

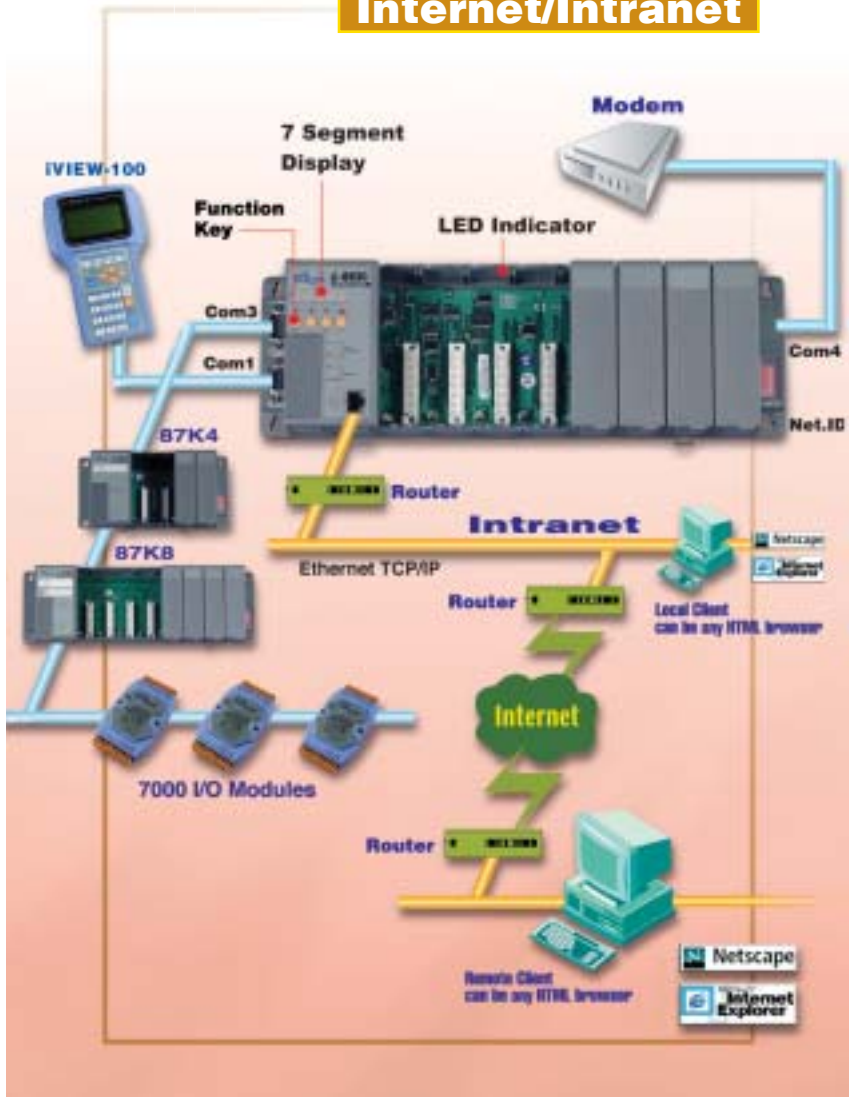
Block Diagram of I-8000

Introduction

The I-8000 is a modular network based system with the capability of connecting I/O either through it's own local bus or alternatively through an I/O expansion or network extension. The unit is comprised of a main control unit with a range of standard communication interfaces, and an I/O bus permitting I/O expansion. The bus is hybrid in nature providing the facility to connect either through serial or parallel I/O modules. The parallel bus is used for high-speed data transfer. The unit can communicate either using serial communications (RS232, RS485), Ethernet or CANbus. The Ethernet version of the product supports an integrated web server permitting Internet and Intranet applications. The I-8000 can be used as an intelligent distributed data acquisition front end connected to a host machine running a standard SCADA package, or alternatively it can be user programmed as an autonomous controller running an embedded software application. Significant non-volatile memory is available for data and program storage. The product is made up of four basic components: 1. Main Control Unit (MCU) 2. I/O Expansion Unit 3. I/O modules 4. Embedded OS.

All I-8000 embedded controllers equip MiniOS7 embedded OS. It is developed by ICP DAS Co., LTD and compatible with DOS. MiniOS7 has more features than regular DOS in embedded applications, such as shorter power-up time, built-in hardware diagnostic function, direct support for I-8000 and I-7000 modules, and direct support for internal memory devices.

