

7.1. μPAC Products

• Overview



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

I-7188 — the 1st generation

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

μPAC-7186 — the 2nd generation

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

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

• Top 12 reasons to choose μPAC by ICP DAS

1. Powerful Embedded OS — MiniOS7

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

Features:

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



2. Free IDE Software — MiniOS7 Studio Simple Programming for Your Applications!

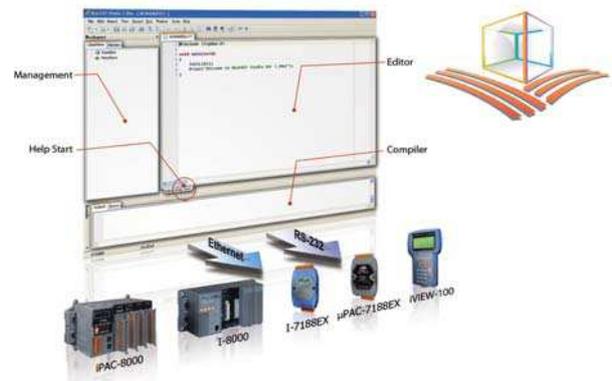
MiniOS7 Studio is a powerful, easy-to-use & free of charge Software Development Toolkit for PACs embedded with MiniOS7.

Including:

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

Programming support:

- MSC • MSVC • BC++ • TC • TC++



3. Rich Development Support

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

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

4. Patented Technology: "Self-Tuner" Chip

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

5. Unique 64-bit Hardware Serial Number Protecting Your Program

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

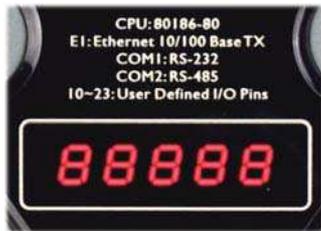
6. Built-in RTC — Real Time Clock

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

7. 5-Digit 7-Segment LED Display

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

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



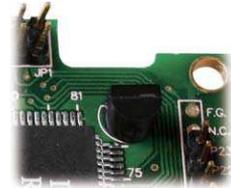
9. Built-in WDT — Watchdog Timer

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

10. Various Memory Expansion Options

- Memory Configuration:

Memory	Size	Description
Flash	512 KB	64 KB: O.S. image; 448 KB or more for program & data. With write protection & limitation.
SRAM	512 KB or 640 KB	640 KB: μ PAC-7186EX-SM, μ PAC-7186EG, μ PAC-7186XG-FD 512 KB: other models
Flash Disk	64 MB NAND	rugged data storage that resists shock and vibration. MiniOS7 file system and APIs are provided to read/write files.
NVRAM	31 bytes	No writing limitation
EEPROM	2 KB or 16 KB	to store not frequently changed parameters.
Note: Different model has different SRAM size, NVRAM and Flash size. Please refer to the Selection Guide.		



8. Highly Reliable Under Harsh Environment

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

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



• Expansion Memory Board (Optional):



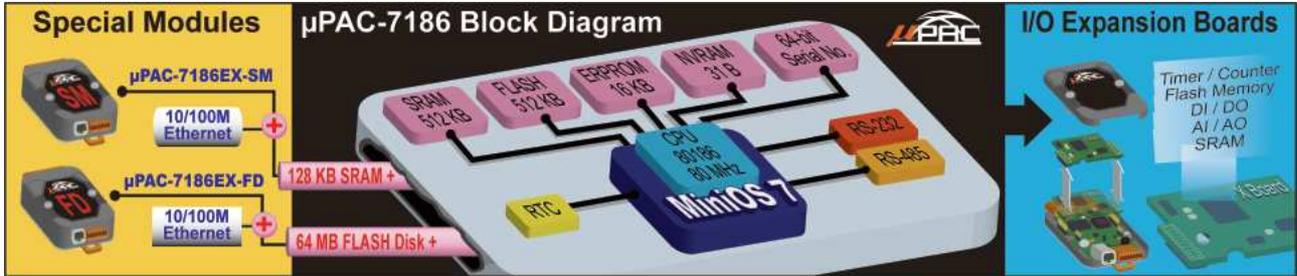
Flash memory Board



Battery-backup RAM Board

• Expansion Memory Board (Optional):

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



11. Expandable Local I/Os & Hardware Functions

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

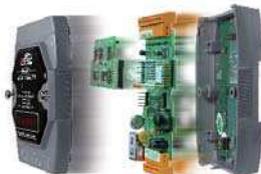
- DI • DO • AI • O • Timer/Counter • Communications • Flash memory • Battery backup SRAM • Motion control • Self-test

We provide various standard X-Boards, and also ODM service. Please contact our sales or service people.

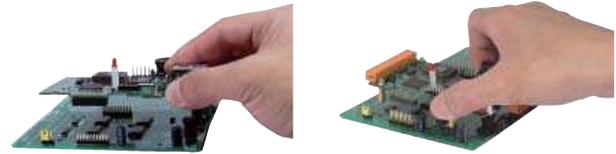
The X-Board has two methods to combine with the palm-size PAC. Plug an X-Board into a palm-size PAC or mount a controller on a larger X-Board.



