 1.05Amp	
<b>X500</b>	X-board for COM port, RS-232*1, without case	
<b>X60x</b>	X-board for memory expansion; Flash: X600(4M), X601(8M); battery backup SRAM:X607(Wide 128K), X608(512K)	
<b>X-Board</b>	Other add-on expansion boards refer to expansion board selection guide	

**3**  
 Palm-size PAC - μPAC  
 μPAC 7186 EX  
 μPAC 7186 EG  
 μPAC 7186 XG  
 μPAC 7186 XB  
 i-7188 E  
 i-7188 G  
 i-7188 X



# i-7188XB / i-7188XBD

**Palm-size PAC – with 1 DI / 1 DO**



**Main Features**

- 80188-40 embedded CPU
- OS: MiniOS7
- 512K SRAM, 512K Flash
- Built-in RTC, 31B NVRAM, 2048B EEPROM
- 2 COM ports : RS-232, RS-485
- User defined Pins: 14 Pins via X-board
- Power / Communication Indicator Red LED
- 5-digit 7-segment LED Display
- Built-in 1 DI & 1 DO channels

**COM1 : RS-232 / RS-485**

RS-232: TXD, RXD, RTS, CTS, GND  
 RS-485: D1+, D1- (self-tuner ASIC)  
 Default is RS-232  
 Program download port  
 1 byte FIFO

**COM2 : RS-485**

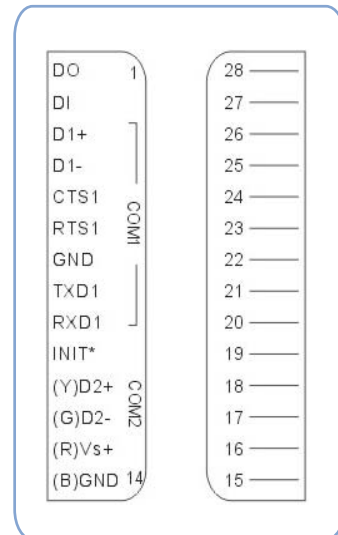
RS-485: D2+, D2-  
 Self-tuner ASIC  
 1 byte FIFO

## Features

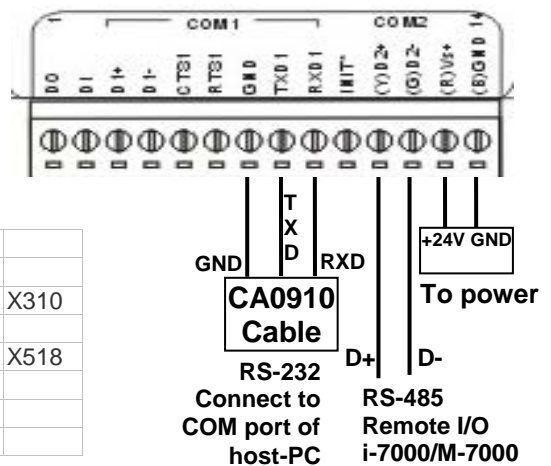
- Built-in Watch dog timer & 64-bit hardware unique serial number
- Built-in power protection circuit & RS-485 network protection circuit
- Easy use software development toolkits
- COM driver support interrupt & 1K QUEUE Input / Output buffer
- Built-in 1 digital input channels & 1 open-collector output channels
- Built-in self-tuner ASIC controller on RS-485 port
- Program language : TC/TC++/BC/MSC/MSVC
- Program download port: COM1
- Re-loadable OS, software & programs
- built-in one expansion bus to add-on an expansion board
- Support remote telephone line or radio modem control



## Pin Assignments



## Wiring



## Expansion Board Selection Guide

Category:	X-Boards:						
Prototype, Testing	X002	X004	X005	X006			
DI/O, photo mos, PWM	X107	X109	X110	X111	X116	X119	
A/D, D/A, DI/O	X202	X203	X303	X304	X305	X308	X310
RS-232/485	X503	X504	X505	X506	X511		
RS-232/485/422, DI/O	X507	X508	X509	X510	X510-128	X518	
Flash ROM	X600	X601					
Battery Backup SRAM	X607	X608					
Motion Control	X702	X703					

■ Specifications

Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188X > i-7188XB/XBD

PACs	i-7188XB	i-7188XBD
<b>■ CPU</b>		
CPU	80188, 40MHz or compatible	
SRAM	512K bytes	
Flash Memory	512K bytes; Erase unit is one sector (64K bytes); 100,000 erase/write cycles.	
EEPROM	2048 Bytes (8 block, each block contains 256byte) Data retention > 100 years; 1,000,000 erase/write cycles	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes; Seconds, minutes, hours, date of the month; month, year, valid up from 1980 to 2079	
64-bit Hardware Serial Number	Yes	
Built-in Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
COM1	RS-232 or RS-485 (default is RS-232); Program download port, 1 byte FIFO RS-232 (TXD, RXD, RTS, CTS, GND) RS-485 (D1+, D1-, self-tuner ASIC inside)	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside), 1 byte FIFO	
<b>■ COM Port Formats</b>		
Communication Speed	115200 bps max. for all ports	
<b>■ Digital Input/Output</b>		
Digital Input	Channels : 1 Input type : non-isolated On voltage level : +1VDCmax (Connect to GND) Off voltage level : +3.5V~30VDC(Open)	
Digital Output	Channels : 1 Output type : Open-collector Output current : 100mA Max load voltage : +30VDC	
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	--	Yes
System LED Indicator	Yes, one red LED	
<b>■ Hardware Expansion</b>		
I/O expansion bus	Yes	
User defined I/O Pins	14 Pins	
<b>■ Dimensions</b>		
L x H x D (mm)	119 x 72 x 33	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C ( -13° F to +167° F)	
Storage Temperature	-40°C to +80°C ( -40° F to +176° F)	
Humidity	5% ~ 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30VDC	
Power consumption	2.0 W	3.0 W



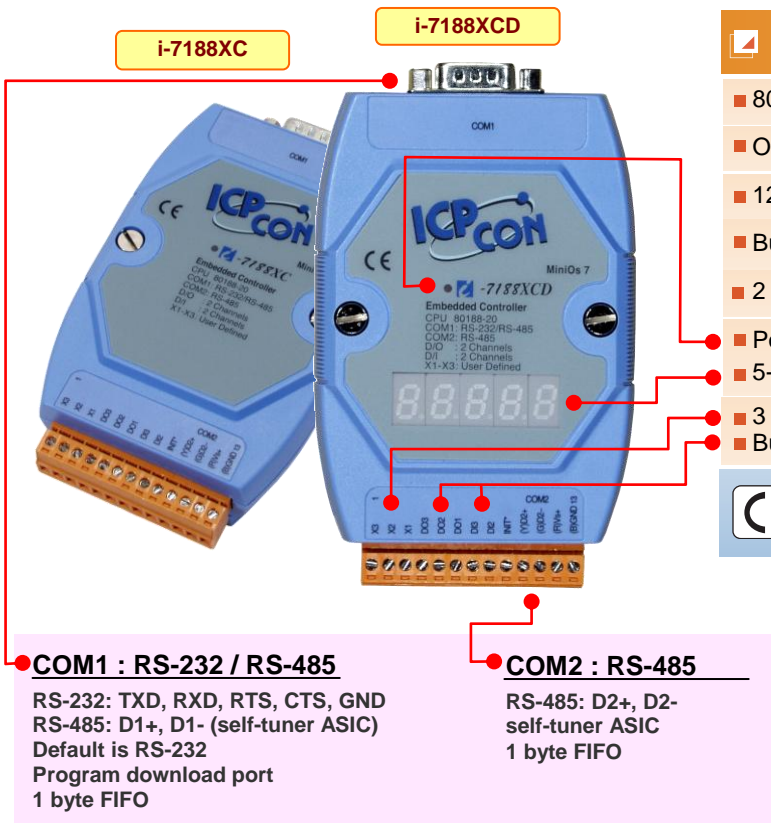
■ Ordering Information

Model Number	Description
<b>I-7188XB-512 CR</b>	Palm-size PAC, 80188-40 CPU, 512K Flash, 2 COM ports (RoHS)
<b>I-7188XBD-512 CR</b>	Palm-size PAC, 80188-40 CPU, 512K Flash, 4 COM ports, LED display (RoHS)
<b>OEM Version</b>	
<b>I-7188XB-512-DW CR</b>	OEM Palm-size PAC; same as i-7188XB-512 CR, but the pin-header of local bus is in the up side down direction, and without plastic box (RoHS)
<b>I-7188XAD-512-DW CR</b>	OEM Palm-size PAC; same as i-7188XA-DW CR with 5-digit 7-segment LED Display (RoHS)
<b>Options &amp; Accessories</b>	
<b>DIN-540A/DIN-KA52F</b>	Power supply; DIN-540A: 42Amp / DIN-KA52F: 1.05Amp
<b>X002 / X005 / X006</b>	X-board, for Prototype expansion: X002(114*170), X005(64*38), X006(64*72)
<b>X310</b>	X-board for A/D, D/A, DI/O expansion, 0.9W power consumption
<b>X600 / X601</b>	X-board for NAND Flash memory expansion: X600(4M), X601(8M)
<b>X607 / X608</b>	X-board for battery backup SRAM memory expansion: X607(Wide 128K), X608(512K)
<b>X-Board</b>	Other add-on expansion boards refer to expansion board selection guide

3  
Palm-size PAC - μPAC  
μPAC 7186 EX  
μPAC 7186 EG  
μPAC 7186 XG  
μPAC 7186 XB  
i-7188 E  
i-7188 G  
i-7188 X

# i-7188XC / i-7188XCD

Palm-size PAC – with 2 DI / 3 DO



- ### Main Features
- 80188-20 embedded CPU
  - OS: MiniOS7
  - 128K SRAM, 512K Flash
  - Built-in RTC, 31B NVRAM, 2048B EEPROM
  - 2 COM ports : RS-232/RS-485, RS-485
  - Power / Communication Indicator red LED
  - 5-digit 7-segment LED Display
  - 3 user defined Pins via X-board
  - Built-in 2 DI & 3 DO channels

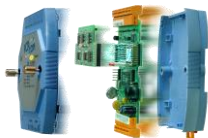


**COM1 : RS-232 / RS-485**  
 RS-232: TXD, RXD, RTS, CTS, GND  
 RS-485: D1+, D1- (self-tuner ASIC)  
 Default is RS-232  
 Program download port  
 1 byte FIFO

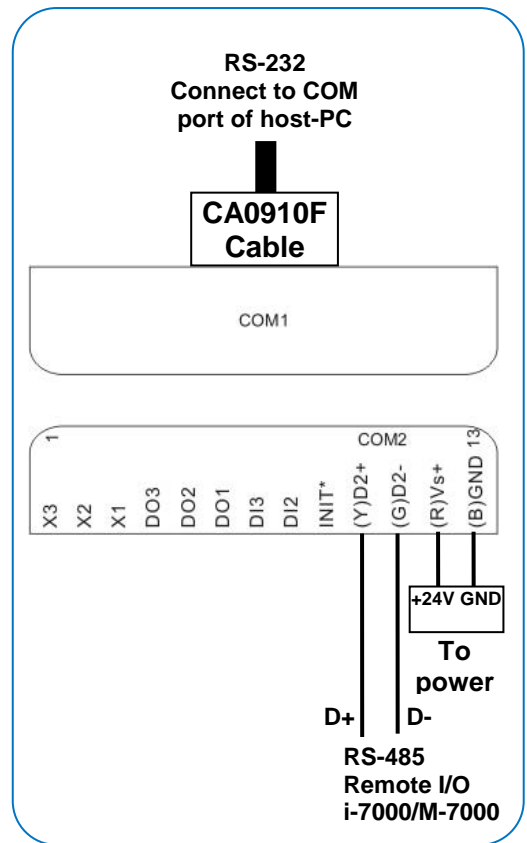
**COM2 : RS-485**  
 RS-485: D2+, D2-  
 self-tuner ASIC  
 1 byte FIFO

### Features

- Built-in Watch dog timer
- Built-in power protection circuit
- Built-in internal self-tuner ASIC controller on RS-485 port
- Easy use software development toolkits
- COM driver support interrupt & 1K QUEUE Input / Output buffer
- Built-in 2 digital input channels & 3 open-collector output channels
- Program language : TC/ TC++/BC/MSC/MSVC
- Program download port: COM1
- Re-loadable OS, software & programs
- Support remote telephone line or radio modem applications
- built-in one expansion bus to add-on an expansion board



### Pin Assignments & Wiring



### Expansion Board Selection Guide

Category:	X-Boards:									
Prototype, Testing	X000	X001	X002	X003						
DI/O, photo mos, PWM, Timer/Counter.	X100	X101	X102	X103	X104	X105	X106	X119	X400	
A/D, D/A, DI/O	X200	X300	X301	X302						
RS-232/485	X500	X501	X502							
Flash ROM	X600	X601								
Battery Backup SRAM	X607	X608								

**Specifications** Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188X > i-7188XC/7188XCD

PACs	i-7188XC	i-7188XCD
<b>■ CPU</b>		
CPU	80188, 20MHz or compatible	
SRAM	128K bytes	
Flash Memory	512K bytes; Erase unit is one sector (64K bytes); 100,000 erase/write cycles.	
EEPROM	2048 Bytes (8 block, each block contains 256byte) Data retention > 100 years; 1,000,000 erase/write cycles	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes; Seconds, minutes, hours, date of the month; month, year, valid up from 1980 to 2079	
64-bit Hardware Serial Number	No	
Built-in Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
COM1	RS-232 or RS-485 (default is RS-232) RS-232 (TXD, RXD, RTS, CTS, GND) RS-485 (D1+, D1-, self-tuner ASIC inside) 1 byte FIFO	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside), 1 byte FIFO	
<b>■ COM Port Formats</b>		
Communication Speed	115200bps max. for all ports	
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	--	Yes
System LED Indicator	Yes, one red LED	
<b>■ Hardware Expansion</b>		
I/O expansion bus	Yes	
User defined I/O Pins	3 Pins, user defined through X-board	
<b>■ Dimensions</b>		
L x H x D (mm)	119 x 72 x 33	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C ( -13° F to +167° F)	
Storage Temperature	-40°C to +80°C ( -40° F to +176° F)	
Humidity	5% ~ 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30V/DC (non-regulated)	
Power consumption	2W	3W



**Ordering Information**

Model Number	Description
<b>I-7188XC-512 CR</b>	Palm-size PAC, 80188-20 CPU, 512K Flash, 128K SRAM, MiniOS7 (RoHS)
<b>I-7188DXCD-512 CR</b>	Palm-size PAC, 80188-20 CPU, 512K Flash, 128K SRAM, MiniOS7, LED display (RoHS)
<b>OEM Version</b>	
<b>I-7188XC/512/RTC CR</b>	Same as i-7188XC-512 CR, but with RTC and NVRAM (RoHS)
<b>I-7188XCD/512/RTC CR</b>	Same as i-7188XC-512 CR, but with RTC and NVRAM, 5-Digit 7 Segment LED display (RoHS)
<b>Options &amp; Accessories</b>	
<b>DIN-540A/DIN-KA52F</b>	Power supply; DIN-540A: 42Amp / DIN-KA52F: 1.05Amp
<b>GPSU06U-6</b>	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W
<b>PWR-24/110</b>	AC 110V input, flat type power adaptor
<b>GPSU06U-6</b>	Wall-plug power Adapter / 100-240VAC, 50/60Hz, 6W
<b>RU-87P1 / 2 / 4 / 8</b>	1 / 2 / 4 / 8 slots I/O expansion unit
<b>X10x ~ X30x / X400</b>	X-board for D/I, D/O, A/D, D/A, PWM expansion: X10x~X30x; for Timer/Counter: X400
<b>X50x</b>	X-board for RS-232/ RS-485
<b>X600 / X601</b>	X-board for NAND Flash memory expansion: X600(4M), X601(8M)
<b>X607 / X608</b>	X-board for battery backup SRAM memory expansion: X607(Wide 128K), X608(512K)
<b>X-Board</b>	Detail information for add-on expansion boards refer to expansion board selection guide

3  
Palm-size PAC - μPAC

μPAC 7186 EX

μPAC 7186 EG

μPAC 7186 XG

μPAC 7186 XB

i-7188 E

i-7188 G

i-7188 X



# i-7188XBD-CAN

## Palm-size PAC With CAN bus



### Main Features

- 80188-40 embedded CPU
- Built-in OS: MiniOS7
- 512K SRAM, 512K Flash
- Built-in RTC, 31B NVRAM, 2048B EEPROM
- RS-232, RS-485
- **CAN bus port**
- 1 power Indicator Red LED, 3 program LED
- 5-digit 7-segment LED Display
- 1 DI (3.5V~30V), 1 DO (100mA, 30V max)



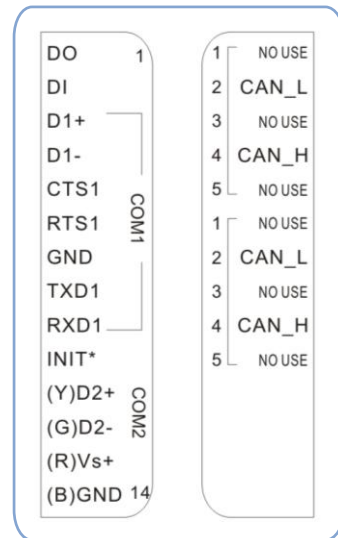
### COM1 : RS-232 / RS-485

RS-232: TXD, RXD, RTS, CTS, GND  
 RS-485: D1+, D1- (self-tuner ASIC)  
 Default is RS-232  
 Program download port  
 1 byte FIFO

### COM2 : RS-485

RS-485: D2+, D2-  
 Self-tuner ASIC  
 1 byte FIFO

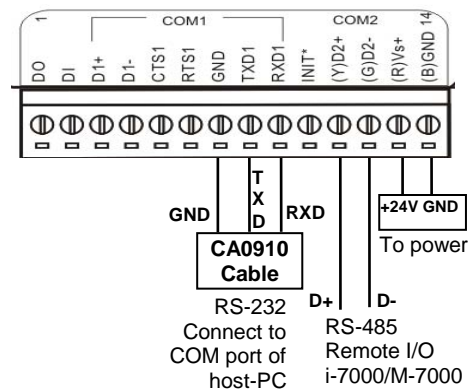
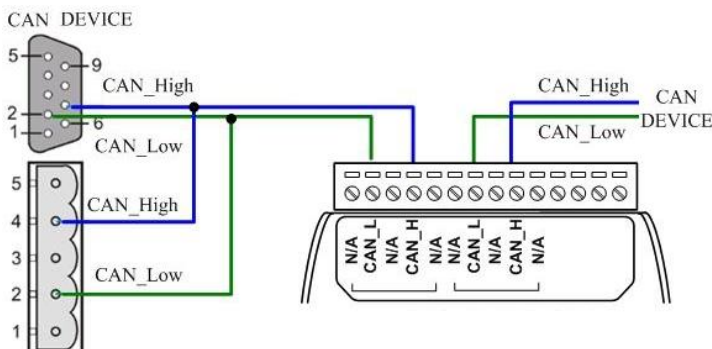
### Pin Assignments



### Features

- 2500Vrms photo-isolation protection.
- Compatible with CAN specification 2.0 parts A and B.
- Programmable transfer rate up to 1 Mbps.
- Jumper select 120Ω terminator resistor for CAN channel
- 64-bit hardware unique serial number inside
- COM driver support interrupt & 1K QUEUE input buffer
- Program download port: COM1
- One digital Input channel and one open collector output channel
- Built-in self-tuner ASIC controller on RS-485 port
- Support the CAN bus instead of the X-bus, so it can not be add-on any X-board

