

I-7188XG(D)

 $\mu$ PAC-7186EG(D)

## Features

- 80186, 80 MHz CPU or 80188, 40 MHz CPU
- MiniOS7 Inside
- Development Software: ISaGRAF Ver.3
- Ethernet
  - 10/100 Base-TX (for  $\mu$ PAC-7186EG)
- 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

$\mu$ PAC-7186EG Series is a palm-size PAC and includes ISaGRAF SoftLogic. It has one 10/100 Base-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  $\mu$ PAC.  $\mu$ PAC-7186EG 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.

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

The user can choose an I/O expansion board, X-Board, to expand COM Ports, I/Os or memories of I-7188XG and  $\mu$ PAC-7186EG.

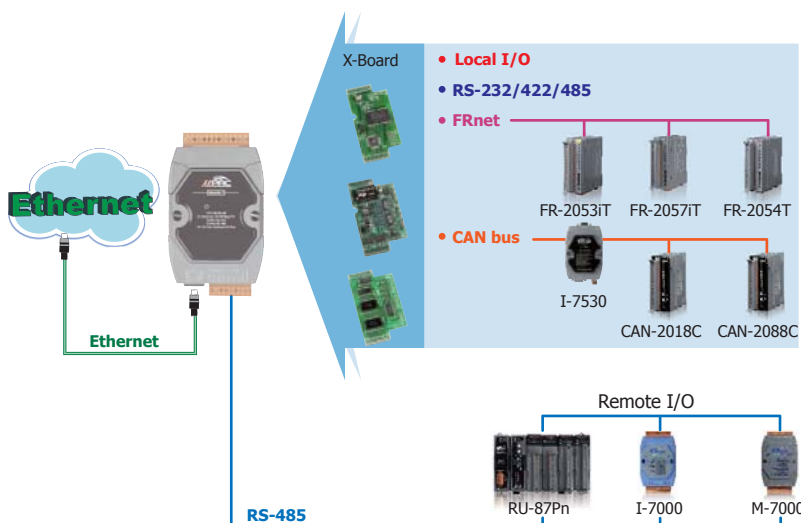
The ISaGRAF workbench Ver. 3.x features:

- IEC 61131-3 Standard Open PLC Programming Languages (LD, FBD, SFC, ST, IL, FC) + Flow Chart (FC)
- Auto-Scan I/O
- On-Line Debug/Control/Monitor, Off-Line Simulation
- Simple Graphic HMI
- Support Soft-GRAF HMI



## Applications

Rich I/O Expansion Ability



## Pin Assignments

I-7188XG(D)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
DO	DI	D1+	D1-	CTS1	RTS1	GND	TXD1	RXD1	INIT*	(Y)D2+	(G)D2-	(R)V+	(B)GND

$\mu$ PAC-7186EG(D)

1	2	3	4	5	6	7	8	9
Link/Act	IE1	CTS1	RTS1	RxD1	TxD1	INIT*	D2+	D2-
							(R)+Vs	(B)GND

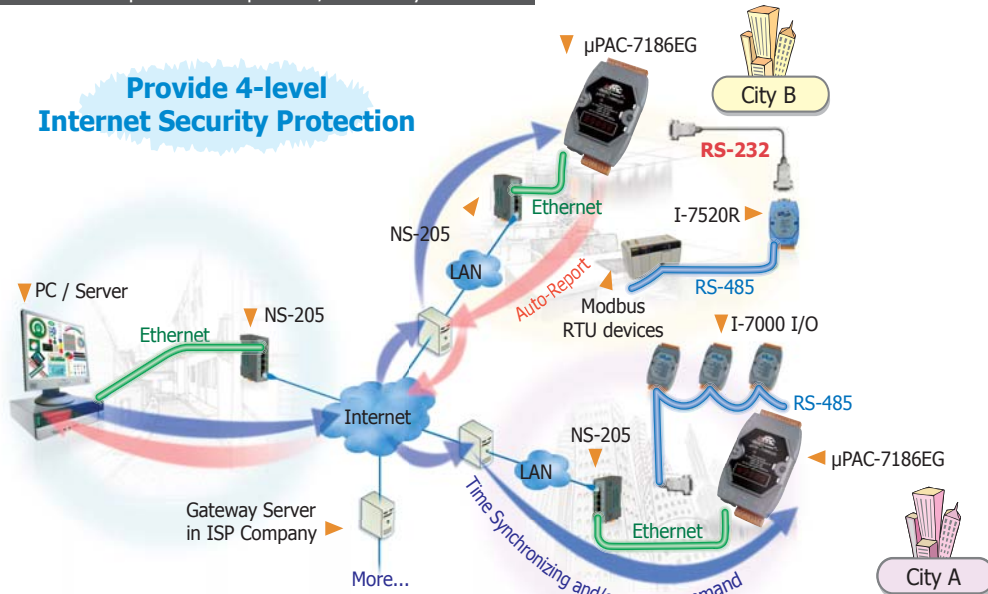


Diagram illustrating the RS-485 connection between a Modbus Device (µPAC-7186EG) and an M-7000 Module (tM-7000 I/O). The connection is shown via a blue wavy line labeled RS-485.