Plug an X-Board into a palm-size PAC

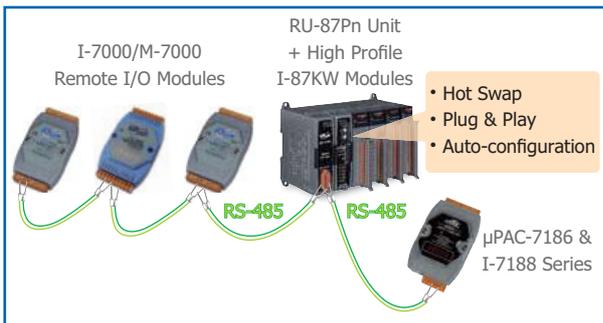


Mount a controller on a larger X-Board

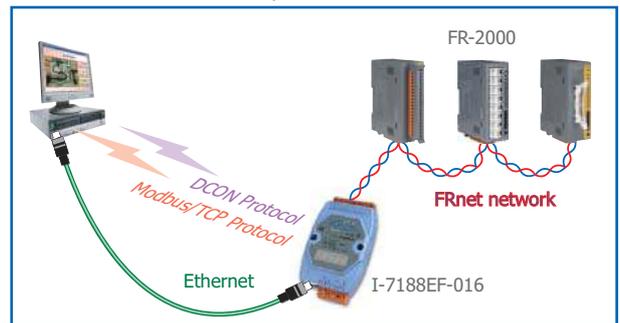


12. Multiple Remote I/O Expansion

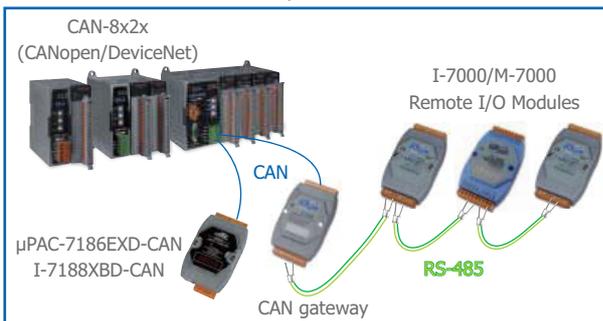
- Connect to RS-485 Remote I/O Module/Unit



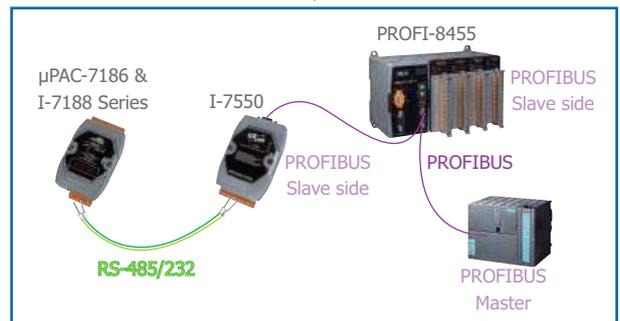
- Connect to FRnet Remote I/O



- Connect to CAN bus Remote I/O



- Connect to PROFIBUS Remote I/O



• Selection Guide

I-7188



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



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



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



Special Feature
 CAN: CAN port
 016: FRnet port

µPAC-7186



Power over Ethernet
 P: With PoE



Software
 X: C language based
 G: ISaGRAF
 F: FRnet



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



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

C Language Based I-7188

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

Note: RS-232 × 2, RS-485 × 1, RS-232/485 × 1

Ethernet and Serial Connectivity										
Model Name	Special Feature	CPU	SRAM	Flash	I/O Expansion Bus	DI	DO	Ethernet	RS-232/RS-485	FRnet
I-7188EA I-7188EAD	DI/DO	40 MHz	512 KB	512 KB	-	6	7	10 Base-T	1/1	-
I-7188EX I-7188EXD	I/O Expansion Bus				Yes	-	-			
I-7188EF-016 I-7188EFD-016	FRnet				-	-	Yes			

I-7188E series is an upgraded version of I-7188 series. It equips a 10 Base-T Ethernet port to make a connection to the Ethernet/Internet word.



C Language Based μ PAC-7186

Model Name	Special Feature	CPU	SRAM	Flash	I/O Expansion Bus	Ethernet	RS-232/RS-485	PoE
μ PAC-7186EX μ PAC-7186EXD	-	80 MHz	512 KB	512 KB	Yes	10/100 Base-Tx	1/1	-
μ PAC-7186PEX μ PAC-7186PEXD			512 KB					Yes
μ PAC-7186EX-SM μ PAC-7186EXD-SM	640 KB SRAM		640 KB					-
μ PAC-7186EX-FD μ PAC-7186EXD-FD	64 MB NAND Flash		512 KB					-
μ PAC-7186EXD-CAN	CAN port		-		1/1			

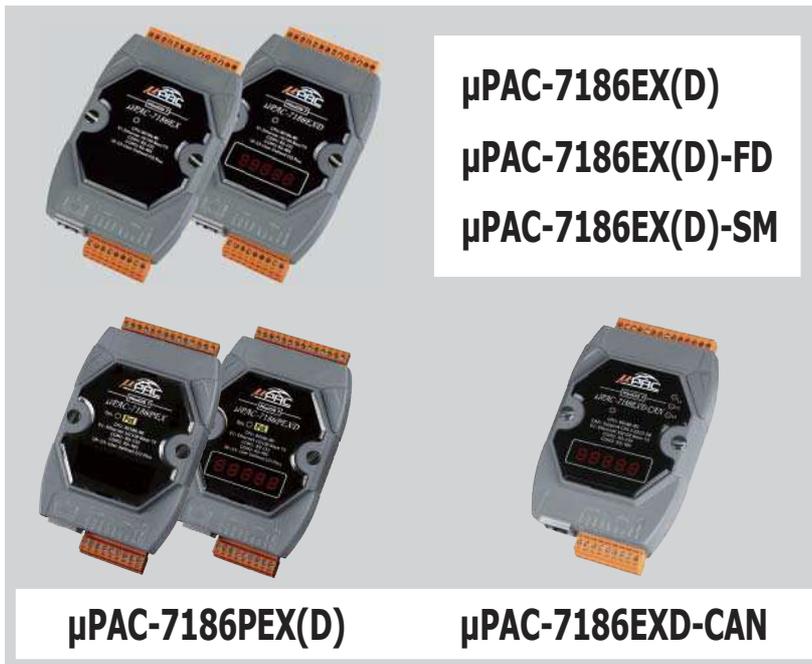
ISaGRAF Based μ PAC-7186 & I-7188

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

ISaGRAF based μ PAC The controller fully supports all five of the IEC61131-3 standard PLC languages:

1. Ladder diagram.
2. Function block diagram.
3. Sequential function chart.
4. Structured text.
5. Instruction List plus flow chart.