### Wiring



**Specifications** *Series : Palm-size PAC > 1<sup>st</sup> Generation > i-7188X > i-7188XB/XBD*

PACs	i-7188XBD-CAN	
<b>■ CPU</b>		
CPU	80188, 40MHz or compatible	
SRAM	512K bytes	
Flash Memory	512K bytes; Erase unit is one sector (64K bytes); 100,000 erase/write cycles.	
EEPROM	2048 Bytes (8 block, each block contains 256byte) Data retention > 100 years; 1,000,000 erase/write cycles	
NVRAM	31 Bytes (battery backup, data valid up to 10 year)	
RTC (Real Time Clock)	Yes; Seconds, minutes, hours, date of the month; month, year, valid up from 1980 to 2079	
64-bit Hardware Serial Number	Yes	
Built-in Watchdog Timer	Yes	
<b>■ Communication Interface</b>		
COM1	RS-232 or RS-485 (default is RS-232); Program download port, 1 byte FIFO RS-232 (TXD, RXD, RTS, CTS, GND) RS-485 (D1+, D1-, self-tuner ASIC inside)	
COM2	RS-485 (D2+, D2-, self-tuner ASIC inside), 1 byte FIFO	
<b>■ CAN bus Interface</b>		
CAN Signal Support	CAN_H, CAN_L	
Connecter	5-pin screw terminal connector	
DI Level: Dry Contact	Logical level 0: closed to GND / Logical level 1: open	
DI Level: Wet Contact	Logical level 0: +1V / Logical level 1: +3.5V to +30V	
DO Level	Open collector to 30V Max. / Output current: 100mA	
CAN Controller	Phillip SJA1000T CAN Controller	
CAN Transceiver	Phillip 82C250 CAN Transceiver	
Isolated	2500Vrms on CAN side	
Clock Frequency	16MHz	
Transmission Speed	1MBPS Max.	
<b>■ COM Port Formats</b>		
Communication Speed	115200 bps max. for all ports	
<b>■ Digital Input/Output</b>		
Digital Input	Channels : 1 Input type : non-isolated	On voltage level : +1VDCmax (Connect to GND) Off voltage level : +3.5V~30VDC(Open)
Digital Output	Channels : 1 Output current : 100mA	Output type : Open-collector Load voltage : +5VDC to +30VDC
<b>■ LED Display</b>		
5-Digit 7 Segment LED Display	Yes	
LED Indicator	One system indicator red LED, three program LED (NS, MS, IO)	
<b>■ Dimensions</b>		
L x H x D (mm)	119 x 72 x 33	
<b>■ Operating Environment</b>		
Operating Temperature	-25°C to +75°C ( -13° F to +167° F)	
Storage Temperature	-40°C to +80°C ( -40° F to +176° F)	
Humidity	5% ~ 90%, non-condensing	
<b>■ Power</b>		
Protection	Power reverse polarity protection	
Required Supply Voltage	+10 to +30VDC	
Power consumption	3.0 W	

**Applications**

- CAN bus communication application • Industry automation
- Auto defection CANopen slave devices • Process monitor & control
- High speed data acquisition system • Laboratory automation
- Communication switching • Factory automation • IO monitor



**Ordering Information**

Model Number	Description
<b>I-7188XBD-CAN-G</b>	CAN bus palm-size PAC, 80188-40 CPU, 512K Flash, 512K SRAM, MiniOS7, one CAN port, 2 serial COM ports (RS-232/RS-485), 5-digital 7-segment Display, 1 DI and 1 DO channels
<b>Options &amp; Accessories</b>	
<b>DIN-540A/DIN-KA52F</b>	Power supply; DIN-540A: 42Amp / DIN-KA52F: 1.05Amp
<b>CAN-8x2x</b>	CANopen / DeviceNet Remote I/O unit

3

Palm-size PAC - μPAC

μPAC 7186 EX

μPAC 7186 EG

μPAC 7186 XG

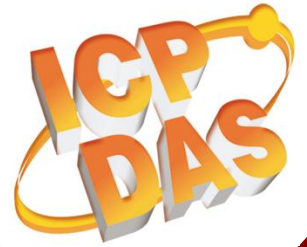
μPAC 7186 XB

i-7188 E

i-7188 G

i-7188 X

# 4



## Expansion Solutions

Expansion Board : X-Board  
Expansion Unit : RU-87Pn

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# Introduction

ICP DAS provides remote I/O modules (I-7000 / M-7000), expansion board (X-board) and expansion unit (RU-87Pn) for your system to expand the local / remote DI / DO / AD / DA, timer, counter, communication interface, Flash / SRAM memory, motion control and other hardware functions.

## Expansion Board: X-Board

The X-Board Series is the expansion board to add-on the palm-size PAC ( $\mu$ PAC). There are about 50 selections for customer to choose for your  $\mu$  PAC. Each  $\mu$ PAC can insert one X-board.

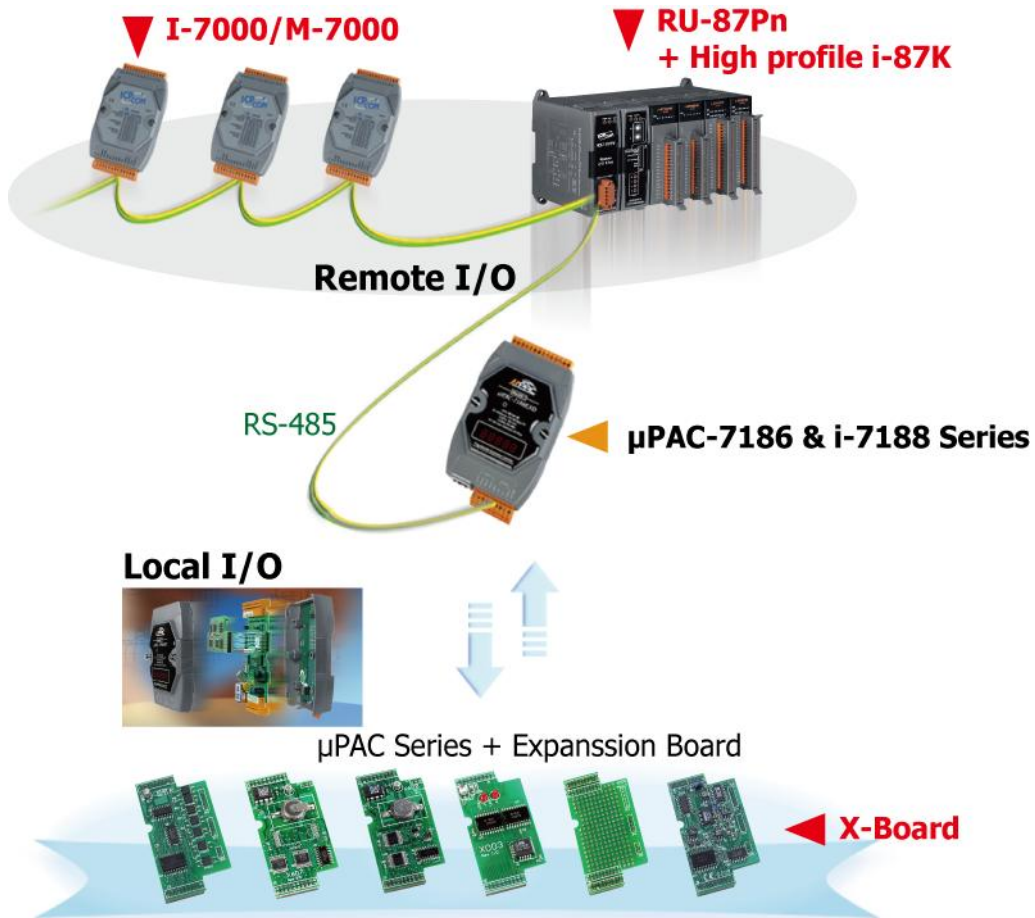
- D/I    • D/O
- Timer/Counter
- Flash memory
- Self-test
- A/D    • D/A
- Communications
- Battery backed SRAM
- Motion control

## Expansion Unit: RU-87Pn

The RU-87Pn Series is a hot swap, plug & play, auto-configuration at run time remote expansion Unit. Customer can choose high-profile i-87K series remote I/O modules to expand their control systems.

### RU-87Pn Features:

- Hot Swap
- Plug & play
- Auto-Configuration
- Easy Duplicate System
- Fully Software Support





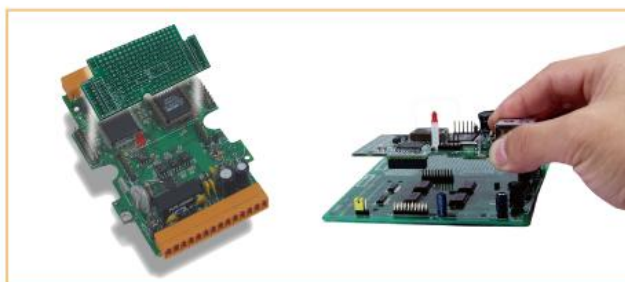
# Expansion Board : X-Board

## Introduction

X-Board is an I/O expansion board to be used with  $\mu$ PAC (  $\mu$ PAC-7186 Series & i-7188 series ) for expanding I/O functions. Each  $\mu$ PAC (except module number i-7188 & i-7188D) supports one I/O expansion bus. Each bus can support one I/O expansion board. The I/O expansion board can be used to implement various I/O functions such as D/I, D/O, A/D, D/A, Timer/Counter, UART, flash memory, battery backup SRAM, AsicKey & other I/O functions.



Users can choose our functioned X-boards (model number X1xx~X7xx) or design their own I/O expansion boards (module number X0xx). We have designed more than 50 X-boards for expanding the  $\mu$ PAC's features. If users choose a small size X-board, then they can mount this I/O expansion board directly into the  $\mu$ PAC. Customized I/O Expansion Boards can be ordered through ODM project.



Pin-Assignment of I/O Expansion Bus

J1				J2			
GND	1	2	GND	1	2	AD0	
CLKOUTA	3	4	ARDY	3	4	AD1	
INT0	5	6	INT 1	5	6	AD2	
VCC	7	8	RESET	7	8	AD3	
GND	9	10	RESET\	9	10	AD4	
TO 0	11	12	TO 1	11	12	AD5	
TI 0	13	14	TI 1	13	14	AD6	
SCLK	15	16	DIO9	15	16	AD7(or NC)	
DIO4	17	18	DIO14	17	18	WRITE\	
VCC	19	20	VCC	19	20	READ\	

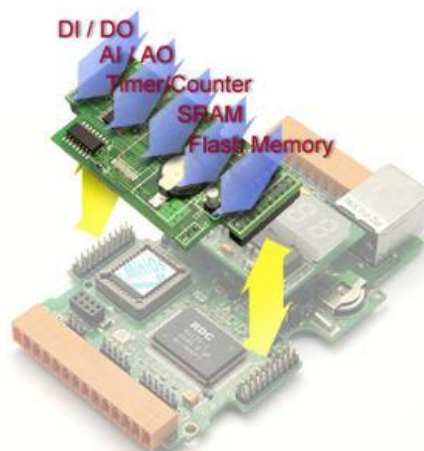
CON20A JDIP20P
CON20A JDIP20P

## X-Boards Selection Guide

### X-Boards :

Expansion Boards for Palm-size PAC

- X1xx : For D/I, D/O
- X2xx & X3xx : For A/D, D/A, D/I, D/O
- X4xx : For Timer/Counter
- X5xx : For RS-232/422/485, D/I, D/O
- X6xx : For Memory expansion
- X7xx : For Motion control



### Expansion Boards for DI, DO, Counter Boards

p.4-2-4~9

Model	Description	D/I	D/O	Relay Output	Counter /Timer	Used with i-7188 / $\mu$ PAC-7186 XA / XB / XC / XG / EX / EG	Page 4-2-
X101	DO	-	8	-	-	XC	4
X102	Relay Output	-	-	2	-	XC	5
X106	DI, DO	Can be used as 3 channels DI or 2 channels DO		-	-	XC	6
X107	DI, DO	6	7	-	-	XB XG EX EG	6
X110	DI	14	-	-	-	XB XG EX EG	4
X111	DO	-	13	-	-	XB XG EX EG	5
X116	Relay Output	4	-	6	-	XB XG EX EG	8
X119	DI, DO	7	7	-	-	XA XB XC XG EX EG	7
X400	Timer/Counter	-	-	-	3 channels 16-bit	XC	9

### Expansion Boards for A/D, D/A, DI, DO Boards

p.4-2-9~16

Model	Description	D/I	D/O	A/D	Input Range	D/A	Output Range	Used with i-7188 / $\mu$ PAC-7186 XA / XB / XC / XG / EX / EG	Page 4-2-
X200	A/D	-	-	1	0~2.5V	-	-	XC	9
X202	A/D	-	-	7	0~20mA	-	-	XB XG EX EG	9
X203	A/D, DI, DO	2	5	2	0~20mA	-	-	XB XG EX EG	10
X302	A/D, D/A	-	-	1	+/-5V	1	+/-5V	XC	11
X303	A/D, D/A, DI, DO	4	6	1	+/-5V	1	+/-5V	XB XG EX EG	12
X304	A/D, D/A, DI, DO	4	4	3	+/-5V	1	+/-5V	XB XG EX EG	13
X305	A/D, D/A, DI, DO	2	2	7	+/-5V	1	+/-5V	XB XG EX EG	14
X308	A/D, DO	-	6	4	0~10V	-	-	XB XG EX EG	16
X310	A/D, D/A, DI, DO	3	3	2	0~20mA/0~10V	2	0~10V	XB XG EX EG	15

## X-Boards Selection Guide

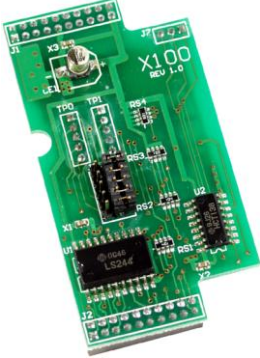

Expansion Boards for RS-232/422/485, DI, DO Boards							p.4-2-17~24				
Model	Description	D/I	D/O	Channels	Speed	Used with i-7188 / $\mu$ PAC-7186 XA / XB / XC / XG / EX / EG			Page 4-2-		
X503	RS-232	-	-	One channel ( 5-wire )	115.2K	XB	XG	EX	EG	17	
X504	RS-232	-	-	One channel ( 5-wire ), and one channel ( 9-wire )	115.2K	XB	XG	EX	EG	17	
X505	RS-232	-	-	Three channels ( 5-wire )	115.2K	XB	XG	EX	EG	17	
X506	RS-232	-	-	Six channels ( 3-wire )	115.2K	XB	XG	EX	EG	18	
X507	RS-422 RS-485	4	4	One channel TxD+, TxD-, RxD+, RxD-	115.2K	XB	XG	EX	EG	19	
X508	RS-232	4	4	One channel ( 5-wire )	115.2K	XB	XG	EX	EG	20	
X509	RS-232	4	4	Two channels ( 3-wire )	115.2K	XB	XG	EX	EG	21	
X510	RS-232	5	5	One channels ( 3-wire ), and <b>EEPROM: 128K * 2 bytes</b>	115.2K	XB	XG	EX	EG	23	
X510-128	RS-232	5	5	One channels ( 3-wire ), and <b>EEPROM: 128K * 1 bytes</b>	115.2K	XB	XG	EX	EG	23	
X511	RS-485	-	-	Three channels ( Data+, Data- )	115.2K	XB	XG	EX	EG	18	
X518	RS-232	-	8	One channel ( 5-wire )	115.2K	XB	XG	EX	EG	22	
X561	RS-232	-	-	Three channels ( 3-wire ), and 64M bytes NAND Flash <b>** Without Case **</b>	115.2K	XA	XB	XG	EX	EG	24

Expansion Boards for SRAM, Flash Boards					p.4-2-24~25					
Model	Description	Flash Disk	Battery Backup SRAM Disk	Used with i-7188 / $\mu$ PAC-7186 XA / XB / XC / XG / EX / EG			Page 4-2-			
X600	Flash Rom	4M bytes NAND Flash	-	XA	XB	XC	EX	24		
X601	Flash Rom	8M bytes NAND Flash	-	XA	XB	XC	EX	24		
X607	Battery backup SRAM board	-	128 K bytes	XA	XB	XC	XG	EX	EG	25
X608	Battery backup SRAM board	-	512K bytes	XA	XB	XC	XG	EX	EG	25

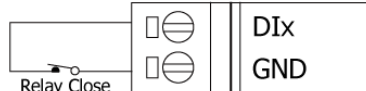
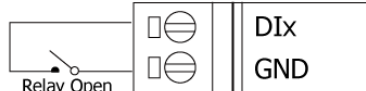
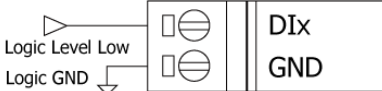
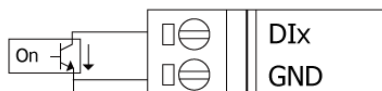
Expansion Boards for Motion Control Boards						p.4-2-26~27			
Model	Description	Motor_axi	Encoder_axis	Encoder_bits	Used with i-7188 / $\mu$ PAC-7186 XA / XB / XC / XG / EX / EG			Page 4-2-	
X702	Encoder	-	2	24	XB	XG	EX	EG	26
X703	Encoder	-	3	24	XB	XG	EX	EG	27

## D/I, D/O, Counter Boards

X-Boards for DI, DO, Timer/Counter expansion.