The diagram illustrates a Modbus network topology. A central horizontal blue line represents the communication bus. Six stations are connected to this bus via blue cables and circular connection points:

- Top Left:** HMI (Human Machine Interface) stations: RS-232, RS-485, RS-422. Represented by a monitor showing a graphical interface.
- Top Right:** SCADA (Supervisory Control and Data Acquisition) stations: Ethernet, RS-232. Represented by a monitor showing a graphical interface.
- Center Left:** μPAC-7186EG(D) Modbus RTU/TCP Slave. Represented by a grey industrial module.
- Center Right:** I-7188XG(D) Modbus RTU Slave. Represented by a blue industrial module.
- Bottom Left:** HMI stations: Touch 8000, Touch 6000, Touch 500. Represented by a monitor showing a graphical interface.
- Bottom Right:** SCADA station: Ethernet. Represented by a monitor showing a graphical interface.

**Remote I/O**

There are nearly 100 choices of Remote I/O modules : I-7000 & I-87K

- ✓ Hot-Swap
- ✓ Auto-Configuration at run time
- ✓ Plug & Play at run time
- ✓ Support only High Profile I-87K I/O

**Remote I/O Modules:**

- I-7000/M-7000
- RU-87Pn
- RU-87P4/+ I-87K I/O
- μPAC-7186EG

**Connections:**

- PC/SCADA
- HMI
- PC/HMI
- RS-232/485
- Ethernet
- Local I/O: X-Board
- NS-205/208

The diagram illustrates a Remote I/O System Architecture. At the top, a **Gateway Server in ISP Company** is connected to the **Internet**. The server is represented by a computer tower and a server rack. Below the server, a green arrow points to a **µPAC-7186EG** module, which is connected to an **Internet** cloud. The **µPAC-7186EG** module is connected to an **RS-485** bus. The **RS-485** bus is connected to an **Ethernet** network. The **Ethernet** network is connected to an **NS-205** module, which is also connected to an **Internet** cloud. The **NS-205** module is connected to an **Ethernet** network. The **Ethernet** network is connected to an **RU-87Pn** module and an **I-7000/M-7000** module. The **RU-87Pn** module is connected to an **RS-485** bus. The **I-7000/M-7000** module is connected to an **RS-485** bus. The **RU-87Pn** module and **I-7000/M-7000** module are connected to **Remote I/O Modules**.

µPAC-7186EG(D)  
+ FX-016  
(Port 0 only)

Max. distance 400M

FR-2053T (DI)    FR-2057T (DO)    FR-32P (DI)    FR-32R (Relay output)

Max. distance 400M

FR-2053T (DI)    FR-2057T (DO)    FR-32P (DI)    FR-32R (Relay output)

## $\mu$ PAC Specifications

Models		I-7188XG(D)	μPAC-7186EG (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	5 ~ 100 ms for normal program 25 ~ 500 ms (or more) for complex or large program	2 ~ 5 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
Flash		512 KB	
EEPROM		2 KB	16 KB
NVRAM		31 Bytes (battery backup, data valid up to 10 years)	
RTC (Real Time Clock)		Provide 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 or RS-485 with internal self-tuner ASIC; non-isolated	RS-232 (TxD, RxD, RTS, CTS, GND), non-isolated
COM 2		RS-485 with internal self-tuner ASIC; non-isolated	
LED Indicator			
System LED		Yes	
LED Display		5-digit 7-segment LED display for (D) version	
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 VDC 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	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 VDC	
Protection		Power reverse polarity protection	
Power Consumption		2 W; 3 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, μPAC-7186EG COM 1~3 (*). (To connect to other Modbus Slave I/O devices) Max. Mbus_xxx Function Block amount for 2 ports : μPAC-7186EG: 128; I-7188XG: 64.	
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: μPAC-7186EG: 6; I-7188XG: 0.	
User-Defined Protocol	By serial communication function blocks. μPAC-7186EG: COM1 ~ COM8 (*) or I-7188XG: COM2 ~ COM8 (*).	
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 Email	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 X608:488 KB or X607:112 KB. (Not for I-7188XG)	
SMS: Short Message Service	One COM port (μPAC-7186EG: 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 μPAC-7186EG series 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 μPAC-7186EG only)	
Optional I/O Functions (Refer to ISaGRAF PAC I/O Selection Guide for I/O Module list)		
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-7K/I-87K DI modules support counters. 100 Hz Max. value: 0 ~ 65535 (16-bit)
	Remote High Speed Counter	I-87082: 100 kHz Max., 32-bit
SRAM Expansion	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. (for retain variables) Optional: X607: 128 KB, X608: 512 KB
<b>* Note: COM3 ~ COM8 are resided at the optional X-board series if it is plugged inside the μPAC-7186EG &amp; I-7188XG.</b>		
<b>* ISaGRAF FAQ: <a href="http://www.icpdas.com/faq/isagraf.htm">http://www.icpdas.com/faq/isagraf.htm</a></b>		
<b>* Recommend to use NS-205/208 or RS-405/408 (Ring Switch) Industrial Ethernet Switch.</b>		

## Ordering Information

μPAC-7186EG CR	ISaGRAF based μPAC with 10/100M Ethernet (RoHS)
μPAC-7186EGD CR	μPAC-7186EG with display (RoHS)
I-7188XG CR	ISaGRAF based μPAC 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. (Using ISaGRAF-32 can control more than 32 I/O tags. Please refer to ISaGRAF User's Manual Ch. 3.)	
Others	
MDR-20-24 CR	24 VDC/1.0 A, 24 W Power Supply with DIN-Rail Mounting (RoHS)
GPSU06U-6 CR	24 VDC/0.25 A, 6 W Power Supply (RoHS)
DIN-KA52F CR	24 VDC/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 / NS-208 CR	5-port / 8-port Unmanaged Industrial 10/100 Ethernet Switch with Plastic Case (RoHS)