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



Features

- MiniOS7 Inside
- C Language Programming
- TCP/IP Library
- Modbus Library
- SNMP Library
- Various Storage Media
- 512 KB Flash
- 16 KB EEPROM
- 64 MB NAND Flash Disk
- Various Communication Interfaces
- 10/100 Base-TX Ethernet
- RS-232/485
- CAN Bus
- 64-bit Hardware Serial Number
- I/O Expansion Bus
- Operating Temperature: -25 ~ +75°C

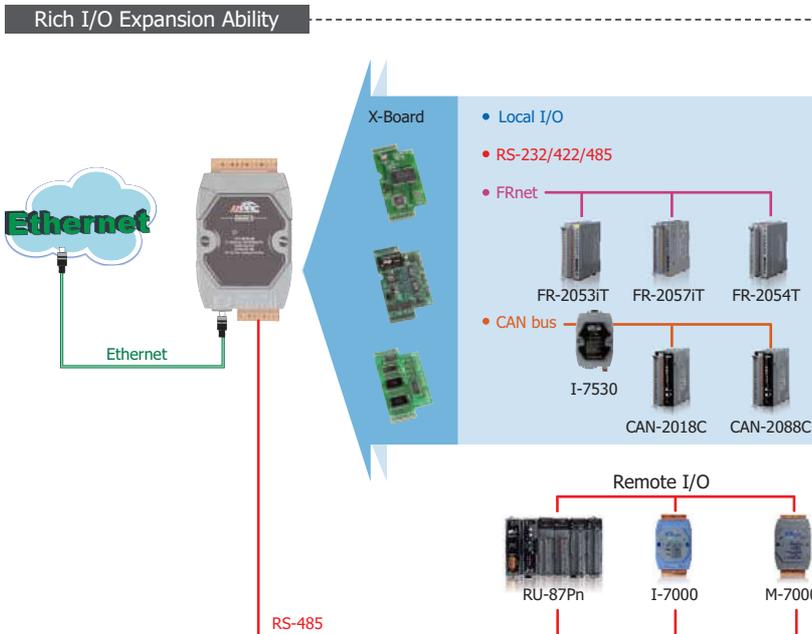


Introduction

The μPAC-7186EX series is a palm-size programmable automation controller that with Ethernet, RS-232, RS-485 communication. ICP DAS provides easy-to-use software development tool kits (Xserver, MiniOS7 framework, VxComm, Modbus libraries). Users can use them to easily integrate serial devices to have Ethernet/Internet communication ability and through the standard Modbus protocol to communicate with SCADA software (Indusoft, ISaGARF, DasyLab, Trace Mode, Citect, iFix, etc.).

For hardware expansion, it also supports an I/O expansion bus. The I/O expansion bus can be used to implement various I/O functions such as D/I, D/O, A/D, D/A, Timer/Counter, UART, flash memory and other I/O functions. Nearly all kinds of I/O functions can be implemented by this bus. But the bus can support only one board. There are more than 50 boards available for μPAC-7186EX, you can choose one of them to expand hardware features.

Applications

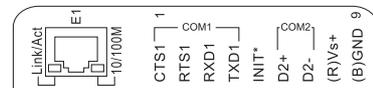
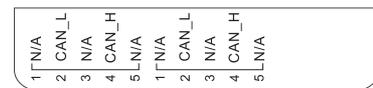


Pin Assignments

μPAC-7186PEX(D)



μPAC-7186EXD-CAN



μPAC-7186EX(D)