<b>X100</b>	<b>DI (8)</b>	<b>For i-7188XC</b>																																																								
	<ul style="list-style-type: none"> <li>64 x 32 (mm)</li> <li><b>Digital Input</b></li> <li>Channels : 8</li> <li>Input Range/Type : Logic high level (3.5V~30V), Logic low level (0V~1V)</li> <li>Isolated : none</li> <li>Power consumption : 0.3 W</li> </ul>	<p><b>Pin assignment</b></p> <table border="1"> <tr> <td colspan="8">(X100)</td> <td colspan="3">COM2</td> </tr> <tr> <td>DI 0</td><td>DI 1</td><td>DI 2</td><td>DI 3</td><td>DI 4</td><td>DI 5</td><td>DI 6</td><td>DI 7</td> <td>INIT*/DI1</td> <td>(Y) D2+</td> <td>(G) D2-</td> <td>(R) VS+</td> <td>(B) GND</td> </tr> <tr> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> <td>○</td> <td>○</td> <td>○</td> <td>○</td> <td>○</td> </tr> <tr> <td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td> <td>□</td> <td>□</td> <td>□</td> <td>□</td> <td>□</td> </tr> </table>	(X100)								COM2			DI 0	DI 1	DI 2	DI 3	DI 4	DI 5	DI 6	DI 7	INIT*/DI1	(Y) D2+	(G) D2-	(R) VS+	(B) GND	○	○	○	○	○	○	○	○	○	○	○	○	○	□	□	□	□	□	□	□	□	□	□	□	□	□						
(X100)								COM2																																																		
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□	□	□	□	□	□	□	□	□	□	□	□	□																																														
	<ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li><b>Digital Input</b></li> <li>Channels : 14</li> <li>Input Range/Type : Logic high level (3.5V~30V), Logic low level (0V~1V)</li> <li>Isolated : none</li> <li>Power consumption : 0.3 W</li> </ul>	<p><b>Pin assignment</b></p> <table border="1"> <tr> <td colspan="14">(X110)</td> </tr> <tr> <td>DI 13</td><td>DI 12</td><td>DI 11</td><td>DI 10</td><td>DI 9</td><td>DI 8</td><td>DI 7</td><td>DI 6</td><td>DI 5</td><td>DI 4</td><td>DI 3</td><td>DI 2</td><td>DI 1</td><td>DI 0</td> </tr> <tr> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> </tr> <tr> <td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td> </tr> </table>	(X110)														DI 13	DI 12	DI 11	DI 10	DI 9	DI 8	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	□	□	□	□	□	□	□	□	□	□	□	□	□	□
(X110)																																																										
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□	□	□	□	□	□	□	□	□	□	□	□	□	□																																													


### X100 / X110 CR Digital Input Wire Connection

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	<p>Relay ON</p> 	<p>Relay Off</p> 
	TTL/CMOS Logic	<p>Voltage &lt; 1V</p> 
Open Collector		<p>Open Collector On</p> 

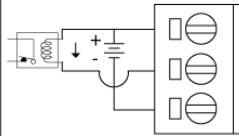
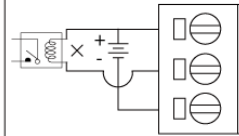
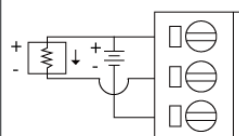
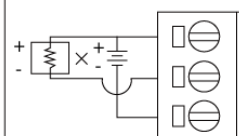
### Ordering Information

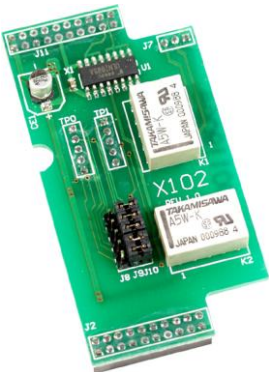
Model Number	Description
X100	8-channel D/I
X110 CR	14-channel D/I (RoHS)



<b>X111</b>	<b>DO (13)</b>	<b>For i-7188/μPAC-7186: XB/XG/EX/EG</b>																																								
	<ul style="list-style-type: none"> <li>• 64 x 38 (mm)</li> <li><b>Digital Output</b></li> <li>• Channels: 13</li> <li>• Open-collector Output : 100 mA / 30V max</li> <li>• Isolated : none</li> </ul>	<p style="text-align: center;"><b>Pin assignment</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="13">Pin assignment diagram showing 13 pins in a row.</td> </tr> <tr> <td style="color: red; font-weight: bold;">DO.PWR</td> <td>DO 12</td> <td>DO 11</td> <td>DO 10</td> <td>DO 9</td> <td>DO 8</td> <td>DO 7</td> <td>DO 6</td> <td>DO 5</td> <td>DO 4</td> <td>DO 3</td> <td>DO 2</td> <td>DO 1</td> <td>DO 0</td> </tr> <tr> <td colspan="13">(X111)</td> </tr> </table>	Pin assignment diagram showing 13 pins in a row.													DO.PWR	DO 12	DO 11	DO 10	DO 9	DO 8	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0	(X111)												
Pin assignment diagram showing 13 pins in a row.																																										
DO.PWR	DO 12	DO 11	DO 10	DO 9	DO 8	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0																													
(X111)																																										

**Digital Output Wire Connection**

Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON	Relay Off
		
Resistance Load		
		

<b>X102</b>	<b>Relay Output (2)</b>	<b>For i-7188XC</b>																																																			
	<ul style="list-style-type: none"> <li>• 64 x 32 (mm), non-isolation</li> <li><b>Relay Output</b></li> <li>• Channels : 2 (Form "C")</li> <li>• Max. Switching voltage : 220Vdc, 250Vac</li> <li>• Max. Switching current : 2A</li> <li>• Max. Carrying current : 2A</li> <li>• Surge Strength : 1,500V</li> <li>• Electrical endurance : Typical 500,000 operation at 30Vdc/1A Typical 100,000 operation at 125Vac/0.5A</li> <li>• Relay on time (typical) : 6ms</li> <li>• Relay off time (typical) : 6ms</li> </ul>	<p style="text-align: center;"><b>Pin assignment</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="13">(X102)</td> <td colspan="4">COM2</td> </tr> <tr> <td>COM 0</td> <td>NC 0</td> <td>NO 0</td> <td>DO 3</td> <td>DO 2</td> <td>COM 1</td> <td>NC 1</td> <td>NO 1</td> <td>INIT*/D1</td> <td>(Y) D2+</td> <td>(G) D2-</td> <td style="color: red;">(R) VS+</td> <td>(B) GND</td> <td colspan="4"></td> </tr> <tr> <td colspan="17">Pin assignment diagram showing 17 pins in a row.</td> </tr> </table>	(X102)													COM2				COM 0	NC 0	NO 0	DO 3	DO 2	COM 1	NC 1	NO 1	INIT*/D1	(Y) D2+	(G) D2-	(R) VS+	(B) GND					Pin assignment diagram showing 17 pins in a row.																
(X102)													COM2																																								
COM 0	NC 0	NO 0	DO 3	DO 2	COM 1	NC 1	NO 1	INIT*/D1	(Y) D2+	(G) D2-	(R) VS+	(B) GND																																									
Pin assignment diagram showing 17 pins in a row.																																																					

**Ordering Information**

Model Number	Description
X111	13-channel D/O
X102	2-channel Relay Output

X106	DI, DO (3 or 2)	For i-7188XC													
	<ul style="list-style-type: none"> <li>64 x 32 (mm)</li> <li>Power consumption : 0.3W</li> <li>Isolated : none</li> </ul> <p><b>Digital Input</b></p> <ul style="list-style-type: none"> <li>Input Voltage: Logic high level (3.5V~30V) Logic low level (0V~1V)</li> </ul> <p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>Open-collector Output : 250 mA / 30V max</li> </ul>	<p style="text-align: center;"><b>Pin assignment</b></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">(X106) <span style="float: right;">COM2</span></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">DI 0 / DO COM</td> <td style="text-align: center;">DI 1 / DO 1</td> <td style="text-align: center;">DI 2 / DO 2</td> <td style="text-align: center;">DO 3</td> <td style="text-align: center;">DO 2</td> <td style="text-align: center;">DO 1</td> <td style="text-align: center;">DI 3</td> <td style="text-align: center;">DI 2</td> <td style="text-align: center;">INIT* / DI 1</td> <td style="text-align: center;">(Y) D2+</td> <td style="text-align: center;">(G) D2-</td> <td style="text-align: center;">(R) VS+</td> <td style="text-align: center;">(B) GND</td> </tr> </table> </div>	DI 0 / DO COM	DI 1 / DO 1	DI 2 / DO 2	DO 3	DO 2	DO 1	DI 3	DI 2	INIT* / DI 1	(Y) D2+	(G) D2-	(R) VS+	(B) GND
	DI 0 / DO COM	DI 1 / DO 1	DI 2 / DO 2	DO 3	DO 2	DO 1	DI 3	DI 2	INIT* / DI 1	(Y) D2+	(G) D2-	(R) VS+	(B) GND		

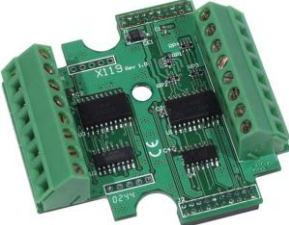

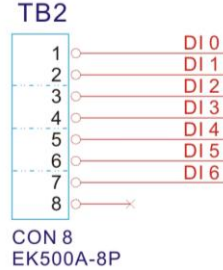
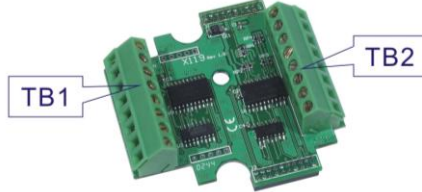

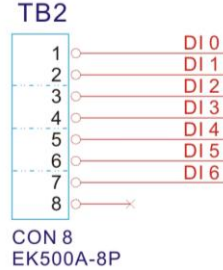

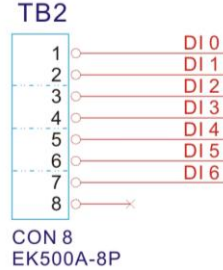
X107 CR	DI, DO (6, 7)	For i-7188/μPAC-7186: XB/XG/EX/EG														
	<ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.3 W</li> <li>Isolated : none</li> </ul> <p><b>Digital Input</b></p> <ul style="list-style-type: none"> <li>Input Voltage: Logic high level (3.5V~30V) Logic low level (0V~1V)</li> </ul> <p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>Open-collector Output : 100 mA / 30V max</li> </ul>	<p style="text-align: center;"><b>Pin assignment</b></p> <div style="border: 1px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>DI 0</td><td>DI 1</td><td>DI 2</td><td>DI 3</td><td>DI 4</td><td>DI 5</td><td style="color: red;">DO.PWR</td><td>DO 0</td><td>DO 1</td><td>DO 2</td><td>DO 3</td><td>DO 4</td><td>DO 5</td><td>DO 6</td> </tr> </table> <p style="text-align: center;">(X107)</p> </div>	DI 0	DI 1	DI 2	DI 3	DI 4	DI 5	DO.PWR	DO 0	DO 1	DO 2	DO 3	DO 4	DO 5	DO 6
	DI 0	DI 1	DI 2	DI 3	DI 4	DI 5	DO.PWR	DO 0	DO 1	DO 2	DO 3	DO 4	DO 5	DO 6		

### X106 / X107 CR Digital Input / Digital Output Wire Connection

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON	Relay Off
TTL/CMOS Logic	Voltage < 1V	Voltage > 3.5V
Open Collector	Open Collector On	Open Collector Off
Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON	Relay Off
Resistance Load	ON State LED ON	OFF State LED OFF

### Ordering Information

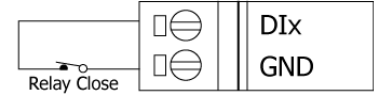
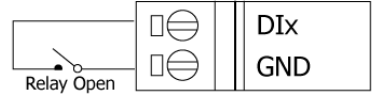
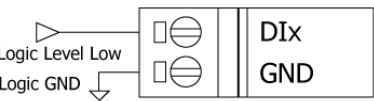
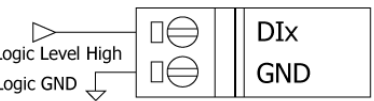
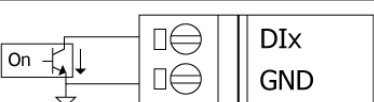
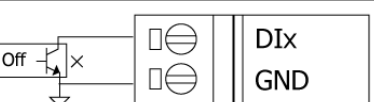
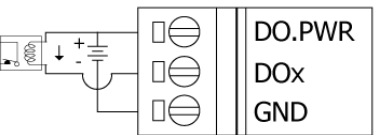
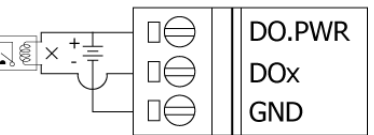
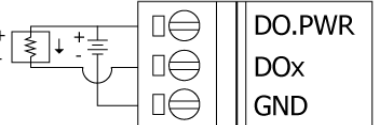
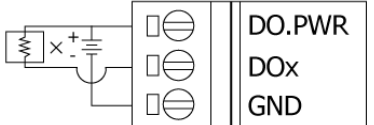
Model Number	Description
X106	3-channel D/I or 2-channel D/O, use Jumper to select D/I or D/O
X107 CR	6-channel D/I or 7-channel D/O (RoHS)

X119	DI, DO (7, 7)	For i-7188/ $\mu$ PAC-7186: XA/XB/XC/XG/EX/EG		
	<p><b>Note:</b> <b>Without case</b></p> <ul style="list-style-type: none"> <li>64 x 36 (mm)</li> <li>Power consumption : 0.5 W</li> <li>Isolated : none</li> </ul> <p><b>Digital Input</b></p> <ul style="list-style-type: none"> <li>Channels: 7</li> <li>Input Voltage: Logic high level (3.5V~30V) Logic low level (0V~1V)</li> </ul> <p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>Channels: 7</li> <li>Open-collector Output : 100 mA / 30V max</li> </ul>	<p><b>Pin assignment</b></p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: center;"> <b>TB1</b>   </td> <td style="text-align: center;"> <b>TB2</b>   </td> </tr> </table> <p style="text-align: center;">  </p>	<b>TB1</b> 	<b>TB2</b> 
<b>TB1</b> 	<b>TB2</b> 			

**Digital Input / Digital Output Wire Connection**



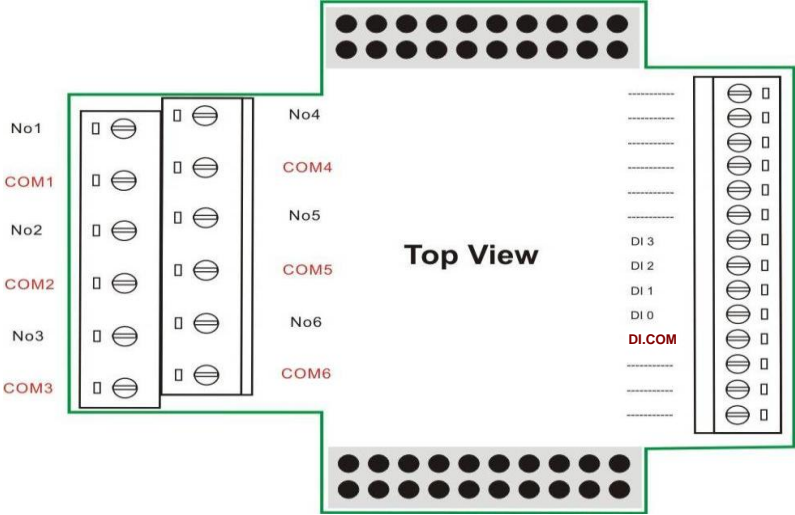
**Install X119 in I-7188XA (Without case)**



Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON	Relay Off
		
TTL/CMOS Logic	Voltage < 1V	Voltage > 3.5V
		
Open Collector	Open Collector On	Open Collector Off
		
Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON	Relay Off
		
Resistance Load		

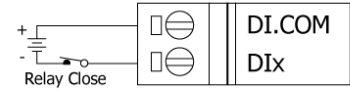
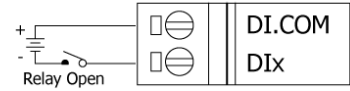
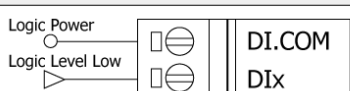

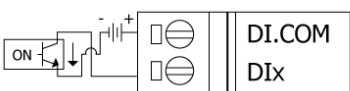
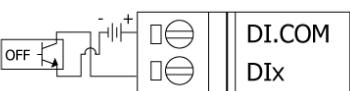
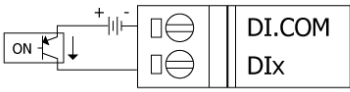
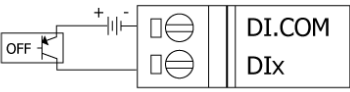
**Ordering Information**

Model Number	Description
X119	7-channel D/I or 7-channel D/O

<p><b>X116</b></p>  <p><b>Install X116 in I-7188EX</b></p> 	<p><b>DI, Relay output (4, 6) For i-7188/μPAC-7186: XB/XG/EX/EG</b></p> <p><b>Note: Without case</b></p> <ul style="list-style-type: none"> <li>• 64 x 64 (mm)</li> </ul> <p style="text-align: center;"><b>Pin assignment</b></p>  <p style="text-align: center;"><b>Top View</b></p>
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- Digital Input**
- Channels : 4
  - Photo coupler isolation voltage: 3750V rms
  - Max. Input voltage: 5V to 24V
  - Dry Contact Input:  
Logical level 0: close to GND  
Logical level 1: open
  - Input impedance: 3K
  - Response time: 10 KHz, Max.
- Digital Output**
- Channels : 6  
(Form "A", Normal Open)
  - Max. Switching capacity : 60W, 60VA
  - Max. Switching voltage : 220Vdc, 250Vac
  - Max. Switching current : 5A
  - Max. Continuous current : 2A
  - Electrical endurance:  
Typical 5 millions operation at 12V / 10mA  
Typical 1 millions operation at 6V / 100mA
  - Mechanical endurance :  
Typical 10 millions operation at 30Vdc / 2A, 110Vdc / 0.3A, 120Vac / 0.5A, 240Vac / 0.25A
  - Relay on time (typical): 5ms
  - Relay off time (typical): 5ms
  - Control logic:  
Input TTL high(+5V), relay on


**Digital Input / Digital Output Wire Connection**

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON	Relay Off
		
TTL/CMOS Logic	Voltage > 3.5V	Voltage < 1V
		
NPN Output	Open Collector On	Open Collector Off
		
PNP Output	Open Collector On	Open Collector Off
		

**Ordering Information**


Model Number	Description
<b>X116</b>	<b>4-channel isolated D/I and 6-channe relay output</b>




X400	Timer/Counter (3)	For i-7188XC																																																
	<p><b>Note :</b>  <b>Can choose 3-channel 16-bit counter or 1-channel 16-bit and 1-channel 32-bit counter</b></p> <ul style="list-style-type: none"> <li>64 x 32 (mm)</li> <li>Power consumption : 0.3 W</li> </ul> <p><b>Timer/Counter</b>            Channels: 3</p> <ul style="list-style-type: none"> <li>Resolution : 16-bit</li> <li>Isolated : none</li> </ul>	<p><b>Pin assignment</b></p> <table border="1"> <tr> <td colspan="10">(X400)</td> <td colspan="2">COM2</td> </tr> <tr> <td>CLK 0</td><td>G 0</td><td>OUT 0</td><td>CLK 1</td><td>CLK 2</td><td>OUT 1</td><td>OUT 2</td><td>INIT*/DI 1</td><td>(Y) D2+</td><td>(G) D2-</td><td>(R) VS+</td><td>(B) GND</td> </tr> <tr> <td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td> </tr> <tr> <td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td> </tr> </table>	(X400)										COM2		CLK 0	G 0	OUT 0	CLK 1	CLK 2	OUT 1	OUT 2	INIT*/DI 1	(Y) D2+	(G) D2-	(R) VS+	(B) GND	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	□	□	□	□	□	□	□	□	□	□
(X400)										COM2																																								
CLK 0	G 0	OUT 0	CLK 1	CLK 2	OUT 1	OUT 2	INIT*/DI 1	(Y) D2+	(G) D2-	(R) VS+	(B) GND																																							
⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖																																							
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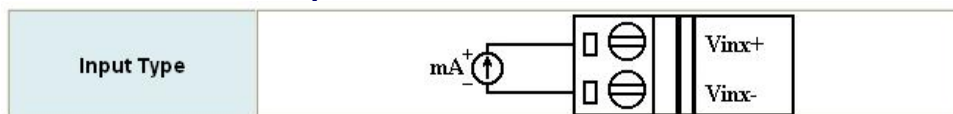
## A/D, D/A, DI, DO Boards

X-Boards for A/D, D/A, DI, DO expansion.  
 When A/D boards on 40MHZ CPU, the sampling rate is 1.8K samples/second max.  
 When D/A boards on 40MHZ CPU, the throughput rate is 900 samples/second max.

X200	A/D (1)	For i-7188XC																																																			
	<ul style="list-style-type: none"> <li>64 x 32 (mm)</li> <li>Power consumption : 0.3W</li> <li>Power requirement : +5VDC</li> </ul> <p><b>Analog Input</b></p> <ul style="list-style-type: none"> <li>Input Channel :1</li> <li>Input Type : 0 ~ 2.5 V</li> <li>Resolution :12-bit</li> <li>Sampling rate :900Hz Max</li> <li>Input Impedance :100K Ohm</li> <li>Over voltage Protection :+/-5VDC</li> <li>Isolation Voltage : Non-isolation</li> </ul>	<p><b>Pin assignment</b></p> <table border="1"> <tr> <td colspan="10">(X200)</td> <td colspan="2">COM2</td> </tr> <tr> <td>N.C.</td><td>GND</td><td>AD 0</td><td>DO 3</td><td>DO 2</td><td>DO 1</td><td>DI 3</td><td>DI 2</td><td>INIT*/DI 1</td><td>(Y) D2+</td><td>(G) D2-</td><td>(R) VS+</td><td>(B) GND</td> </tr> <tr> <td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td> </tr> <tr> <td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td> </tr> </table>	(X200)										COM2		N.C.	GND	AD 0	DO 3	DO 2	DO 1	DI 3	DI 2	INIT*/DI 1	(Y) D2+	(G) D2-	(R) VS+	(B) GND	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	□	□	□	□	□	□	□	□	□	□	□
(X200)										COM2																																											
N.C.	GND	AD 0	DO 3	DO 2	DO 1	DI 3	DI 2	INIT*/DI 1	(Y) D2+	(G) D2-	(R) VS+	(B) GND																																									
⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖																																									
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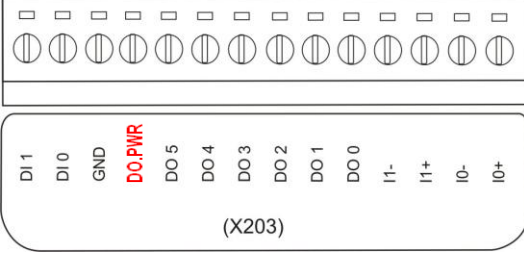
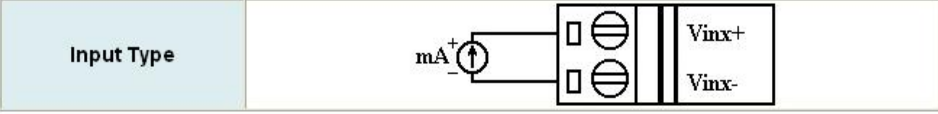
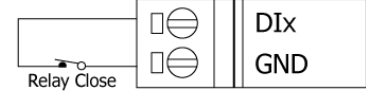
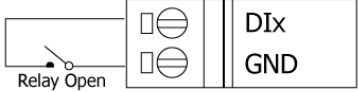
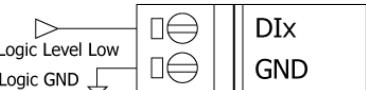
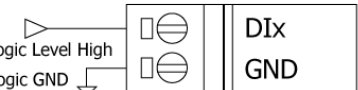
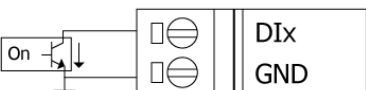
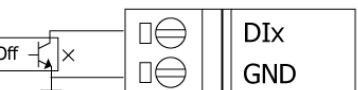
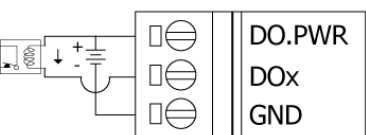
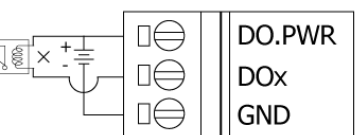
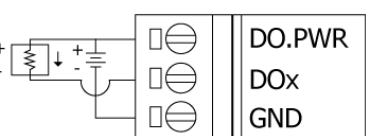
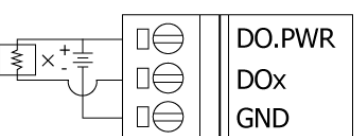
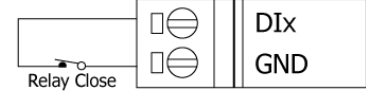
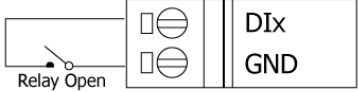
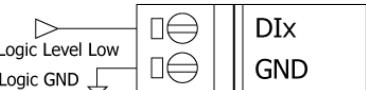
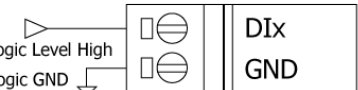
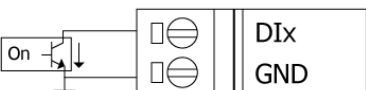
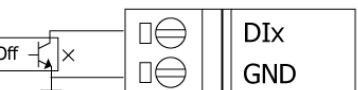
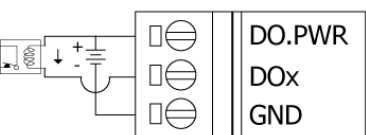
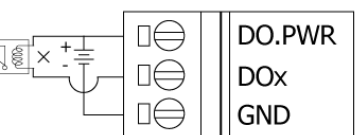
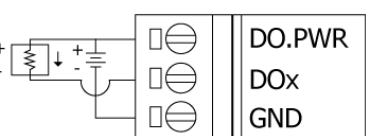
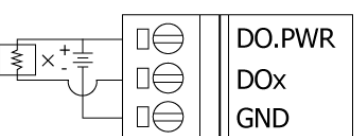
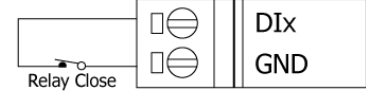
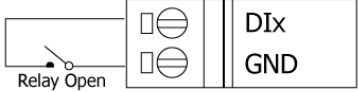
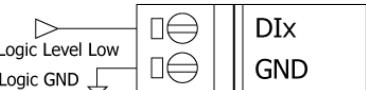
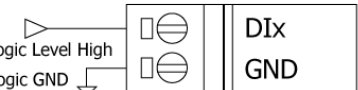
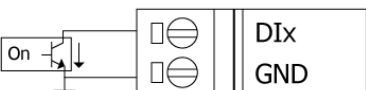
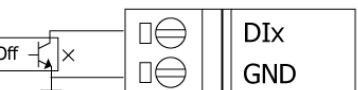
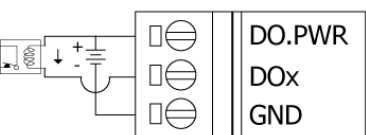
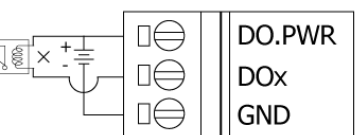
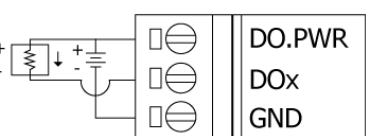
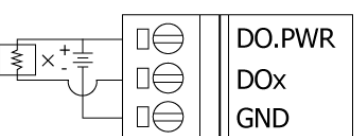
X202	A/D (7)	For i-7188/μPAC-7186: XB/XG/EX/EG																																																
	<ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> <li>Power requirement : +5VDC</li> </ul> <p><b>Analog Input</b></p> <ul style="list-style-type: none"> <li>Input Channels :7</li> <li>Input Type :0 ~ 20mA</li> <li>Resolution :12-bit</li> <li>Sampling Rate : 1KHz Max (Read one channel)</li> <li>Input Impedance :125Ohms</li> <li>Common Voltage :+/-15VDC</li> <li>Isolation Voltage : Non-isolation</li> </ul>	<p><b>Pin assignment</b></p> <table border="1"> <tr> <td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td><td>⊖</td> </tr> <tr> <td>AI 6-</td><td>AI 6+</td><td>AI 5-</td><td>AI 5+</td><td>AI 4-</td><td>AI 4+</td><td>AI 3-</td><td>AI 3+</td><td>AI 2-</td><td>AI 2+</td><td>AI 1-</td><td>AI 1+</td><td>AI 0-</td><td>AI 0+</td><td></td><td></td> </tr> <tr> <td colspan="16" style="text-align: center;">(X202)</td> </tr> </table>	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	AI 6-	AI 6+	AI 5-	AI 5+	AI 4-	AI 4+	AI 3-	AI 3+	AI 2-	AI 2+	AI 1-	AI 1+	AI 0-	AI 0+			(X202)															
⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖																																			
AI 6-	AI 6+	AI 5-	AI 5+	AI 4-	AI 4+	AI 3-	AI 3+	AI 2-	AI 2+	AI 1-	AI 1+	AI 0-	AI 0+																																					
(X202)																																																		

### X200 / X202 Current Input Wire Connection




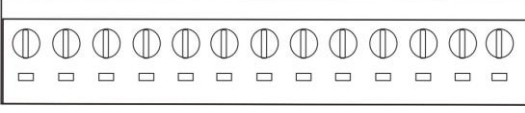
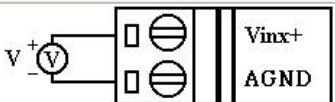
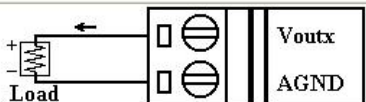
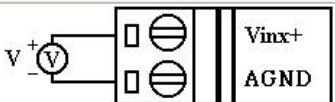
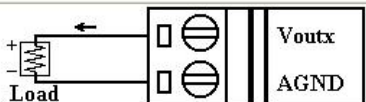
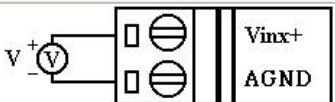
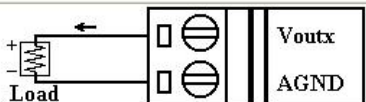
### Ordering Information

Model Number	Description
X400	3-channel of 16-bit Timer/Counter
X200	1-channel A/D (0~2.5V)
X202	7-channel A/D (0~20mA)

X203	A/D, DI, DO (2,2,6)	For i-7188/μPAC-7186: XB/XG/EX/EG																				
	<ul style="list-style-type: none"> <li>2-channel A/D (0~20mA), add 2-channel D/I, 6-channel D/O</li> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> <li>Power requirement : +5VDC</li> </ul>	<p><b>Pin assignment</b></p>  <p>(X203)</p>																				
<p><b>Analog Input:</b></p> <ul style="list-style-type: none"> <li>Input Channels : 2 differential</li> <li>Input Type : 0~20mA</li> <li>Resolution :12-bit</li> <li>Sampling Rate:1KHz Max (Read one channel)</li> <li>Input Impedance : 125Ohms</li> <li>Common Voltage : +/-15VDC</li> <li>Isolation Voltage : Non-isolation</li> </ul> <p><b>Digital Input:</b></p> <ul style="list-style-type: none"> <li>Input Channels :2</li> <li>Input Type : Sink, non-isolated channel with common ground</li> <li>Off Voltage Level : +1V max</li> <li>On Voltage Level : +3.5V ~ +30VDC</li> <li>Isolation Voltage : Non-isolation</li> </ul> <p><b>Digital Output:</b></p> <ul style="list-style-type: none"> <li>Output Channels : 6</li> <li>Output Type : Open-Collector (NPN)</li> <li>Load Voltage : +30VDC, Max</li> <li>Load Current : 100mA, Max</li> <li>Isolation Voltage : Non-isolation</li> </ul>	<p><b>Current Input Wire Connection</b></p>  <p><b>Digital Input / Digital Output Wire Connection</b></p> <table border="1" data-bbox="483 837 1433 1391"> <thead> <tr> <th>Input Type</th> <th>ON State LED ON Readback as 0</th> <th>OFF State LED OFF Readback as 1</th> </tr> </thead> <tbody> <tr> <td>Relay Contact</td> <td>Relay ON </td> <td>Relay Off </td> </tr> <tr> <td>TTL/CMOS Logic</td> <td>Voltage &lt; 1V </td> <td>Voltage &gt; 3.5V </td> </tr> <tr> <td>Open Collector</td> <td>Open Collector On </td> <td>Open Collector Off </td> </tr> </tbody> </table> <table border="1" data-bbox="483 1406 1433 1883"> <thead> <tr> <th>Output Type</th> <th>ON State LED ON Readback as 1</th> <th>OFF State LED OFF Readback as 0</th> </tr> </thead> <tbody> <tr> <td>Drive Relay</td> <td>Relay ON </td> <td>Relay Off </td> </tr> <tr> <td>Resistance Load</td> <td></td> <td></td> </tr> </tbody> </table>	Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1	Relay Contact	Relay ON 	Relay Off 	TTL/CMOS Logic	Voltage < 1V 	Voltage > 3.5V 	Open Collector	Open Collector On 	Open Collector Off 	Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0	Drive Relay	Relay ON 	Relay Off 	Resistance Load		
Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1																				
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Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0																				
Drive Relay	Relay ON 	Relay Off 																				
Resistance Load																						


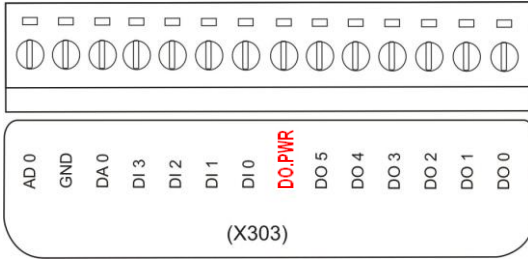
### Ordering Information

Model Number	Description
X203	2-channel A/D (0~20mA), add 2-channel D/I, 6-channel D/O

X302	A/D, D/A (1,1)	For i-7188XC																				
	<ul style="list-style-type: none"> <li>• 1-channel A/D (+/-5V), 1-channel D/A (+/-5V)</li> <li>• 64 x 32 (mm)</li> <li>• Power consumption : 0.9W</li> <li>• Power requirement : +5VDC</li> </ul>	<p style="text-align: center;"><b>Pin assignment</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">(X302)</td> <td style="text-align: center;">COM2</td> </tr> <tr> <td style="text-align: center;">DA 0</td> <td style="text-align: center;">(Y) D2+</td> </tr> <tr> <td style="text-align: center;">GND</td> <td style="text-align: center;">(G) D2-</td> </tr> <tr> <td style="text-align: center;">AD 0</td> <td style="text-align: center;">(R) VS+</td> </tr> <tr> <td style="text-align: center;">DO 3</td> <td style="text-align: center;">(B) GND</td> </tr> <tr> <td style="text-align: center;">DO 2</td> <td></td> </tr> <tr> <td style="text-align: center;">DO 1</td> <td></td> </tr> <tr> <td style="text-align: center;">DI 3</td> <td></td> </tr> <tr> <td style="text-align: center;">DI 2</td> <td></td> </tr> <tr> <td style="text-align: center;">INIT*/DI 1</td> <td></td> </tr> </table> 	(X302)	COM2	DA 0	(Y) D2+	GND	(G) D2-	AD 0	(R) VS+	DO 3	(B) GND	DO 2		DO 1		DI 3		DI 2		INIT*/DI 1	
(X302)	COM2																					
DA 0	(Y) D2+																					
GND	(G) D2-																					
AD 0	(R) VS+																					
DO 3	(B) GND																					
DO 2																						
DO 1																						
DI 3																						
DI 2																						
INIT*/DI 1																						
<p><b>Analog Input</b></p> <ul style="list-style-type: none"> <li>• Input Channel : 1</li> <li>• Input Type : +/- 5V</li> <li>• Resolution : 12-bit</li> <li>• Sampling rate : 900Hz Max</li> <li>• Input Impedance : 50K Ohm</li> <li>• Over voltage Protection : +/-5VDC</li> <li>• Isolation Voltage : Non-isolation</li> </ul> <p><b>Analog Output</b></p> <ul style="list-style-type: none"> <li>• Output Channel : 1</li> <li>• Output Type : +/- 5V</li> <li>• Resolution : 12-bit</li> <li>• Output Capacity : 10mA</li> <li>• Isolation Voltage : Non-isolation</li> </ul>	<p style="text-align: center;"><b>Voltage Input Wire Connection</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; text-align: center;">Input Type</td> <td style="text-align: center;">  </td> </tr> </table> <p style="text-align: center;"><b>Voltage Output Wire Connection</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; text-align: center;">Output Type</td> <td style="text-align: center;">  </td> </tr> </table>		Input Type		Output Type																	
Input Type																						
Output Type																						

**Ordering Information**

Model Number	Description
X302	1-channel A/D (+/-5V), 1-channel D/A (+/-5V)

<b>X303</b>	<b>A/D, D/A, DI, DO (1,1,4,6,)</b>	<b>For i-7188/μPAC-7186: XB/XG/EX/EG</b>
	<ul style="list-style-type: none"> <li>1-channel A/D ( +/-5V), 1-channel D/A ( +/-5V), add 4-channel D/I, 6-channel D/O</li> <li>64 x 38 (mm)</li> <li>Power consumption : 0.9W</li> <li>Power requirement : +5VDC</li> </ul>	<b>Pin assignment</b> 

### Analog Input

- Input Channel : 1
- Input Type : +/- 5V
- Resolution : 12-bit
- Sampling Rate:1KHz Max
- Input Impedance : 50K Ohm
- Over voltage Protection : +/- 5VDC
- Isolation Voltage : Non-isolation

### Analog Output

- Output Channel : 1
- Output Type : +/- 5V
- Resolution : 12-bit
- Output Capacity :10mA
- Isolation Voltage : Non-isolation

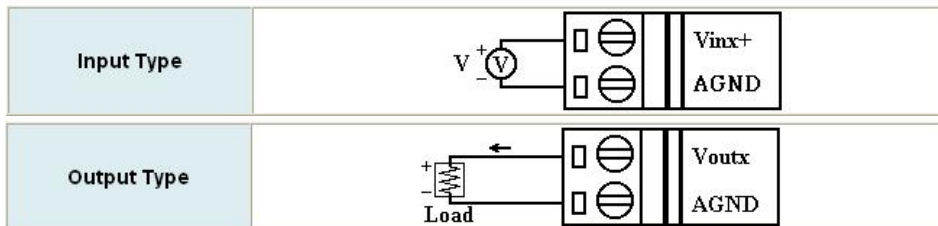
### Digital Input

- Input Channel : 4
- Input Type : Sink, non-isolated channel with common ground
- Off Voltage Level : +1V max
- On Voltage Level : +3.5V ~ +30VDC
- Isolation Voltage : Non-isolation

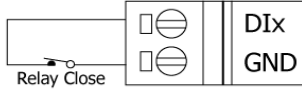
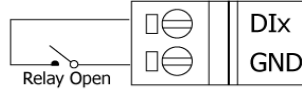
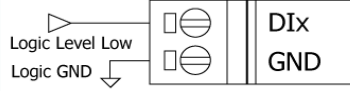
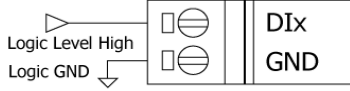
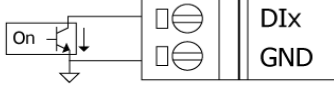
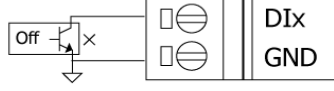
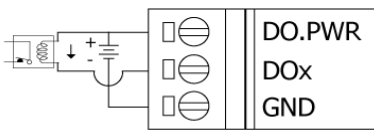
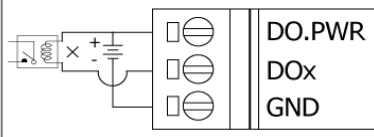
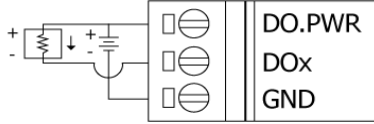
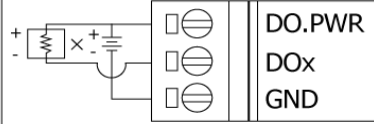
### Digital Output