μPAC-7186EX(D)-FD



μPAC-7186EX(D)-SM

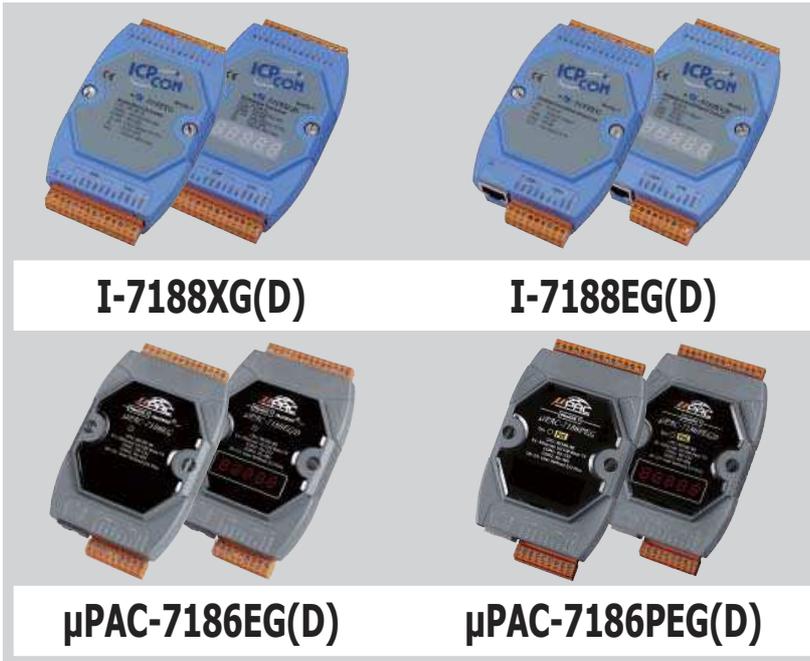


Specifications

Models	μ PAC-7186EX(D)	μ PAC-7186PEX(D)	μ PAC-7186EX(D)-SM	μ PAC-7186EX(D)-FD	μ PAC-7186EXD-CAN
System Software					
OS	MiniOS7 (DOS-like embedded operating system)				
Program Download Interface	RS-232 (COM1) or Ethernet				
Programming Language	C language				
Compilers to create.exe Files	TC++ 1.01 TC 2.01 BC++3.1 ~ 5.2x MSC 6.0 MSVC++ (before version 1.5.2)				
CPU Module					
CPU	80186 or compatible (16-bit and 80 MHz)				
SRAM	512 KB		640 KB		512 KB
Flash	512 KB				
NAND Flash Disk		-		64 MB	-
EEPROM	16 KB				
NVRAM	31 Bytes (battery backup, data valid up to 10 years)				
RTC (Real Time Clock)	Provides second, minute, hour, date, day of week, month, year				
64-bit Hardware Serial Number	Yes, for Software Copy Protection				
Watchdog Timers	Yes (0.8 second)				
Communication Ports					
Ethernet	RJ-45 x 1, 10/100 Base-TX				
COM 1	RS-232 (TxD, RxD, RTS, CTS, GND), non-isolated, Speed: 115200 bps Max.				
COM 2	RS-485 (D2+, D2-), self-tuner ASIC inside, non-isolated, Speed: 115200 bps Max.				
CAN Bus					Yes
LED Indicator					
System LED	Yes				
LED Display	5-digit 7-segment LED display for D versions				
Special Indicator	-	PoE LED		-	Program LED
Hardware Expansion					
I/O Expansion Bus	Yes, 1				
Mechanical					
Dimensions (W x L x H)	72 mm x 123 mm x 35 mm				
Installation	DIN-Rail or Wall Mounting				
Environmental					
Operating Temperature	-25 ~ +75°C				
Storage Temperature	-30 ~ +80°C				
Ambient Relative Humidity	10 ~ 90% RH (non-condensing)				
Power					
Input Range	+10 ~ +30 V _{dc}	+12 ~ +48 V _{dc}	+10 ~ +30 V _{dc}		
Protection	Power reverse polarity protection				
Power over Ethernet (PoE)	-	IEEE 802.3af Class 1	-		
Power Consumption	1.5 W; 2.5 W for (D) version	2 W; 3 W for (D) version			3.0 W

Ordering Information

μ PAC-7186EX CR	μ PAC with 10/100M Ethernet (RoHS)
μ PAC-7186EXD CR	μ PAC-7186EX with display (RoHS)
μ PAC-7186PEX CR	μ PAC with 10/100M Ethernet, Power over Ethernet (RoHS)
μ PAC-7186PEXD CR	μ PAC-7186PEX with display (RoHS)
μ PAC-7186EX-SM CR	μ PAC with 10/100M Ethernet, 640 KB SRAM (RoHS)
μ PAC-7186EXD-SM CR	μ PAC-7186EX-SM with display (RoHS)
μ PAC-7186EX-FD CR	μ PAC with 10/100M Ethernet, 64 MB Flash Disk (RoHS)
μ PAC-7186EXD-FD CR	μ PAC-7186-FD with display (RoHS)
μ PAC-7186EXD-CAN CR	μ PAC with 10/100M Ethernet, CAN bus & Display (RoHS)



Features

- Development Software: ISaGRAF Ver.3
 - ISaGRAF Version 3
 - Provide 6 PLC Syntaxes (5 IEC 61131-3 Standard)
 - Code Size: Max. 64 KB ISaGRAF Code Size
 - Support Off-line Simulation
 - On-line Debugging, Monitoring and Controlling
 - Easy to integrating with HMI/MMI
- MiniOS7 Inside
- 80186, 80 MHz CPU or 80188, 40 MHz CPU
- Ethernet
 - 10/100 Base-TX (for μPAC-7186EG/PEG)
 - 10 Base-T (for I-7188EG)
- Support Modbus Master
 - RTU, ASCII, RS-232/485/422
- Support Modbus RTU/TCP Slave
 - Modbus RTU (RS-232/485/422) Slave
 - Modbus TCP Slave (not for I-7188XG)
- Operating Temperature: -25 ~ +75°C



Introduction

μPAC-7186EG Series is a palm-size PAC and includes ISaGRAF SoftLogic. It has one 10/100 Best-TX Ethernet port, one RS-232 port and one RS-485 port. The user can choose an I/O expansion board, X-Board, to expand the I/Os or memories of μPAC. μPAC-7186EG/PEG support Modbus Serial protocol, Modbus TCP/IP protocol, Modbus Master protocol, Remote I/O, Fbus, Ebus, SMS: Short Message Service, modem link, MMICON/LCD, ZigBee wireless communication, GPS application, FRnet, CAN remote I/O connection and user defined protocol. Compared with I-7188EG, μPAC-7186 is 2 ~ 4 times faster.

μPAC-7186PEG is the model of μPAC-7186EG with PoE(Power-over-Ethernet). PoE allows power and data to be carried over a single Ethernet cable, so a device can operate solely with the power from the Ethernet cable instead of the electric wire. This innovation allows greater flexibility in office design, higher efficiency in systems design, and faster turnaround time in set-up and implementation.

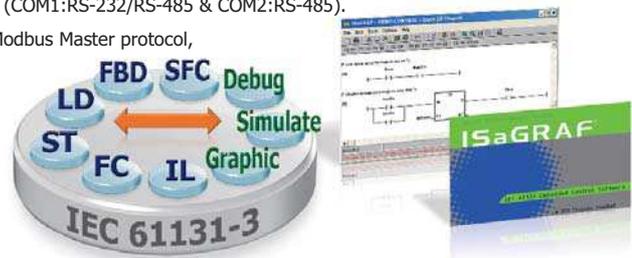
I-7188EG series is a palm-size PAC with ISaGRAF SoftLogic. It has one 10 Base-T Ethernet port, one RS-232 port and one RS-485 port.

I-7188XG series is a palm-size PAC with ISaGRAF SoftLogic. It has 2 Serial ports (COM1:RS-232/RS-485 & COM2:RS-485).