- Output Channels : 6
- Output Type : Open-Collector (NPN)
- Load Voltage : +30VDC, Max
- Load Current : 100mA, Max
- Isolation Voltage : Non-isolation

### Voltage Input / Voltage Output Wire Connection




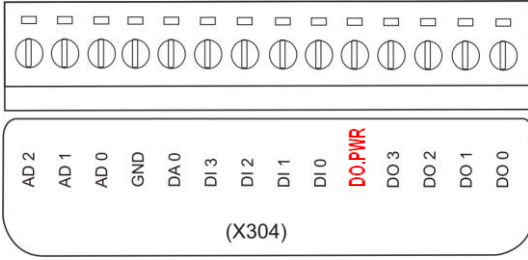
### Digital Input / Digital Output Wire Connection

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON 	Relay Off 
TTL/CMOS Logic	Voltage < 1V 	Voltage > 3.5V 
Open Collector	Open Collector On 	Open Collector Off 
Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON 	Relay Off 
Resistance Load		

### Ordering Information

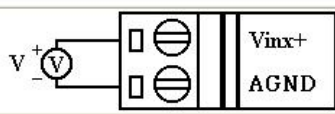
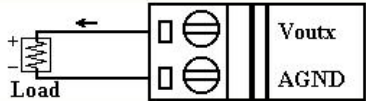
Model Number	Description
X303	1-channel A/D ( +/-5V), 1-channel D/A ( +/-5V), add 4-channel D/I, 6-channel D/O



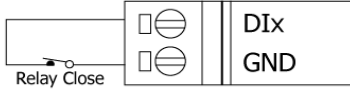
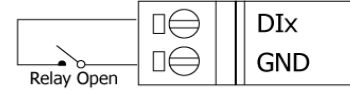
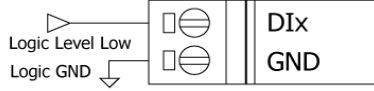
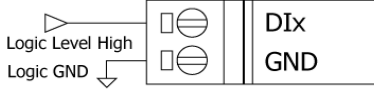
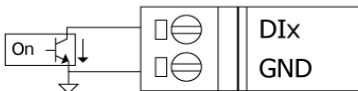
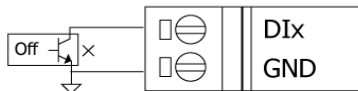
<b>X304</b>	<b>A/D, D/A, DI, DO (3,1,4,4,)</b>	<b>For i-7188/<math>\mu</math>PAC-7186: XB/XG/EX/EG</b>
	<ul style="list-style-type: none"> <li>• 3-channel A/D (+/-5V), 1-channel D/A (+/-5V), add 4-channel D/I, 4-channel D/O</li> <li>• 64 x 38 (mm)</li> <li>• Power consumption : 0.9W</li> <li>• Power requirement : +5VDC</li> </ul>	<p><b>Pin assignment</b></p>  <p>(X304)</p>

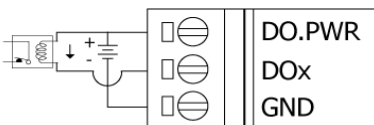
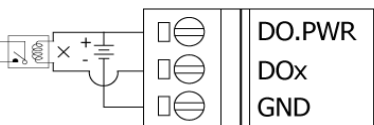
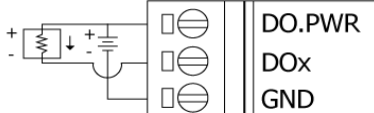
- Analog Input**
- Input Channel : 3
  - Input Type : +/- 5V
  - Resolution : 12-bit
  - Sampling Rate:1KHz Max
  - Input Impedance : 50K Ohm
  - Over voltage Protection : +/- 5VDC
  - Isolation Voltage : Non-isolation
- Analog Output**
- Output Channel : 1
  - Output Type : +/- 5V
  - Resolution : 12-bit
  - Output Capacity :10mA
  - Isolation Voltage : Non-isolation
- Digital Input**
- Input Channel : 4
  - Input Type : Sink, non-isolated channel with common ground
  - Off Voltage Level : +1V max
  - On Voltage Level : +3.5V ~ +30VDC
  - Isolation Voltage : Non-isolation
- Digital Output**
- Output Channels : 4
  - Output Type : Open-Collector (NPN)
  - Load Voltage : +30VDC, Max
  - Load Current : 100mA, Max
  - Isolation Voltage : Non-isolation

**Voltage Input / Voltage Output Wire Connection**

<b>Input Type</b>	
<b>Output Type</b>	


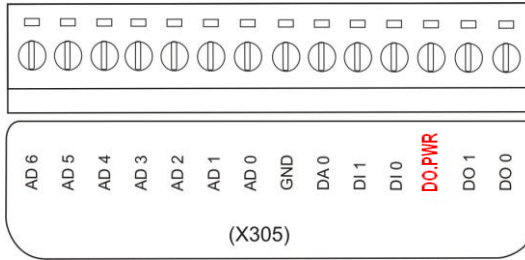
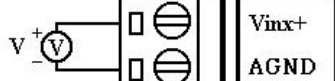



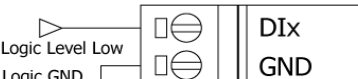
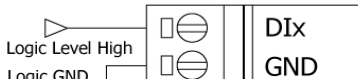

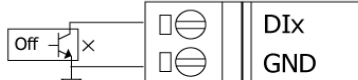
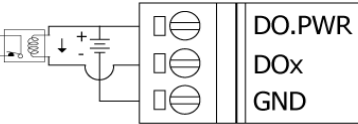
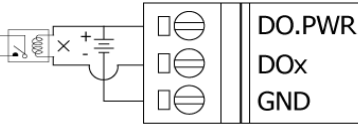
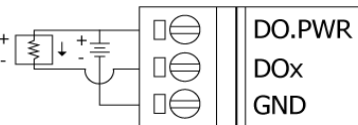
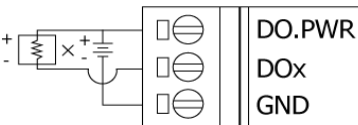
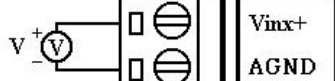



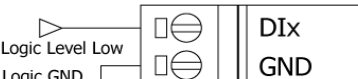
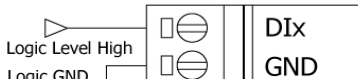

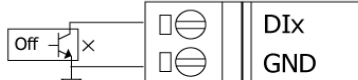
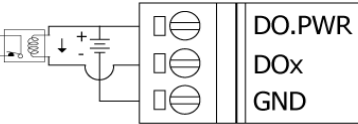
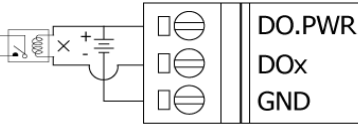
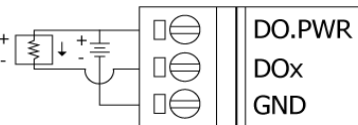
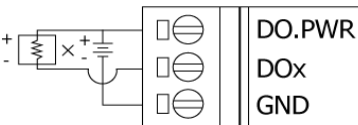
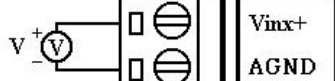



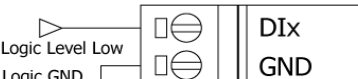
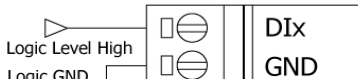

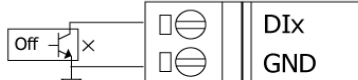
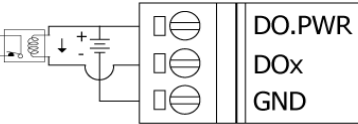
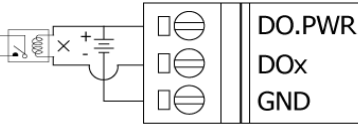
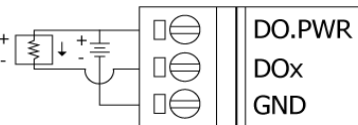
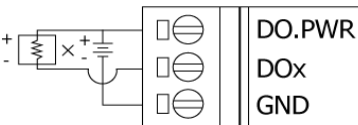
**Digital Input / Digital Output Wire Connection**


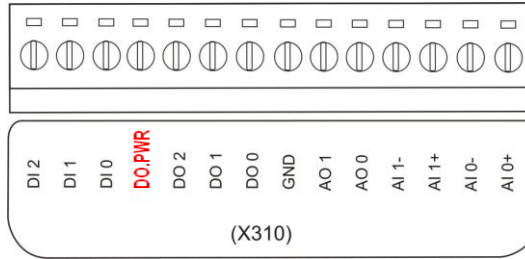
Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON 	Relay Off 
	Voltage < 1V 	Voltage > 3.5V 
Open Collector	Open Collector On 	Open Collector Off 

Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON 	Relay Off 
	Resistance Load	

**Ordering Information**

Model Number	Description
X304	3-channel A/D (+/-5V), 1-channel D/A (+/-5V), add 4-channel D/I, 4-channel D/O

X305	A/D, D/A, DI, DO (7,1,2,2,)	For i-7188/μPAC-7186: XB/XG/EX/EG																								
	<ul style="list-style-type: none"> <li>7-channel A/D (+/-5V), 1-channel D/A (+/-5V), add 2-channel D/I, 2-channel D/O</li> <li>64 x 38 (mm)</li> <li>Power consumption : 0.9W</li> <li>Power requirement : +5VDC</li> </ul>	<p><b>Pin assignment</b></p>  <p>(X305)</p>																								
<p><b>Analog Input</b></p> <ul style="list-style-type: none"> <li>Input Channel : 7</li> <li>Input Type : +/- 5V</li> <li>Resolution : 12-bit</li> <li>Sampling Rate:1KHz Max</li> <li>Input Impedance : 50K Ohm</li> <li>Over voltage Protection : +/- 5VDC</li> <li>Isolation Voltage : Non-isolation</li> </ul> <p><b>Analog Output</b></p> <ul style="list-style-type: none"> <li>Output Channel : 1</li> <li>Output Type : +/- 5V</li> <li>Resolution : 12-bit</li> <li>Output Capacity :10mA</li> <li>Isolation Voltage : Non-isolation</li> </ul> <p><b>Digital Input</b></p> <ul style="list-style-type: none"> <li>Input Channel : 2</li> <li>Input Type : Sink, non-isolated channel with common ground</li> <li>Off Voltage Level : +1V max</li> <li>On Voltage Level : +3.5V ~ +30VDC</li> <li>Isolation Voltage : Non-isolation</li> </ul> <p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>Output Channels : 2</li> <li>Output Type : Open-Collector (NPN)</li> <li>Load Voltage : +30VDC, Max</li> <li>Load Current : 100mA, Max</li> <li>Isolation Voltage : Non-isolation</li> </ul>	<p><b>Voltage Input / Voltage Output Wire Connection</b></p> <table border="1"> <tr> <td data-bbox="478 649 726 750">Input Type</td> <td data-bbox="726 649 1428 750">  </td> </tr> <tr> <td data-bbox="478 761 726 862">Output Type</td> <td data-bbox="726 761 1428 862">  </td> </tr> </table> <p><b>Digital Input / Digital Output Wire Connection</b></p> <table border="1"> <thead> <tr> <th data-bbox="478 929 638 985">Input Type</th> <th data-bbox="638 929 1029 985">ON State LED ON Readback as 0</th> <th data-bbox="1029 929 1428 985">OFF State LED OFF Readback as 1</th> </tr> </thead> <tbody> <tr> <td data-bbox="478 996 638 1142">Relay Contact</td> <td data-bbox="638 996 1029 1142"> <p>Relay ON</p>  </td> <td data-bbox="1029 996 1428 1142"> <p>Relay Off</p>  </td> </tr> <tr> <td data-bbox="478 1153 638 1288">TTL/CMOS Logic</td> <td data-bbox="638 1153 1029 1288"> <p>Voltage &lt; 1V</p>  </td> <td data-bbox="1029 1153 1428 1288"> <p>Voltage &gt; 3.5V</p>  </td> </tr> <tr> <td data-bbox="478 1299 638 1444">Open Collector</td> <td data-bbox="638 1299 1029 1444"> <p>Open Collector On</p>  </td> <td data-bbox="1029 1299 1428 1444"> <p>Open Collector Off</p>  </td> </tr> <tr> <th data-bbox="478 1467 638 1523">Output Type</th> <th data-bbox="638 1467 1029 1523">ON State LED ON Readback as 1</th> <th data-bbox="1029 1467 1428 1523">OFF State LED OFF Readback as 0</th> </tr> <tr> <td data-bbox="478 1534 638 1724">Drive Relay</td> <td data-bbox="638 1534 1029 1724"> <p>Relay ON</p>  </td> <td data-bbox="1029 1534 1428 1724"> <p>Relay Off</p>  </td> </tr> <tr> <td data-bbox="478 1736 638 1915">Resistance Load</td> <td data-bbox="638 1736 1029 1915">  </td> <td data-bbox="1029 1736 1428 1915">  </td> </tr> </tbody> </table>	Input Type		Output Type		Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1	Relay Contact	<p>Relay ON</p> 	<p>Relay Off</p> 	TTL/CMOS Logic	<p>Voltage &lt; 1V</p> 	<p>Voltage &gt; 3.5V</p> 	Open Collector	<p>Open Collector On</p> 	<p>Open Collector Off</p> 	Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0	Drive Relay	<p>Relay ON</p> 	<p>Relay Off</p> 	Resistance Load		
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Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0																								
Drive Relay	<p>Relay ON</p> 	<p>Relay Off</p> 																								
Resistance Load																										
<p><b>Ordering Information</b></p> <table border="1"> <thead> <tr> <th data-bbox="215 2004 470 2049">Model Number</th> <th data-bbox="470 2004 1444 2049">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="215 2049 470 2083">X305</td> <td data-bbox="470 2049 1444 2083">7-channel A/D (+/-5V), 1-channel D/A (+/-5V), add 2-channel D/I, 2-channel D/O</td> </tr> </tbody> </table>			Model Number	Description	X305	7-channel A/D (+/-5V), 1-channel D/A (+/-5V), add 2-channel D/I, 2-channel D/O																				
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X310	A/D, D/A, DI, DO (2,2,3,3,)	For i-7188/μPAC-7186: XB/XG/EX/EG
	<ul style="list-style-type: none"> <li>1-channel A/D (0~20mA), 1-channel A/D (0~10V), 2-channel D/A (0~10V) add 3-channel D/I, 3-channel D/O</li> <li>64 x 38 (mm)</li> <li>Power consumption : 0.9W</li> <li>Power requirement : +5VDC</li> </ul>	<p><b>Pin assignment</b></p>  <p>(X310)</p>

**Analog Input**

- Input Channels : 2 differential
- Input Type : Ch0 : 0 ~ 20 mA Ch1 : 0 ~ +10 V
- Resolution : 12-bit
- Sampling Rate:1KHz Max (Read one channel)
- Input Impedance : Ch0 : 500R Ohm Ch1 : 2M Ohm
- Over voltage Protection : +30VDC
- Isolation Voltage : Non-isolation

**Analog Output**

- Output Channels : 2
- Output Type : 0 ~ +10 V
- Resolution : 12-bit
- Output Capacity : 20mA
- Isolation Voltage : Non-isolation

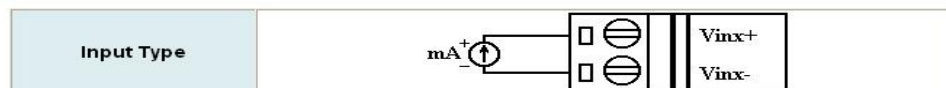
**Digital Input**

- Input Channels : 3
- Input Type : Sink, non-isolated channel with common ground
- Off Voltage Level : +1V max
- On Voltage Level : +3.5V ~ +30VDC
- Isolation Voltage : Non-isolation

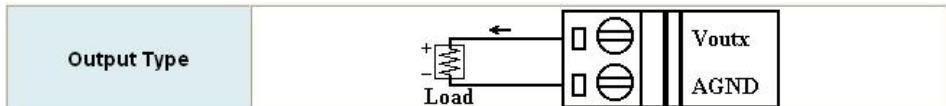
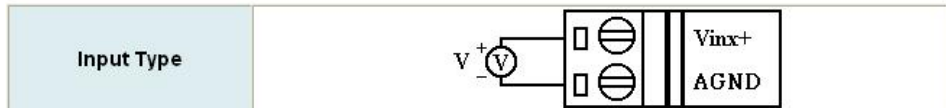
**Digital Output**

- Output Channels : 3
- Output Type : Open-Collector (NPN)
- Load Voltage : +30VDC, Max
- Load Current : 100mA, Max
- Isolation Voltage : Non-isolation


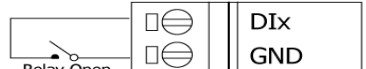

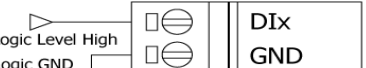


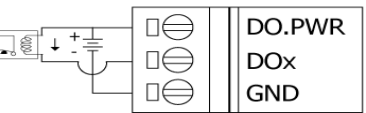
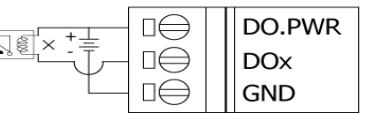
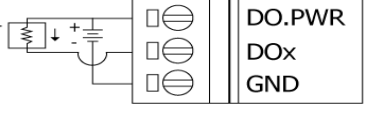
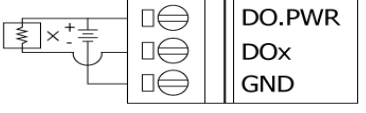
**Current Input Wire Connection**



**Voltage Input / Voltage Output Wire Connection**


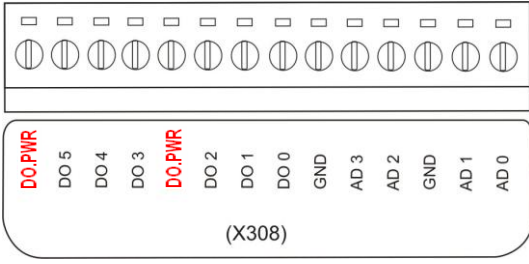
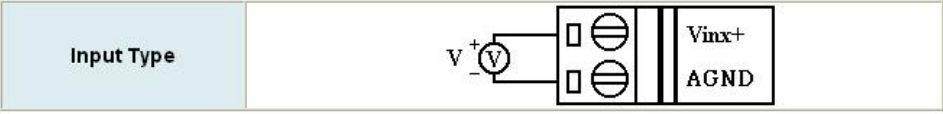
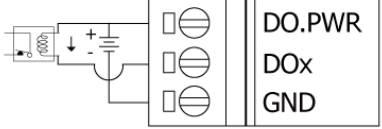
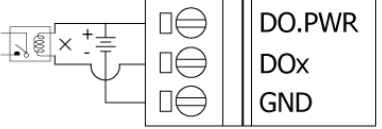
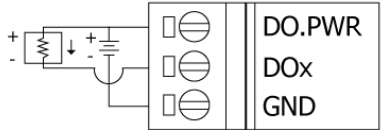
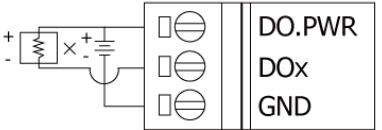
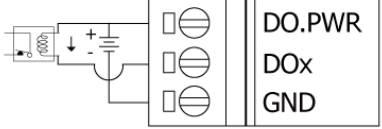
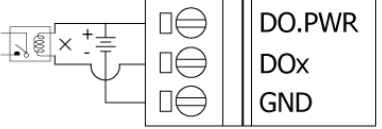
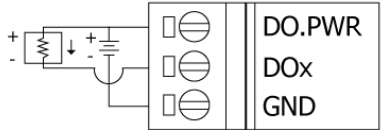
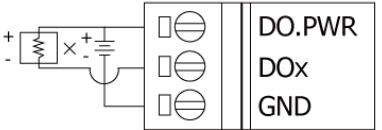
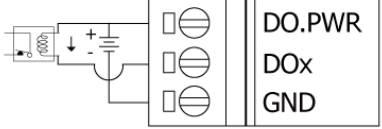
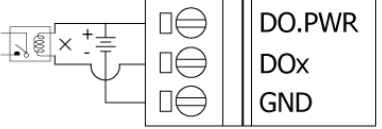
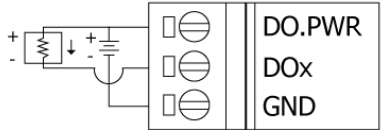
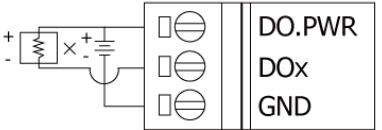


**Digital Input / Digital Output Wire Connection**

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
	Relay ON                      Relay Off	
Relay Contact		
	Voltage < 1V                      Voltage > 3.5V	
TTL/CMOS Logic		
	Open Collector On                      Open Collector Off	
Open Collector		
	ON State LED ON Readback as 1                      OFF State LED OFF Readback as 0	
	Relay ON                      Relay Off	
Drive Relay		
Resistance Load		

**Ordering Information**

Model Number	Description
X310	1-channel A/D (0~20mA), 1-channel A/D (0~10V), 2-channel D/A (0~10V) add 3-channel D/I, 3-channel D/O

X308	A/D, DO (4,6)	For i-7188/ $\mu$ PAC-7186: XB/XG/EX/EG								
	<ul style="list-style-type: none"> <li>4-channel A/D (0~10V), add 6-channel D/O</li> <li>64 x 38 (mm)</li> <li>Power requirement : +5VDC</li> </ul>	<p><b>Pin assignment</b></p>  <p>(X308)</p>								
<p><b>Analog Input</b></p> <ul style="list-style-type: none"> <li>Input Channels : 4</li> <li>Input Type : 0 ~ +10 V</li> <li>Resolution : 12-bit</li> <li>Sampling Rate:1KHz Max (Read one channel)</li> <li>Input Impedance : 2M Ohm</li> <li>Over voltage Protection : +/- 30VDC</li> <li>Isolation Voltage : Non-isolation</li> </ul> <p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>Output Channels : 6</li> <li>Output Type : Open-Collector (NPN)</li> <li>Load Voltage : +30VDC, Max</li> <li>Load Current : 100mA, Max</li> <li>Isolation Voltage : Non-isolation</li> </ul>	<p><b>Voltage Input Wire Connection</b></p>  <p><b>Digital Output Wire Connection</b></p> <table border="1" data-bbox="486 987 1433 1473"> <thead> <tr> <th>Output Type</th> <th>ON State LED ON Readback as 1</th> <th>OFF State LED OFF Readback as 0</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Drive Relay</td> <td>Relay ON </td> <td>Relay Off </td> </tr> <tr> <td>Resistance Load </td> <td>Resistance Load </td> </tr> </tbody> </table>		Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0	Drive Relay	Relay ON 	Relay Off 	Resistance Load 	Resistance Load 
Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0								
Drive Relay	Relay ON 	Relay Off 								
	Resistance Load 	Resistance Load 								


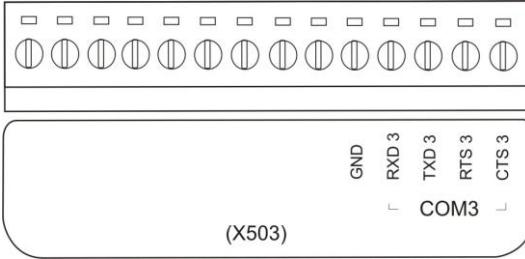

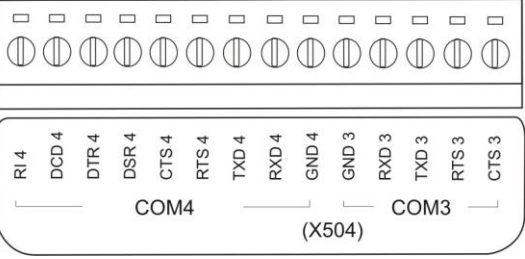

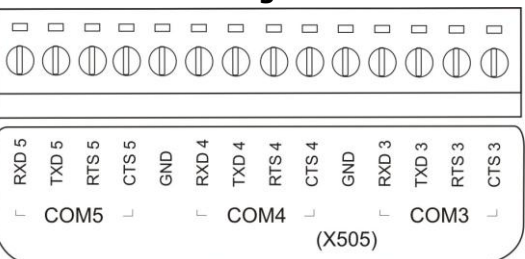
### Ordering Information

Model Number	Description
X308	4-channel A/D (0~10V), add 6-channel D/O



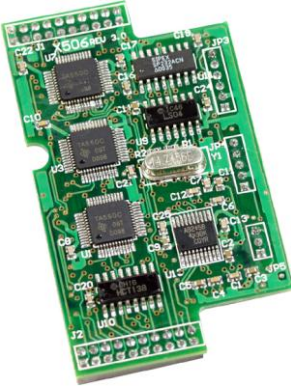
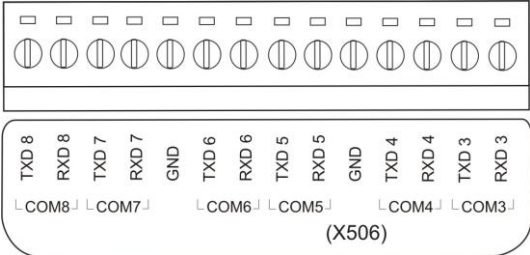

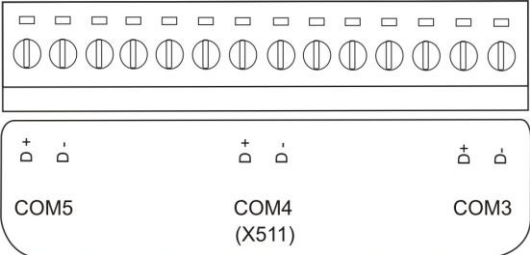
## RS-232/RS-485 Boards

X-Boards for RS-232/485 communication ports expansion

X503	RS-232 (1)	For i-7188/μPAC-7186: XB/XG/EX/EG
	<ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.6W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-232 port : 1</li> <li>COM3:TXD, RXD, RTS, CTS, GND</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes</li> <li>Transmission speed: 115.2K BPS max.</li> <li>Isolated : none</li> </ul>	<p><b>Pin assignment</b></p> 
	<ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-232 ports : 2</li> <li>COM3:TXD, RXD, RTS, CTS, GND</li> <li>COM4:TXD, RXD, RTS, CTS, DSR, DTR, DCD, RI, GND</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes for each COM port</li> <li>Transmission speed: 115.2K BPS max.</li> <li>Isolated : none</li> </ul>	<p><b>Pin assignment</b></p> 
	<ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-232 ports : 3</li> <li>COM3:TXD, RXD, RTS, CTS, GND</li> <li>COM4:TXD, RXD, RTS, CTS, GND</li> <li>COM5:TXD, RXD, RTS, CTS, GND</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes for each COM port</li> <li>Transmission speed: 115.2K BPS max.</li> <li>Isolated : none</li> </ul>	<p><b>Pin assignment</b></p> 

### Ordering Information

Model Number	Description
X503	1-Port RS-232 (5-Pin)
X504 CR	2-Port RS-232 (5-Pin) & (9-Pin) (RoHS)
X505 CR	3-Port RS-232 (5-Pin) (RoHS)


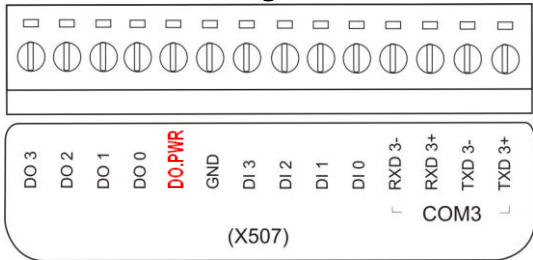
<p><b>X506 CR</b></p>  <p>RoHS</p>	<p><b>RS-232 (6)</b></p> <ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-232 ports : 6</li> <li>COM3 : TXD, RXD, GND</li> <li>COM4 : TXD, RXD, GND</li> <li>COM5 : TXD, RXD, GND</li> <li>COM6 : TXD, RXD, GND</li> <li>COM7 : TXD, RXD, GND</li> <li>COM8 : TXD, RXD, GND</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes for each COM port</li> <li>Transmission speed: 115.2K BPS max.</li> <li>Isolated : none</li> </ul>	<p><b>For i-7188/μPAC-7186: XB/XG/EX/EG</b></p> <p><b>Pin assignment</b></p> 
<p><b>X511 CR</b></p>  <p>RoHS</p>	<p><b>RS-485 (3)</b></p> <ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.8W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-485 ports : 3</li> <li>COM3 : RS-485 : Data+, Data-</li> <li>COM4 : RS-485 : Data+, Data-</li> <li>COM5 : RS-485 : Data+, Data-</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes</li> <li>Transmission speed: 115.2K BPS max.</li> <li>Self-Turner ASIC inside : Yes</li> <li>Isolated : none</li> </ul>	<p><b>For i-7188/μPAC-7186: XB/XG/EX/EG</b></p> <p><b>Pin assignment</b></p> 

### Ordering Information

Model Number	Description
X506 CR	6-Port RS-232 (3-Pin) (RoHS)
X511 CR	3-Port RS-485 (RoHS)

# RS-232/422/485, DI, DO Boards

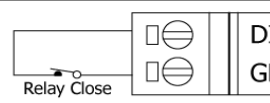
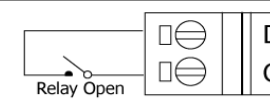
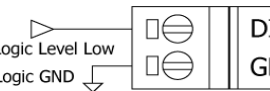
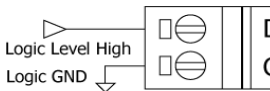
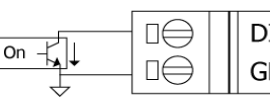
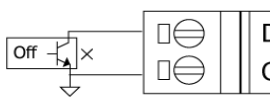
X-Boards for RS-232/422/485 communication ports, DI, DO expansion

<b>X507 CR</b>	<b>RS-422/485, DI, DO (1,4,4)</b>	<b>For i-7188/μPAC-7186: XB/XG/EX/EG</b>
	<ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-422/485 port : 1</li> <li>COM3 :</li> <li>RS-422: RXD+, RXD-, TXD+, TXD-</li> <li>RS-485: TXD+, TXD-</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes</li> <li>Transmission speed: 115.2K BPS max.</li> <li>Self-Turner ASIC inside : Yes</li> <li>Isolated : none</li> </ul>	<p><b>Pin assignment</b></p> 

**Digital Input**

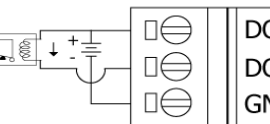
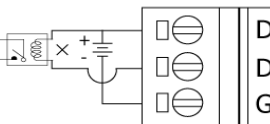
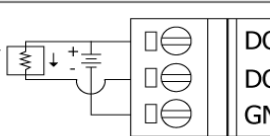
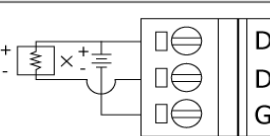
- Channels : 4
- Input Voltage: Logic high level (3.5V~30V)  
Logic low level (0V~1V)
- Isolated : none

**Digital Input / Digital Output Wire Connection**

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON	Relay Off
		
TTL/CMOS Logic	Voltage < 1V	Voltage > 3.5V
		
Open Collector	Open Collector On	Open Collector Off
		


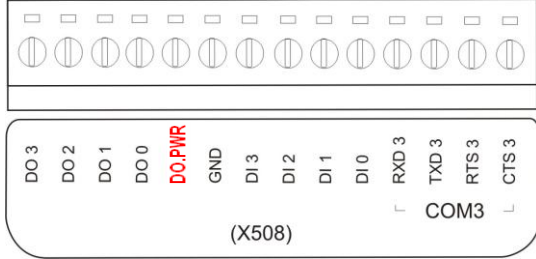
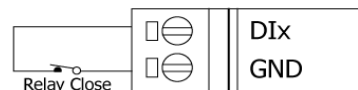
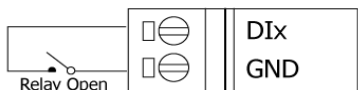
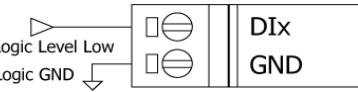
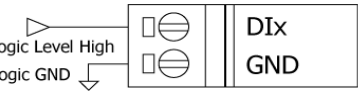
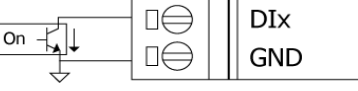

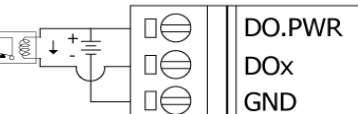
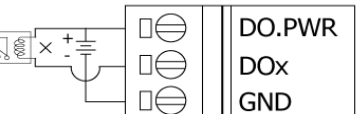
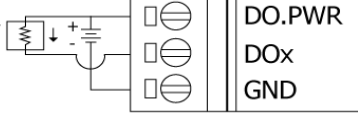
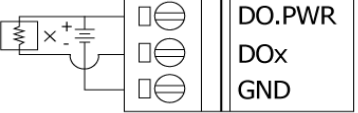
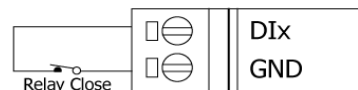
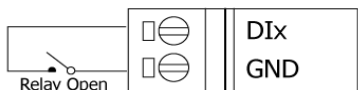
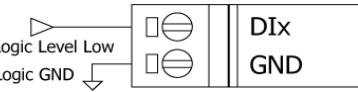
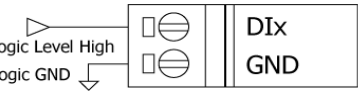
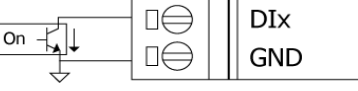

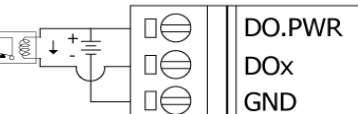
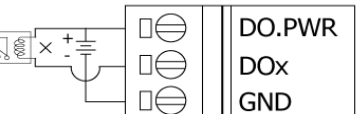
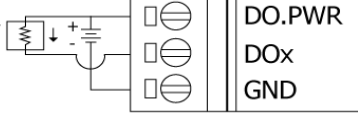
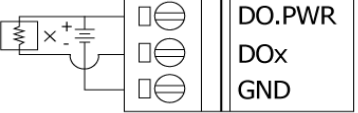
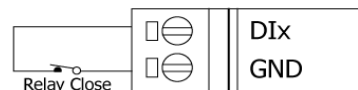
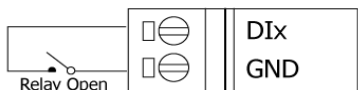
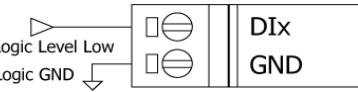
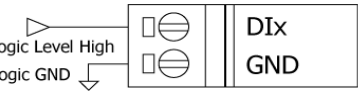
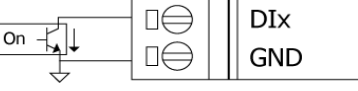

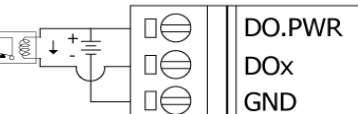
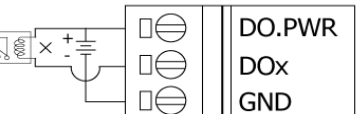
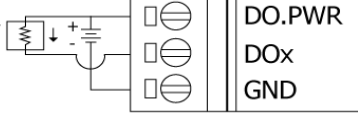
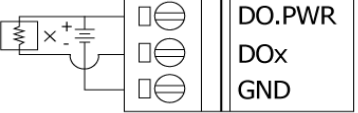
**Digital Output**

- Channels: 4
- Open-collector Output : 100 mA / 30V max
- Isolated : none

Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON	Relay Off
		
Resistance Load	Relay ON	Relay Off
		

**Ordering Information**


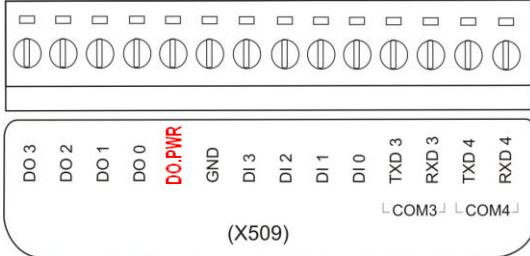


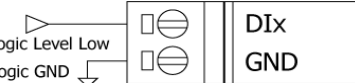
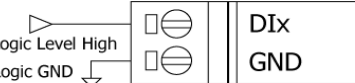

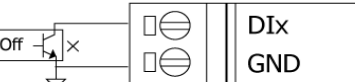
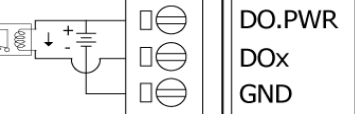
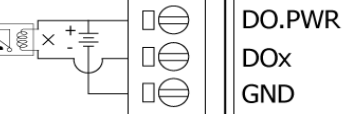
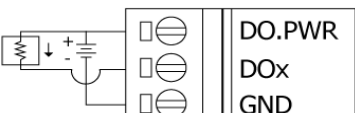
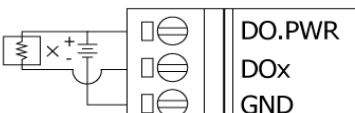


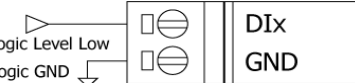
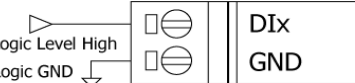

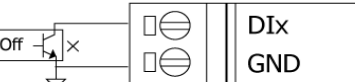
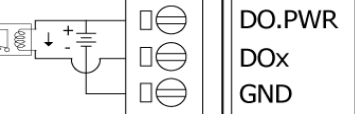
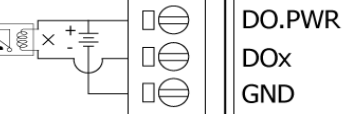
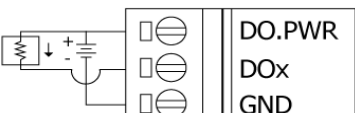
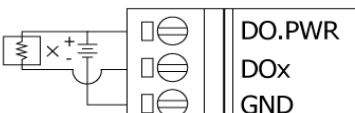