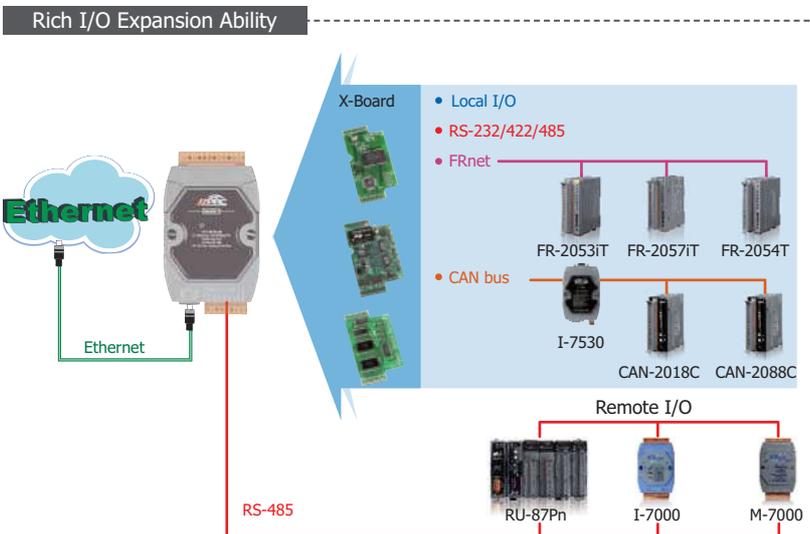
I-7188EG/I-7188XG supports Modbus serial protocol, Modbus TCP/IP protocol, Modbus Master protocol, Remote I/O,Fbus, Ebus, SMS: Short Message Service, modem link, MMICON/LCD and user defined protocol.

I-7188EGD/I-7188XGD is the same as I-7188EG/XG but with 5-digit 7-segment LED display.

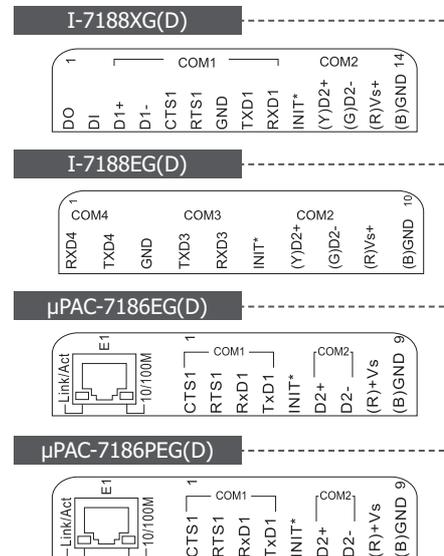
The user can choose an I/O expansion board, X-Board, to expand COM Ports, I/Os or memories of I-7188EG/I-7188XG and μPAC-7186(P)EG.



Applications



Pin Assignments



μPAC Specifications

Models	I-7188XG(D)	I-7188EG(D)	μPAC-7186EG (D)	μPAC-7186PEG (D)
System Software				
OS	MiniOS7 (DOS-like embedded operating system)			
Development Software				
ISaGRAF Software	ISaGRAF Version 3	IEC 61131-3 standard		
	Languages	LD, ST, FBD, SFC, IL & FC		
	Max. Code Size	64 KB		
	Scan Time	2 ~ 25 ms for normal program 10 ~ 125 ms (or more) for complex or large program		
CPU Module				
CPU	80188, 40 MHz		80186, 80 MHz	
SRAM	512 KB		640 KB	768 KB
Flash	512 KB			
EEPROM	2 KB		16 KB	
NVRAM	31 Bytes (battery backup, data valid up to 10 years)			
RTC (Real Time Clock)	Provides second, minute, hour, date, day of week, month, year			
64-bit Hardware Serial Number	Yes, for Software Copy Protection			
Watchdog Timers	Yes (0.8 second)			
Communication Ports				
Ethernet	-	RJ-45 x 1, 10 Base-T	RJ-45 x 1, 10/100 Base-TX	
COM 1	RS-232 or RS-485 (Self-Tuner ASIC inside), non-isolated	RS-232 (TxD, RxD, RTS, CTS, GND), non-isolated		
COM 2	RS-485 (Self-Tuner ASIC inside), non-isolated			
LED Indicator				
System LED	Yes			
LED Display	5-digit 7-segment LED display for (D) version			
Special Indicator	-			PoE LED
Digital Input				
Channels	1	-		
Contact	Dry	-		
On Voltage Level	Connect to GND	-		
Off Voltage Level	Open	-		
Digital Output				
Channels	1	-		
Output Type	Open Collector	-		
Load Current	100 mA	-		
Load Voltage	30 V _{DC} Max.	-		
Hardware Expansion				
I/O Expansion Bus	Yes, 1 (14 Pins)			
Mechanical				
Dimensions (W x L x H)	72 mm x 123 mm x 33 mm			
Installation	DIN-Rail or Wall Mounting			
Environmental				
Operating Temperature	-25 ~ +75°C			
Storage Temperature	-30 ~ +80°C			
Ambient Relative Humidity	10 ~ 90% RH (non-condensing)			
Power				
Input Range	+10 ~ +30 V _{DC}		+12 ~ +48 V _{DC}	
Protection	Power reverse polarity protection			
Power over Ethernet (PoE)	-			IEEE 802.3af Class 1
Power Consumption	2 W; 3 W for (D) version	2 W; 3 W for (D) version	1.5 W; 2.5 W for (D) version	1.5 W; 2.5 W for (D) version