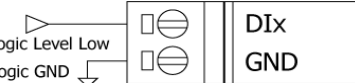
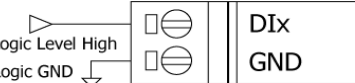

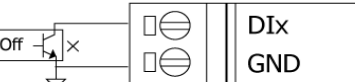
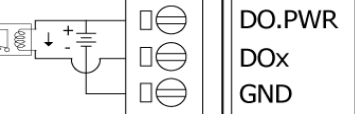
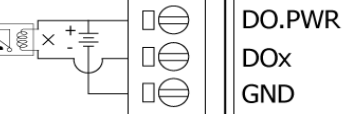
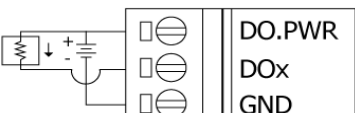
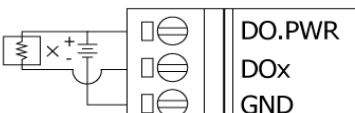
Model Number	Description
<b>X507 CR</b>	<b>1-Port RS-422/485, add 4-channel D/I, 4-channel D/O (RoHS)</b>

X508 CR	RS-232, DI, DO (1,4,4)	For i-7188/μPAC-7186: XB/XG/EX/EG																															
 <p><b>RoHS</b></p>	<ul style="list-style-type: none"> <li>• 64 x 38 (mm)</li> <li>• Power consumption : 0.7W</li> <li>• Power requirement : +5VDC</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>• RS-232 port : 1</li> <li>• COM3:TXD, RXD, RTS, CTS, GND</li> <li>• 16550 compatible</li> <li>• Internal FIFO : 16 bytes</li> <li>• Transmission speed: 115.2K BPS max.</li> <li>• Data bit: 5, 6, 7, 8</li> <li>• Stop bit: 1, 1.5, 2</li> <li>• Parity: None, Even, Odd, Mark, Space</li> <li>• Isolated : none</li> </ul>	<p style="text-align: center;"><b>Pin assignment</b></p>  <p style="text-align: center;">(X508)</p>																															
<p><b>Software</b></p> <ul style="list-style-type: none"> <li>• Support interrupt driven software library</li> <li>• Support VxCOM library</li> </ul> <p><b>Digital Input</b></p> <ul style="list-style-type: none"> <li>• Input Channels : 4</li> <li>• Input Type : Sink, non-isolated channel with common ground</li> <li>• Off Voltage Level : +1V max</li> <li>• On Voltage Level : +3.5V ~ +30VDC</li> <li>• Isolation Voltage : Non-isolation</li> </ul> <p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>• Output Channels : 4</li> <li>• Output Type : Open-Collector (NPN)</li> <li>• Load Voltage : +30VDC, Max</li> <li>• Load Current : 100mA, Max</li> <li>• Isolation Voltage : Non-isolation</li> </ul>	<p style="text-align: center;"><b>Digital Input / Digital Output Wire Connection</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d9ead3;">Input Type</th> <th style="background-color: #d9ead3;">ON State LED ON Readback as 0</th> <th style="background-color: #d9ead3;">OFF State LED OFF Readback as 1</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">Relay Contact</td> <td style="text-align: center;">Relay ON</td> <td style="text-align: center;">Relay Off</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">TTL/CMOS Logic</td> <td style="text-align: center;">Voltage &lt; 1V</td> <td style="text-align: center;">Voltage &gt; 3.5V</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">Open Collector</td> <td style="text-align: center;">Open Collector On</td> <td style="text-align: center;">Open Collector Off</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d9ead3;">Output Type</th> <th style="background-color: #d9ead3;">ON State LED ON Readback as 1</th> <th style="background-color: #d9ead3;">OFF State LED OFF Readback as 0</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">Drive Relay</td> <td style="text-align: center;">Relay ON</td> <td style="text-align: center;">Relay Off</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">Resistance Load</td> <td style="text-align: center;">Relay ON</td> <td style="text-align: center;">Relay Off</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>		Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1	Relay Contact	Relay ON	Relay Off			TTL/CMOS Logic	Voltage < 1V	Voltage > 3.5V			Open Collector	Open Collector On	Open Collector Off			Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0	Drive Relay	Relay ON	Relay Off			Resistance Load	Relay ON	Relay Off		
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### Ordering Information


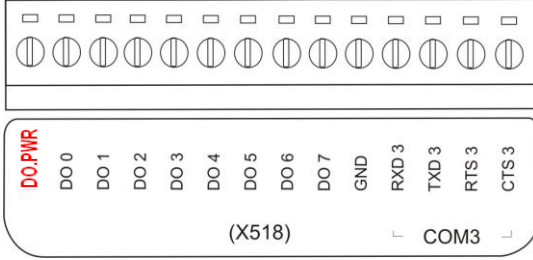
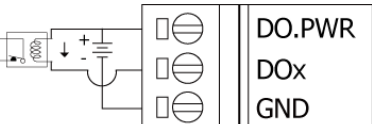
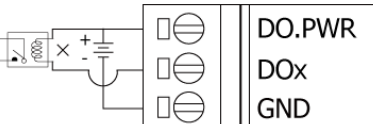
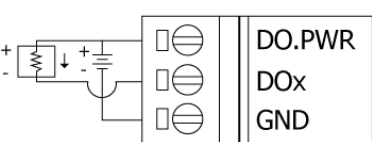
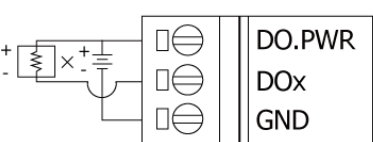
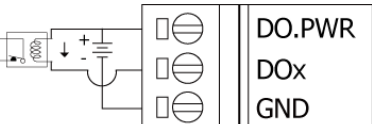
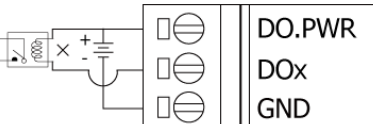
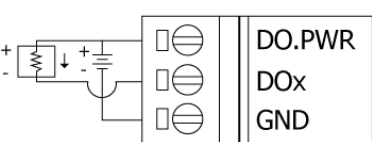
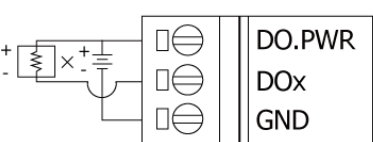
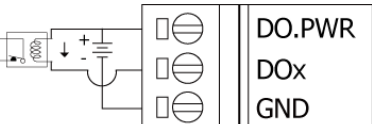
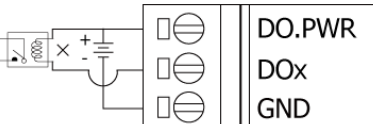
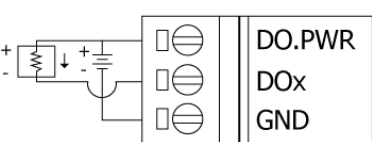
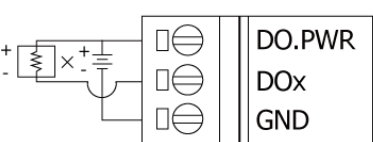
Model Number	Description
X508 CR	1-Port RS-232 ( 5-Pin ) add 4-channel D/I, 4-channel D/O (RoHS)



X509 CR	RS-232, DI, DO (2,4,4)	For i-7188/μPAC-7186: XB/XG/EX/EG																			
 <p>RoHS</p> <ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> <li>Power requirement : +5VDC</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-232 port : 2</li> <li>COM3 : TXD, RXD, GND</li> <li>COM4 : TXD, RXD, GND</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes</li> <li>Transmission speed : 115.2K BPS max.</li> <li>Isolated : none</li> </ul>		<p><b>Pin assignment</b></p>  <p>(X509)</p>																			
<p><b>Digital Input</b></p> <ul style="list-style-type: none"> <li>Channels : 4</li> <li>Input Voltage: Logic high level (3.5V~30V), Logic low level (0V~1V)</li> <li>Isolated : none</li> </ul> <p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>Channels : 4</li> <li>Open-collector Output : 100 mA / 30V max</li> <li>Isolated : none</li> </ul>	<p><b>Digital Input / Digital Output Wire Connection</b></p> <table border="1"> <thead> <tr> <th>Input Type</th> <th>ON State LED ON Readback as 0</th> <th>OFF State LED OFF Readback as 1</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Relay Contact</td> <td>Relay ON </td> <td>Relay Off </td> </tr> <tr> <td>Voltage &lt; 1V </td> <td>Voltage &gt; 3.5V </td> </tr> <tr> <td rowspan="2">Open Collector</td> <td>Open Collector On </td> <td>Open Collector Off </td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Output Type</th> <th>ON State LED ON Readback as 1</th> <th>OFF State LED OFF Readback as 0</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Drive Relay</td> <td>Relay ON </td> <td>Relay Off </td> </tr> <tr> <td>Resistance Load </td> <td>Resistance Load </td> </tr> </tbody> </table>		Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1	Relay Contact	Relay ON 	Relay Off 	Voltage < 1V 	Voltage > 3.5V 	Open Collector	Open Collector On 	Open Collector Off 	Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0	Drive Relay	Relay ON 	Relay Off 	Resistance Load 	Resistance Load 
Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1																			
Relay Contact	Relay ON 	Relay Off 																			
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Open Collector	Open Collector On 	Open Collector Off 																			
	Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0																		
Drive Relay	Relay ON 	Relay Off 																			
	Resistance Load 	Resistance Load 																			

**Ordering Information**

Model Number	Description
X509 CR	2-Port RS-232 ( 3-Pin ) add 4-channel D/I, 4-channel D/O (RoHS)

X518 CR	RS-232, DO (1,8)	For i-7188/ $\mu$ PAC-7186: XB/XG/EX/EG								
 <p><b>RoHS</b></p> <ul style="list-style-type: none"> <li>64 x 38 (mm)</li> <li>Power consumption : 0.7W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>RS-232 port : 1</li> <li>COM3:TXD, RXD, RTS, CTS, GND</li> <li>16550 compatible</li> <li>Internal FIFO : 16 bytes</li> <li>Transmission speed: 115.2K BPS max.</li> <li>Isolated : none</li> </ul>		<p><b>Pin assignment</b></p> 								
<p><b>Digital Output</b></p> <ul style="list-style-type: none"> <li>Channels: 8</li> <li>Open-collector Output : 100 mA / 30V max</li> <li>Isolated : none</li> </ul>	<p><b>Digital Output Wire Connection</b></p> <table border="1"> <thead> <tr> <th data-bbox="481 913 638 981">Output Type</th> <th data-bbox="641 913 1034 981">ON State LED ON Readback as 1</th> <th data-bbox="1037 913 1430 981">OFF State LED OFF Readback as 0</th> </tr> </thead> <tbody> <tr> <td data-bbox="481 985 638 1176" rowspan="2">Drive Relay</td> <td data-bbox="641 985 1034 1176"> <p>Relay ON</p>  </td> <td data-bbox="1037 985 1430 1176"> <p>Relay Off</p>  </td> </tr> <tr> <td data-bbox="641 1180 1034 1388">  </td> <td data-bbox="1037 1180 1430 1388">  </td> </tr> </tbody> </table>		Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0	Drive Relay	<p>Relay ON</p> 	<p>Relay Off</p> 		
Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0								
Drive Relay	<p>Relay ON</p> 	<p>Relay Off</p> 								
										


**Ordering Information**

Model Number	Description
X518 CR	1-Port RS-232 ( 5-Pin ) add 8-channel D/O (RoHS)

# RS-232, DI, DO, EEPROM Boards

X-Boards for RS-232 communication ports, DI, DO, EEPROM, Flash memory expansion

<b>X510</b>	<b>RS-232, DI, DO (1,5,5) EEPROM (128K*2)</b>	<b>For i-7188/μPAC-7186: XB/XG/EX/EG</b>
<b>X510-128</b>	<b>RS-232, DI, DO (1,5,5) EEPROM (128K*1)</b>	<b>For i-7188/μPAC-7186: XB/XG/EX/EG</b>



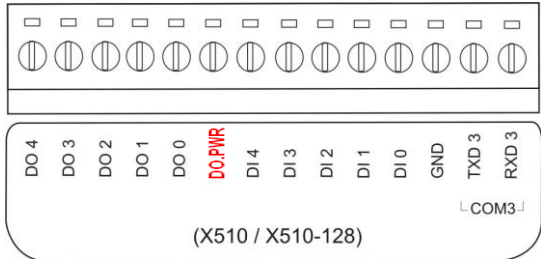
- 64 x 38 (mm)
- Power consumption : 0.7W

**Parallel I/O**

- RS-232 port : 1
- COM3 : TXD, RXD, GND
- 16550 compatible
- Internal FIFO : 16 bytes
- Transmission speed: 115.2K BPS max.
- Isolated : none

**Note:**  
**EG/XG do not support EEPROM memory**

**Pin assignment**



(X510 / X510-128)

**EEPROM**

- 128K \* 2 bytes for X510
- 128K \* 1 bytes for X510-128
- Endurance: 100,000 Write Cycles/Page
- Data Retention : 40 Years

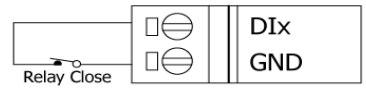
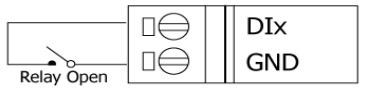
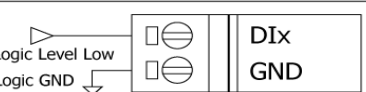
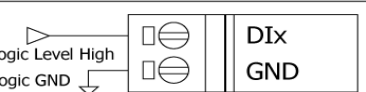


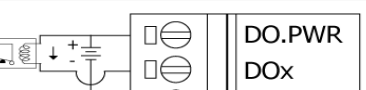
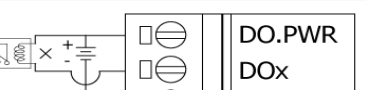
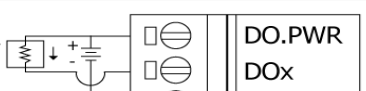
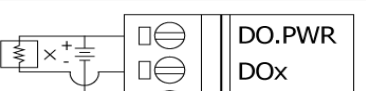
**Digital Input**

- Channels : 5
- Input Voltage: Logic high level (3.5V~30V), Logic low level (0V~1V)
- Isolated : none

**Digital Output**

- Channels: 5
- Open-collector Output : 100 mA / 30V max
- Isolated : none


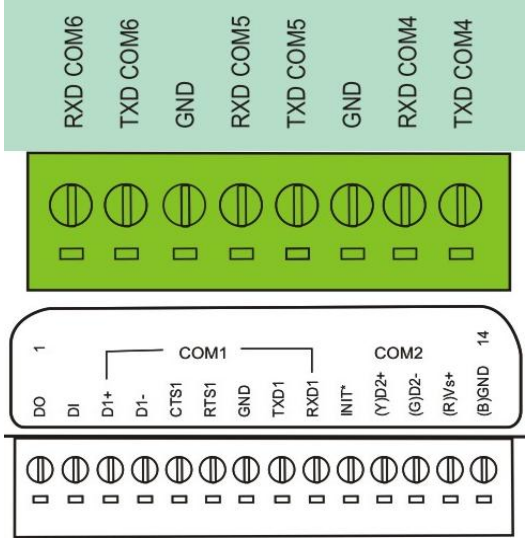
**Digital Input / Digital Output Wire Connection**

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON 	Relay Off 
	Voltage < 1V 	Voltage > 3.5V 
Open Collector	Open Collector On 	Open Collector Off 
	Output Type	ON State LED ON Readback as 1
Drive Relay	Relay ON 	Relay Off 
	Resistance Load 	

**Ordering Information**



Model Number	Description
<b>X510</b>	1-Port RS-232 (3-Pin) add 5-channel D/I, 5-channel D/O, EEPROM 128K*2
<b>X510-128</b>	1-Port RS-232 (3-Pin) add 5-channel D/I, 5-channel D/O, EEPROM 128K*1

## RS-232, Flash Memory Boards

X561 CR	RS-232 Flash (3) (64K)	For i-7188/μPAC-7186: XA/XB/XG/EX/EG
 <ul style="list-style-type: none"> <li>• 72 x 65 (mm)</li> <li>• Power consumption : 0.7W</li> </ul> <p><b>Parallel I/O</b></p> <ul style="list-style-type: none"> <li>• RS-232 ports : 3</li> <li>• COM3 : TXD, RXD, GND FOR I-7188XB/EX</li> <li>• COM4 : TXD, RXD, GND FOR I-7188XB/EX</li> <li>• COM5 : TXD, RXD, GND FOR I-7188XB/EX</li> <li>• 16550 compatible</li> <li>• Internal FIFO : 16 bytes for each COM port</li> <li>• Transmission speed : 115.2K BPS max.</li> <li>• Isolated : none</li> </ul> <p><b>Flash Memory</b></p> <ul style="list-style-type: none"> <li>• Memory size : 64K Bytes</li> <li>• Endurance : 1,000,000 Program/Erase Cycles</li> <li>• Data Retention : 10 years</li> </ul>		<p><b>Note:</b></p> <ol style="list-style-type: none"> <li>1. Without Case</li> <li>2. EG/XG do not support Flash memory</li> </ol> <p><b>Pin assignment</b></p> 

## Flash Memory Boards

X-Boards for Flash memory expansion.

X600	X601	For i-7188: XA/XB/XC/EX
Flash (4M)	Flash (8M)	
		<ul style="list-style-type: none"> <li>• 64 x 32 (mm)</li> <li>• Power consumption : 0.3W for X600</li> <li>• Power consumption : 0.4W for X601</li> </ul> <p><b>Flash Memory</b></p> <ul style="list-style-type: none"> <li>• Memory size : <b>4M</b> Bytes for X600</li> <li>• Memory size : <b>8M</b> Bytes for X601</li> <li>• Endurance : 1,000,000 Program/Erase Cycles</li> <li>• Data Retention : 10 years</li> </ul>



### Ordering Information

Model Number	Description
X561 CR	64MB Flash and 3-channel RS-232 ( 3-Pin ) (RoHS)
X600	4 MB NAND Flash
X601	8 MB NAND Flash



## SRAM Memory Boards

X-Boards for battery backup SRAM expansion.