ISaGRAF Specifications

Protocols (some protocols need optional devices)		
NET ID	User-assigned by software, 1 ~ 255	
Modbus RTU/ASCII Master Protocol	Up to 2 COM ports: I-7188XG COM 2 ~3, μ PAC-7186EG/PEG COM 1~3 (*). (To connect to other Modbus Slave I/O devices) max. Mbus_xxx Function Block amount for 2 ports: 128.	
Modbus RTU Slave Protocol	Up to 2 COM Ports: COM1, one of COM2 or COM3 (*). (For connecting ISaGRAF, PC/HMI/OPC Server & MMI panels)	
Modbus TCP/IP Slave Protocol	Ethernet port supports Modbus TCP/IP Slave protocol for connecting ISaGRAF & PC/HMI. Max. connections: μ PAC-7186EG/PEG: 6 I-7188EG: 4 I-7188XG: 0	
User-Defined Protocol	COM1, COM2 & COM3 ~ COM8 (*) by serial communication function blocks.	
Remote I/O	One of COM2 or COM3:RS-485 (*) supports I-7K, I-87K I/O modules as Remote I/O. I-87K series must plug on RU-87Pn (High profile) or I-87K (Low profile) I/O Unit. max. 64 I/O modules for one PAC.	
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. (Not for I-7188XG)	
Send E-mail	Send email 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 488 KB (using X608) or about 112 KB (using X607).	
SMS: Short Message Service	One COM port (μ PAC-7186EG/PEG & I-7188EG: one of COM1 or COM3 or COM4; I-7188XG: one of COM3 or COM4) (*) 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: GTM-201-RS232 (GSM/GPRS 850/900/1800/1900)	
Modem Link	Support PC remotely download & monitor the controller through COM4 of X504.	
MMICON/LCD	COM3: RS-232 (*) 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.	
Redundant 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, there is no need of any Ethernet switch). All I/O should be RS-485 I/O except the status I/O in the slot 0: X107. (for μ PAC-7186EG/PEG only)	
CAN/CANopen	Use COM1 or COM3 ~ COM8 (*) to connect one I-7530: the RS-232 to CAN converter to support CAN/CANopen devices/sensors. One PAC supports max. 3 RS-232 ports to connect max. 3 I-7530 modules. (FAQ-086) (for μ PAC-7186EG/PEG only)	
Battery Backup SRAM	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: 128 KB, X608: 512 KB	
PWM Output	Pulse Width Modulation Output All X-Board series DO boards support PWM output. 8 channels max. for one controller. 500 Hz max. for Off=1 & On=1 ms, Output square curve: Off: 1 ~ 32767 ms, On: 1 ~ 32767 ms	
Counters	Parallel DI Counter	All X-Board series DI boards support DI counter. 8 channels. max. for one controller. Counter value: 32 bit, 500 Hz max. Min. ON & OFF width must > 1 ms
	Remote DI Counter	All remote I-7000 & I-87K DI modules support counters. 100 Hz max. value: 0 ~ 65535 (16-bit)
	Remote High Speed Counter	Optional I-87082: 100 kHz max., 32-bit
* Note: COM3 ~ COM8 are resided at the optional X-series board if it is plugged inside the μ PAC-7186EG/PEG & I-7188EG/XG.		
* ISaGRAF FAQ: http://www.icpdas.com/faq/isagraf.htm		

Ordering Information

μ PAC-7186EG CR	ISaGRAF based μ PAC with 10/100M Ethernet (RoHS)
μ PAC-7186EGD CR	μ PAC-7186EG with display (RoHS)
μ PAC-7186PEG-G CR	Palm-size μ PAC-7186EG with PoE (RoHS), 768K SRAM
μ PAC-7186PEGD-G CR	Palm-size μ PAC-7186EGD with PoE (RoHS), 768K SRAM
I-7188EG CR	ISaGRAF based μ PAC with 10M Ethernet (RoHS)
I-7188EGD CR	I-7188EG with display (RoHS)
I-7188XG CR	ISaGRAF based μ PAC with 1 DI, 1 DO (RoHS)
I-7188XG CR	I-7188XG with display (RoHS)

Accessories

ISaGRAF Development Software	
ISaGRAF-256-E	ISaGRAF Workbench Software Ver.3 (256 I/O Tags) with One Application Book (English version) and one USB Dongle
ISaGRAF-256-C	ISaGRAF Workbench Software Ver.3 (256 I/O Tags) with One Application Book (Chinese version) and one USB Dongle
ISaGRAF-32-E	ISaGRAF Workbench Software Ver.3 (32 I/O Tags) with One Application Book (English version)
ISaGRAF-32-C	ISaGRAF Workbench Software Ver.3 (32 I/O Tags) with One Application Book (Chinese version)
Note: Do not offer upgrade service from ISaGRAF-32 to ISaGRAF-256	
Others	
MDR-20-24 CR	24 V _{DC} /1.0 A, 24 W Power Supply with DIN-Rail Mounting (RoHS)
GPSU06U-6 CR	24 V _{DC} /0.25 A, 6 W Power Supply (RoHS)
DIN-KA52F CR	24 V _{DC} /1.04 A, 25 W Power Supply with DIN-Rail Mounting (RoHS)
I/O Expansion Boards	Other add-on expansion boards refer to expansion board selection guide
NS-205 CR	Unmanaged 5-port Industrial Ethernet Switch (RoHS)



Features

- MiniOS7 Inside
- C Language Programming
- Modbus Library
- CAN Bus Library
- Various Storage Media
- 512 KB Flash
- 2 KB EEPROM
- 31 Bytes NVRAM
- Various Communication Interfaces
- RS-232/485
- CAN Bus
- 64-bit Hardware Serial Number
- I/O Expansion Bus
- Operating Temperature: -25 ~ +75°C



Introduction

The I-7188 series is a palm-size PAC designed to survive in harsh environment. It has a CPU, SRAM, Flash and several RS-232, RS-485 ports. With a DOS-like OS (MiniOS7) and a developed firmware running inside, the I-7188 can act like a small PC.

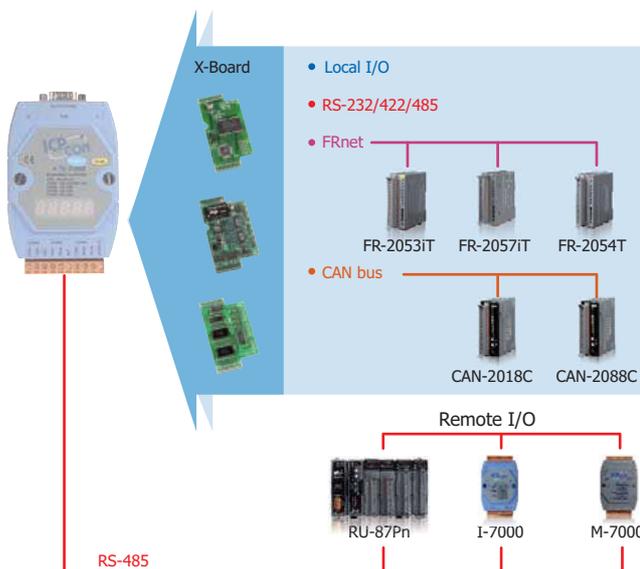
For the hardware expansion, it supports an I/O expansion bus to implement various I/O functions such as D/I, D/O, A/D, D/A, Timer/Counter, UART, flash memory, etc. Customers can develop their own I/O expansion boards or choose one of 50 available boards that ICP DAS has developed.

For the firmware developing, a 16-bit C compiler for 80188/80186 CPU and C language programming knowledge are needed. To shorten the developing time, there are many demo programs for reference. And for industrial applications, a Modbus library and CAN bus library are provided to ease the developing.

Depending on the type of embedded firmware that is being developed, and which I/O expansion board, the I-7188 series can be used as a single versatile controller. The application fields can be factory automation, building automation, machine automation, environment monitoring, etc.

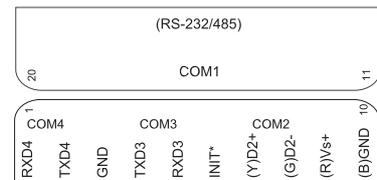
Applications

Rich I/O Expansion Ability

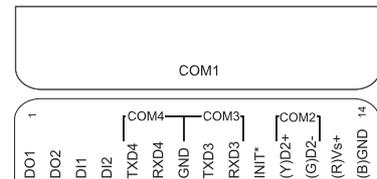


Pin Assignments

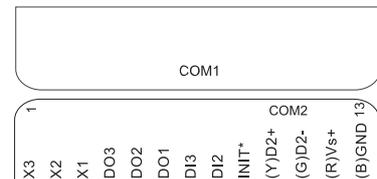
I-7188(D)



I-7188XA(D)



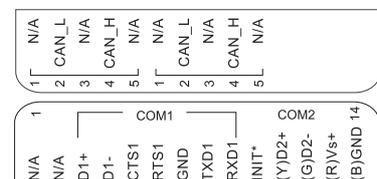
I-7188XC(D)



I-7188XB(D)



I-7188XBD-CAN



Specifications

Models	I-7188(D)	I-7188XA(D)	I-7188XB(D)	I-7188XBD-CAN	I-7188XC(D)
System Software					
OS	MiniOS7 (DOS-like embedded operating system)				
Program Download Interface	RS-232 (COM4)		RS-232 (COM1)		
Programming Language	C language				
Compilers to create.exe Files	TC++ 1.01; TC 2.01; BC++3.1 ~ 5.2x; MSC 6.0; MSVC++ (before version 1.5.2)				
CPU Module					
CPU	80188, 40 MHz or compatible				80188, 20 MHz
SRAM	256 KB	512 KB		128 KB	
Flash	512 KB				
EEPROM	2 KB				
NVRAM	31 Bytes (battery backup, data valid up to 10 years)				-
RTC (Real Time Clock)	Provides second, minute, hour, date, day of week, month, year				-
64-bit Hardware Serial Number	-	Yes			-
Watchdog Timers	Yes (0.8 second)				
Communication Ports					
COM 1	RS-232 with modem control or RS-485	RS-232 with modem control or RS-485 (Self-Tuner ASIC inside), non-isolated	RS-232 or RS-485 (Self-Tuner ASIC inside), non-isolated		
COM 2	RS-485, non-isolated	RS-485 (Self-Tuner ASIC inside), 3000 V _{dc} isolated	RS-485 (Self-Tuner ASIC inside), non-isolated		
COM 3	RS-232 (TxD, RxD, GND)		-		
COM 4	RS-232 (TxD, RxD, GND)		-		
CAN Bus	-		Yes	-	
LED Indicator					
System LED	Yes				
LED Display	5-digit 7-segment LED display for (D) versions				
Digital Input					
Channels	-	2	1	2	
Contact	Dry				
On Voltage Level	Connect to GND				
Off Voltage Level	Open				
Digital Output					
Channels	-	2	1	3	
Type	Open Collector				
Load Current	100 mA/channel				
Load Voltage	+30 V _{dc} Max.				
Hardware Expansion					
I/O Expansion Bus	-	Yes (for memory board only)	Yes	-	Yes
Mechanical					
Dimensions (W x L x H)	72 mm x 119 mm x 33 mm				
Installation	DIN-Rail or Wall Mounting				
Environmental					
Operating Temperature	-25 ~ +75°C				
Storage Temperature	-30 ~ +80°C				
Ambient Relative Humidity	10 ~ 90% RH (non-condensing)				
Power					
Input Range	+10 ~ +30 V _{dc}				
Protection	Power reverse polarity protection				
Power Consumption	2 W; or 3 W for (D) version				

Ordering Information

I-7188/512 CR	uPAC with 4 COM ports (RoHS)
I-7188D/512 CR	I-7188/512 CR with display
I-7188XA CR	uPAC with 4 COM ports and 2 DI, 2 DO (RoHS)
I-7188XAD CR	I-7188XA CR with display
I-7188XB-512 CR	uPAC with 2 COM ports and 1 DI, 1 DO (RoHS)
I-7188XBD-512 CR	I-7188XB-512 CR with display
I-7188XBD-CAN CR	uPAC with 2 COM ports, 1 CAN port and 1 DI, 1 DO (RoHS)
I-7188XC-512 CR	uPAC with 2 COM ports and 2 DI, 3 DO (RoHS)
I-7188XCD-512 CR	I-7188XC-512 CR with display



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

Features

- MiniOS7 Inside
- C Language Programming
 - TCP/IP Library
 - Modbus Library
 - SNMP Library
- Various Storage Media
 - 512 KB Flash
 - 2 KB EEPROM
 - 31 Bytes NVRAM
- Various Communication Interfaces
 - 10 Base-T Ethernet
 - RS-232/485
 - FRnet
- 64-bit Hardware Serial Number
- I/O Expansion Bus
- Operating Temperature: -25 ~ +75°C



Introduction

The I-7188EX series is a palm-size PAC designed to survive in harsh environment and has ability to connect to the Internet world. It has a CPU, SRAM, Flash, Ethernet port and several RS-232, RS-485 ports. With a DOS-like OS (MiniOS7) and a developed firmware running inside, the I-7188EX series can act like a small PC.