X607	SRAM (128K)	For i-7188/ $\mu$ PAC-7186: XA/XB/XC/XG/EX/EG
 <ul style="list-style-type: none"> <li>• 64 x 32 (mm)</li> <li>• Power consumption : 0.5W</li> </ul> <p><b>SRAM Memory</b></p> <ul style="list-style-type: none"> <li>• Memory size : 128K Bytes</li> <li>• Battery backup : Yes (10 years)</li> </ul>		<p>The power supply of SRAM is selected from the highest voltage of <math>\mu</math>PAC (VCC).</p> <p>The initial voltage of battery is about 3V. If the <math>\mu</math>PAC is power on, the <math>\mu</math>PAC series (VCC) will be about 5V. If the <math>\mu</math>PAC is off, the <math>\mu</math>PAC (VCC) will be about 0V.</p> <p>So when the <math>\mu</math>PAC is power on, the <math>\mu</math>PAC (VCC) will supply power to SRAM. In this condition, battery will preserve their battery for later usage.</p> <p>If <math>\mu</math>PAC's power is off, the battery with higher voltage will supply power to SRAM. The stored data of SRAM will remain if the power is higher than 2.0V. When <math>\mu</math>PAC's power is off, the power control circuit will select the battery with higher voltage to backup SRAM.</p> <p>The <b>X607</b> can replace with new batteries, but the data stored in SRAM will be lost.</p> <p>The <b>X607</b> can provide between <b>seven and eight years</b> (Shutdown 24 hours everyday) of backup time over a <b>nine</b> years period.</p>
X608 CR	SRAM (512K)	For i-7188/ $\mu$ PAC-7186: XA/XB/XC/XG/EX/EG
 <ul style="list-style-type: none"> <li>• 64 x 32 (mm)</li> <li>• Power consumption : 0.6W</li> </ul> <p><b>SRAM Memory</b></p> <ul style="list-style-type: none"> <li>• Memory size : 512K Bytes</li> <li>• Battery backup : Yes (10 years)</li> </ul>		<p>The power supply of SRAM is selected from the highest voltage of <math>\mu</math>PAC (VCC).</p> <p>The initial voltage of battery is about 3V. If the <math>\mu</math>PAC is power on, the <math>\mu</math>PAC series (VCC) will be about 5V. If the <math>\mu</math>PAC is off, the <math>\mu</math>PAC (VCC) will be about 0V.</p> <p>So when the <math>\mu</math>PAC is power on, the <math>\mu</math>PAC (VCC) will supply power to SRAM. In this condition, battery will preserve their battery for later usage.</p> <p>If <math>\mu</math>PAC's power is off, the battery with higher voltage will supply power to SRAM. The stored data of SRAM will remain if the power is higher than 2.0V. When <math>\mu</math>PAC's power is off, the power control circuit will select the battery with higher voltage to backup SRAM.</p> <p>The <b>X608</b> can replace with new batteries, but the data stored in SRAM will be lost.</p> <p>The <b>X608</b> can provide between <b>three and five years</b> (Shutdown 24 hours everyday) of backup time over a <b>nine</b> years period.</p>

### Ordering Information

Model Number	Description
X607	128KB NV-SRAM (Battery backup SRAM)
X608 CR	512KB NV-SRAM (Battery backup SRAM) (RoHS)

## Motion Control Boards


X-Boards for motion control functions expansion. Used to drive motors or get encoder data.

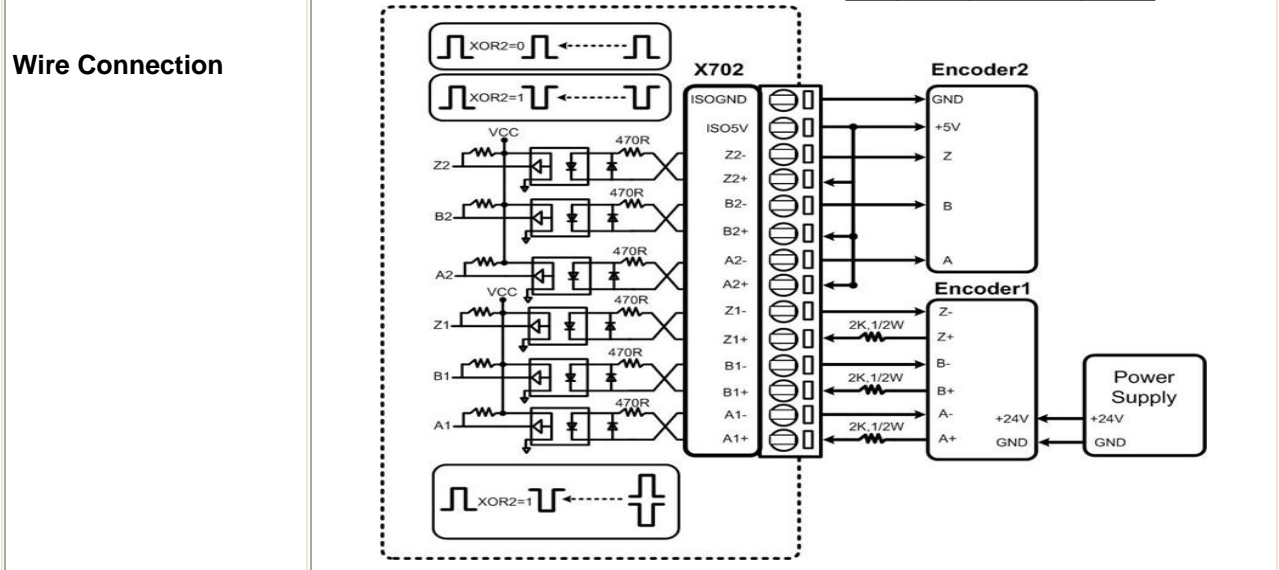
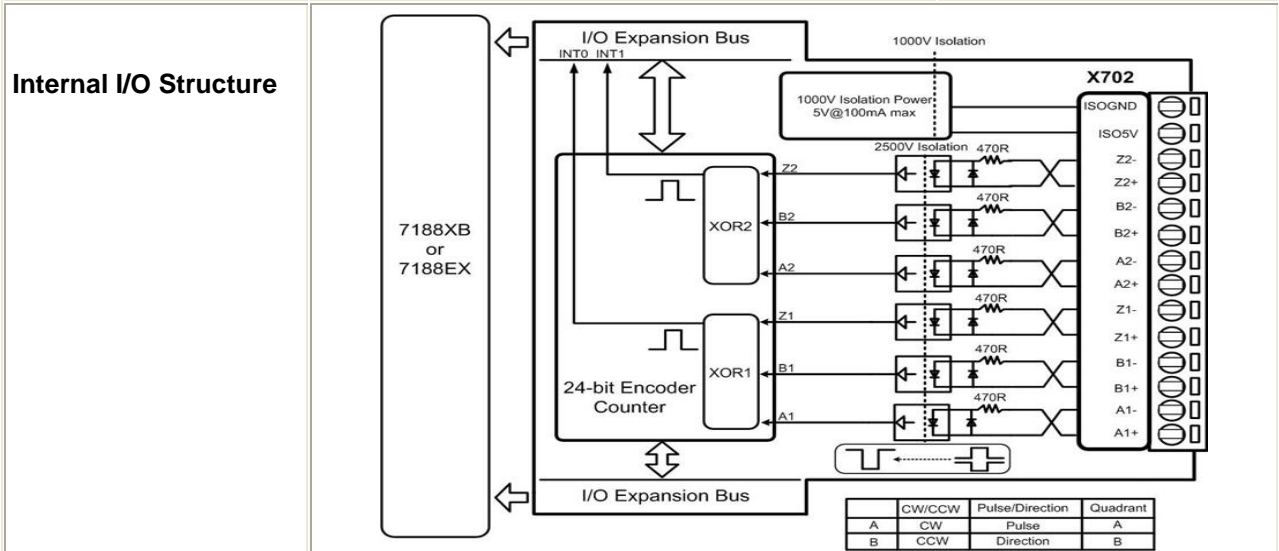
4

Expansion Solutions


X-Board

RU-87Pn

X702	Encoder (2)	For i-7188/ $\mu$ PAC-7186: XB/XG/EX/EG																																										
	<ul style="list-style-type: none"> <li>• 64 x 38 (mm)</li> <li><b>Features</b></li> <li>• 2-axis encoder counter</li> <li>• 24-bit encoder counter</li> <li>• Encoder mode: Quadrant, CW/CCW, Pulse/Direction</li> <li>• Maximum counting rate: 1MHz</li> <li>• <b>Input Level:</b></li> <li>• *Input 5V Logic High: 3.5V~5V Logic Low : 0V~2V</li> <li>• *Input 12V with external resistor 1K ohm Logic High: 5V~12V Logic Low : 0V~2V</li> <li>• *Input 24V with external resistor 2K ohm Logic High: 7V~24V Logic Low : 0V~2V</li> <li>• Built-in XOR logic for active high or low</li> <li>• Isolated voltage output: +5V, 100 mA(max)</li> </ul>	<p><b>Pin assignment</b></p> <table border="1"> <tr><td>14</td><td>ISOGND</td><td></td></tr> <tr><td></td><td>ISO5V</td><td></td></tr> <tr><td></td><td>Z2 -</td><td></td></tr> <tr><td></td><td>Z2 +</td><td></td></tr> <tr><td></td><td>B2 -</td><td></td></tr> <tr><td></td><td>B2 +</td><td></td></tr> <tr><td></td><td>A2 -</td><td></td></tr> <tr><td></td><td>A2 +</td><td></td></tr> <tr><td></td><td>Z1 -</td><td></td></tr> <tr><td></td><td>Z1 +</td><td></td></tr> <tr><td></td><td>B1 -</td><td></td></tr> <tr><td></td><td>B1 +</td><td></td></tr> <tr><td></td><td>A1 -</td><td></td></tr> <tr><td>1</td><td>A1 +</td><td></td></tr> </table>	14	ISOGND			ISO5V			Z2 -			Z2 +			B2 -			B2 +			A2 -			A2 +			Z1 -			Z1 +			B1 -			B1 +			A1 -		1	A1 +	
14	ISOGND																																											
	ISO5V																																											
	Z2 -																																											
	Z2 +																																											
	B2 -																																											
	B2 +																																											
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**X703**
**Encoder (3)**
**For i-7188/μPAC-7186: XB/XG/EX/EG**

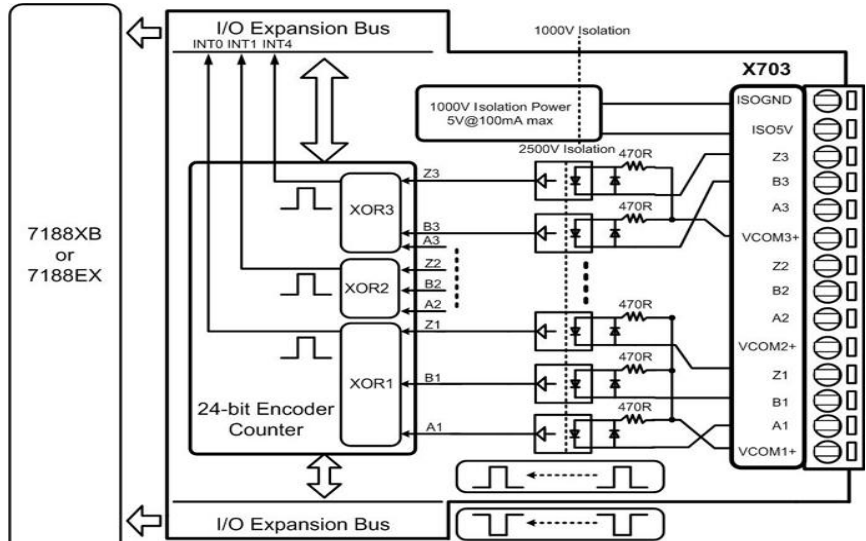


- 64 x 41 (mm)
- Features**
- 3-axis encoder counter
- 24-bit encoder counter
- Encoder mode: Quadrant, CW/CCW, Pulse/Direction
- Maximum counting rate: 1MHz
- **Input Level:**
- \*Input 5V      Logic High: 3.5V~5V  
                      Logic Low : 0V~2V
- \*Input 12V with external resistor 1K ohm  
                      Logic High: 5V~12V  
                      Logic Low : 0V~2V
- \*Input 24V with external resistor 2K ohm  
                      Logic High: 7V~24V  
                      Logic Low : 0V~2V
- Built-in XOR logic for active high or low
- Isolated voltage output: +5V, 100 mA(max)

**Pin assignment**

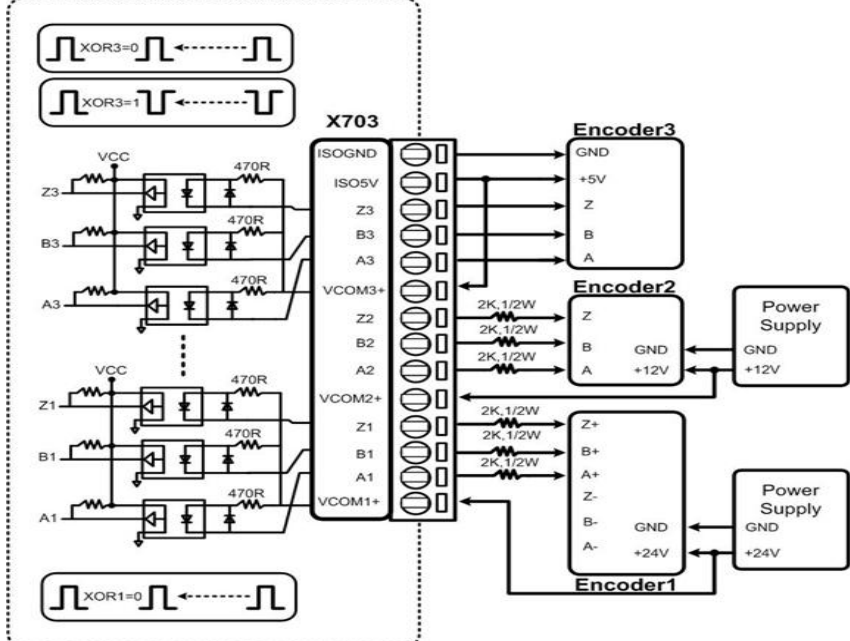
14 ISOGND	
ISO5V	
Z3	
B3	
A3	
VCOM3+	
Z2	
B2	
A2	
VCOM2+	
Z1	
B1	
A1	
1 VCOM1+	

**Internal I/O Structure**



	CW/CCW	Pulse/Direction	Quadrant
A	CW	Pulse	A
B	CCW	Direction	B

**Wire Connection**



**Ordering Information**

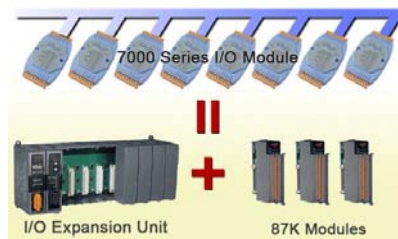
Model Number	Description
X702	2-axis Encoder Module
X703	3-axis Encoder Module

ICP DAS www.icpdas.com

4-2-27



# Expansion Unit : RU-87Pn



RU-87Pn series is an intelligent remote I/O expansion unit that used to expand I/O modules (I-87K high profile series) over the RS-485 for industrial monitoring and controlling applications. There are more than 30 I/O modules supported with the unit, including analog input/output, digital input/output, counter/frequency I/O modules.

## For Harsh/Noisy Industrial Environment

The RU-87Pn is manufactured with **isolated power, wide power input range** (10~30VDC) and **operating temperature** (-25°C ~ +75°C).

## Hot Swap • Plug & Play

RU-87Pn support plug-on or replace i-87K I/O modules at run time. Plug & play without any system interruption! It's so easy!



## Auto Configuration

When the RU-87Pn is powered on or an i-87K I/O module is plugged in, the RU-87Pn automatically checks and configures each i-87K I/O module on it.

## Easy to Duplicate

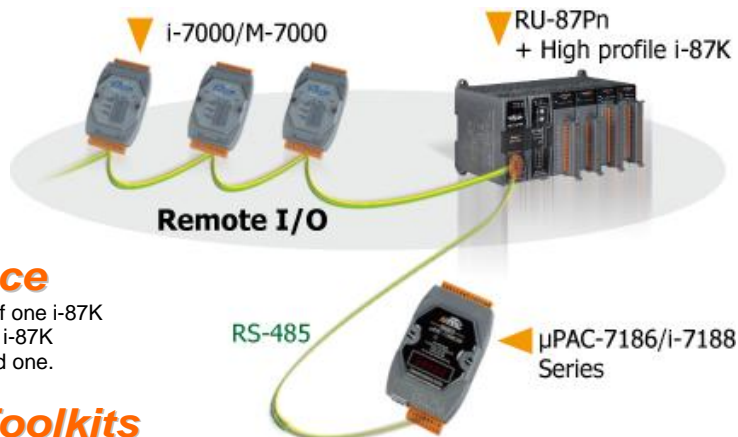
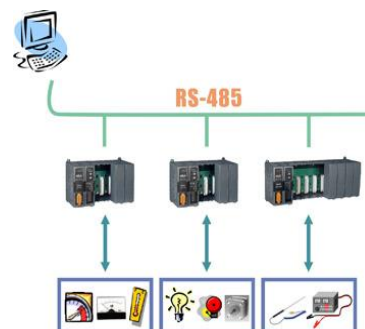
You can easily make a configuration backup of the i-87K modules and write to another RU-87Pn. This design can easily and quickly duplicate many RU-87Pns.

## Easy Diagnostic/Maintenance

The switch and LED design makes it easy for maintenance. If one i-87K module is damaged, the operator just needs to get one good i-87K module with the same model number to replace the damaged one.

## Variant Software Develop Toolkits

Various software development kits (SDK) and demos are provided, such as DLL, ActiveX, Labview driver, Indusoft driver, Linux driver, OPC server, etc. The I-87K series I/O modules plugged in the RU-87Pn can be easily integrated into variant software system.



For more details, please visit :

[www.icpdas.com](http://www.icpdas.com) > Products > Remote I/O Modules/Units > RS-485 Remote I/O Unit

[www.icpdas.com](http://www.icpdas.com) > Products > Remote I/O Modules/Units > 8K & 87K I/O Modules





Specifications	RU-87P1	RU-87P2	RU-87P4	RU-87P8
<b>Interface Type (RS-485)</b>				
Baud rate	115200 bps maximum			
Distance	1.2 Km (4000 ft) maximum			
Isolation	3000 VDC			
ESD Protection	+/- 4K Contact Discharge and +/- 8K Air Discharge			
<b>Switch</b>				
Rotary Switch	x2 , For RS-485 address			
DIP Switch	8 bit *1, For auto configuration, check sum and baud rate			
<b>LED Indicators</b>				
Power	Yes			
System Ready	Yes			
Auto configuration	Yes			
Slot Status	Yes			
<b>I/O Expansion Slots</b>				
Hot Swap	Yes			
Auto Configuration	Yes			
Support Module Type	High profile i-87K module only			
Slots numbers	1	2	4	8
<b>Dimensions</b>				
W x H x D (mm)	64 x 117 x 110	95 x 132 x 111	188 x 132 x 111	312 x 132 x 111
<b>Power</b>				
Input Range	10~30 VDC (non-regulated)			
Reverse polarity protection	Yes			
Isolation	1000 VDC			
Frame Ground	Yes			
Consumption	1 W	1 W	2 W	2.4 W
Power Board Driving	5 W	8 W	15 W	30 W
<b>Environment</b>				
Operating Temperature	-25 to +75 °C			
Storage Temperature	-30 to +75 °C			
Humidity	5 ~ 95%, Non-condensing			

## Ordering Information

Model Number	Description
RU-87P1-G CR	1 slots I/O expansion unit (Gray Cover) (RoHS)
RU-87P2-G CR	2 slots I/O expansion unit (Gray Cover) (RoHS)
RU-87P4-G CR	4 slots I/O expansion unit (Gray Cover) (RoHS)
RU-87P8-G CR	8 slots I/O expansion unit (Gray Cover) (RoHS)
<b>Related Products</b>	
<b>Converters</b>	USB, RS-232, Fiber Optical to RS-485 Converters and Repeaters
<b>Power Supply</b>	24V DC power supply
<b>EZ Data Logger</b>	User friendly data logger software (free)
<b>DCON Utility</b>	Search and Configure I/O modules software (free)