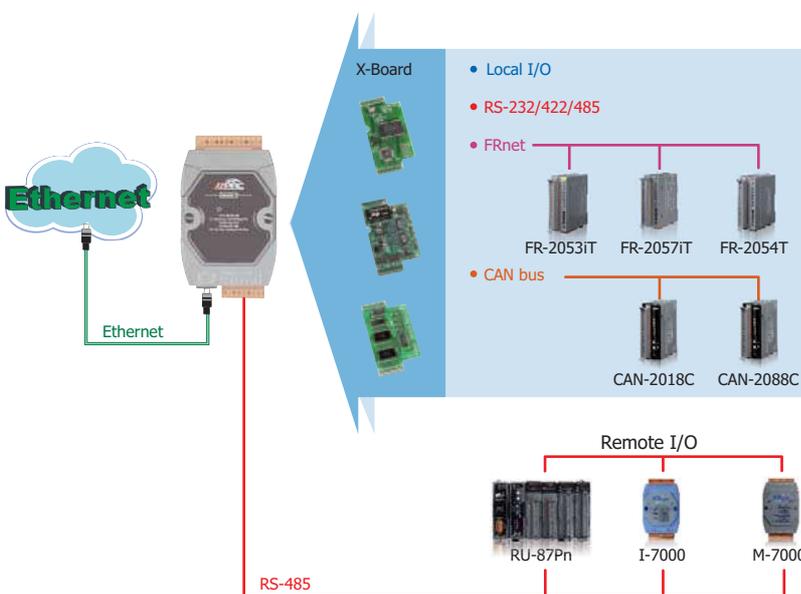
For the hardware expansion, it supports an I/O expansion bus to implement various I/O functions such as D/I, D/O, A/D, D/A, Timer/Counter, UART, flash memory, etc. Customers can develop their own I/O expansion boards or choose one of 50 available boards that ICP DAS has developed.

For the firmware developing, a 16-bit C compiler for 80188/80186 CPU and C language programming knowledge are needed. To shorten the developing time, there are many demo programs for reference. And for industrial applications, a Modbus library and CAN bus library are provided to ease the developing.

Depending on the type of embedded firmware that is being developed, and which I/O expansion board, the I-7188EX series can be used as a single versatile controller. The application fields can be factory automation, building automation, machine automation, environment monitoring, etc.

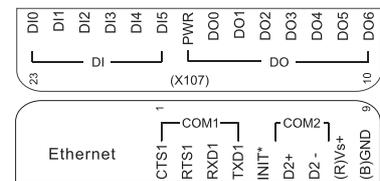
Applications

Rich I/O Expansion Ability



Pin Assignments

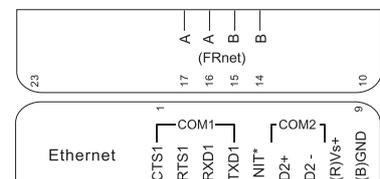
I-7188EA(D)



I-7188EX(D)



I-7188EF(D)-016



Specifications

Models	I-7188EA(D)	I-7188EX(D)	I-7188EF(D)-016
System Software			
OS	MiniOS7 (DOS-like embedded operating system)		
Program Download Interface	RS-232 (COM1) or Ethernet		
Programming Language	C language		
Compilers to create.exe Files	TC++ 1.01; TC 2.01; BC++3.1 ~ 5.2x; MSC 6.0; MSVC++ (before version 1.5.2)		
CPU Module			
CPU	80188, 40 MHz or compatible		
SRAM	512 KB		
Flash	512 KB		
EEPROM	16 KB		
NVRAM	31 Bytes (battery backup, data valid up to 10 years)		
RTC (Real Time Clock)	Provides second, minute, hour, date, day of week, month, year		
64-bit Hardware Serial Number	Yes, for Software Copy Protection		
Watchdog Timers	Yes (0.8 second)		
Communication Ports			
Ethernet	RJ-45 x 1, 10 Base-T		
COM 1	RS-232 (TxD, RxD, RTS, CTS, GND); non-isolated		
COM 2	RS-485 (D2+, D2-); self-tuner ASIC inside; non-isolated		
FRnet	Port	-	1
	Wiring	-	Multi-drop networking with twisted pair cable
	Transfer Distance	-	Max. 400 m
	Cycle time	-	2.88 ms (fixed)
	Distributed I/O Modules	-	Max. 8 DI and 8 DO modules; each module contains 16 DI or DO channels.
LED Indicator			
System LED	Yes		
LED Display	5-digit 7-segment LED display for (D) versions		
Digital Input			
Channels	6	-	-
Input Type	Non-isolated	-	-
On Voltage Level	+3.5 ~ +30 V _{dc} Max.	-	-
Off Voltage Level	1 V _{dc} Max. (Connect to GND)	-	-
Digital Output			
Channels	7	-	-
Output Type	Open Collector	-	-
Load Current	100 mA/channel	-	-
Load Voltage	+30 V _{dc} Max.	-	-
Hardware Expansion			
I/O Expansion Bus	-	Yes	-
Mechanical			
Dimensions (W x L x H)	72 mm x 119 mm x 33 mm		
Installation	DIN-Rail or Wall Mounting		
Environmental			
Operating Temperature	-25 ~ +75°C		
Storage Temperature	-30 ~ +80°C		
Ambient Relative Humidity	10 ~ 90% RH (non-condensing)		
Power			
Input Range	+10 ~ +30 V _{dc}		
Protection	Power reverse polarity protection		
Power Consumption	2 W; or 3 W for (D) version		

Ordering Information

I-7188EA CR	μPAC with 10 M Ethernet and 6 DIs, 7 DOs (RoHS)
I-7188EA D CR	I-7188EA with display (RoHS)
I-7188EX CR	μPAC with 10 M Ethernet (RoHS)
I-7188EX D CR	I-7188EX with display (RoHS)
I-7188EF-016 CR	μPAC with 10 M Ethernet and one FRnet (RoHS)
I-7188EFD-016 CR	I-7188EF-016 with display (RoHS)