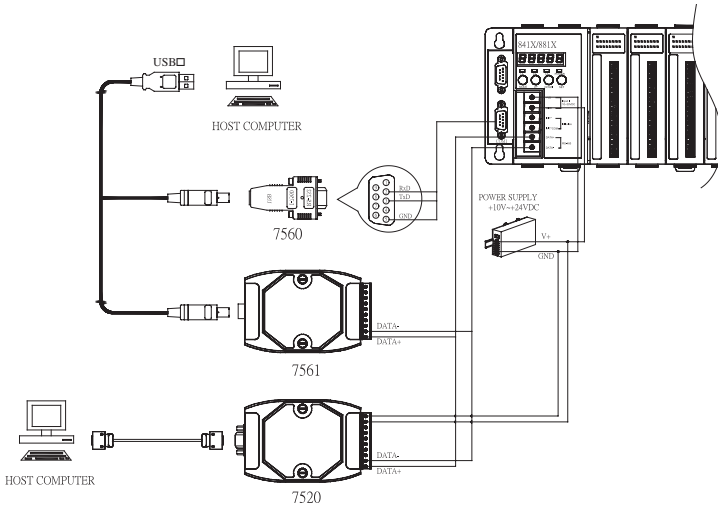
Solution for Internet/Intranet



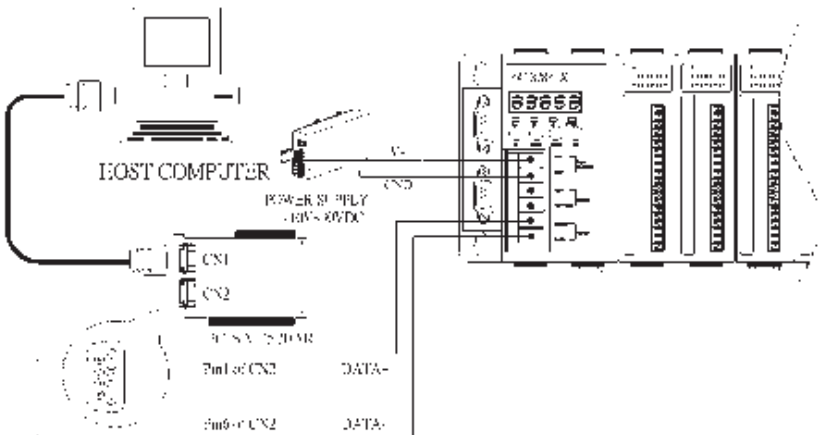
i-8000 Compact Embedded Controller SERIES

Connecting I-841X/881X to Host-PC

Configuration A

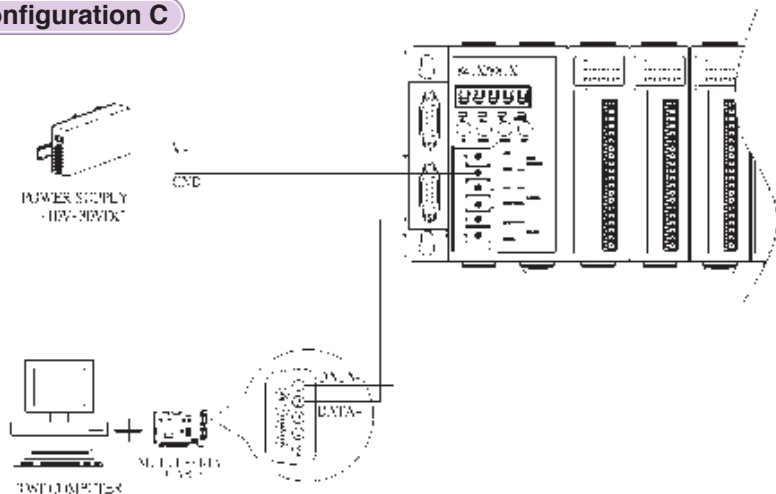


Configuration B

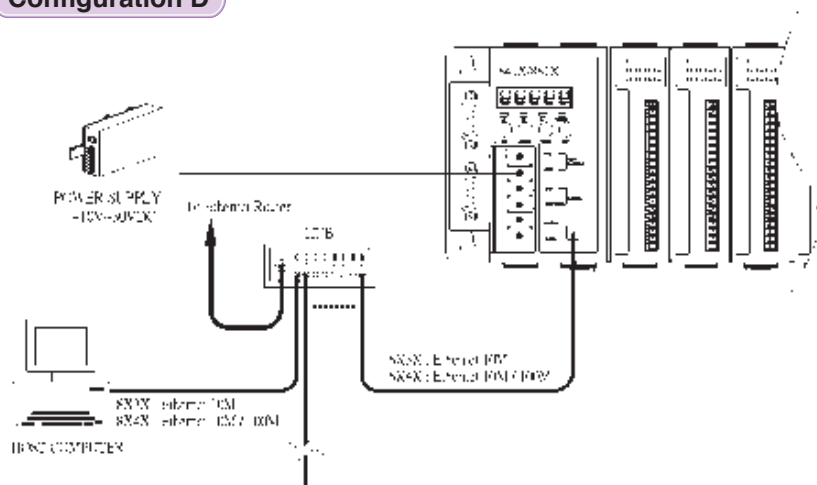


i-8000 Compact Embedded Controller SERIES

Configuration C



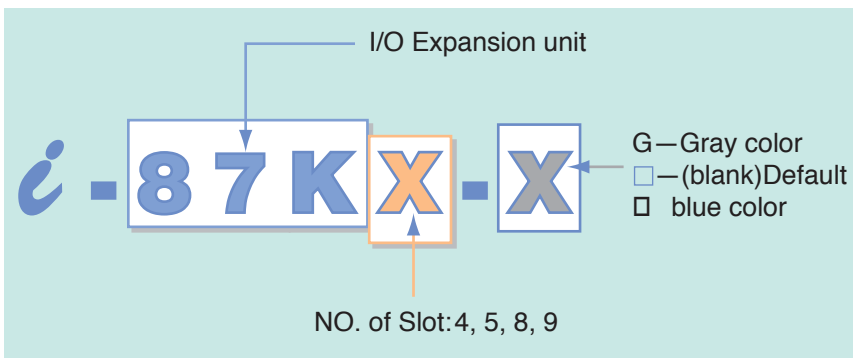
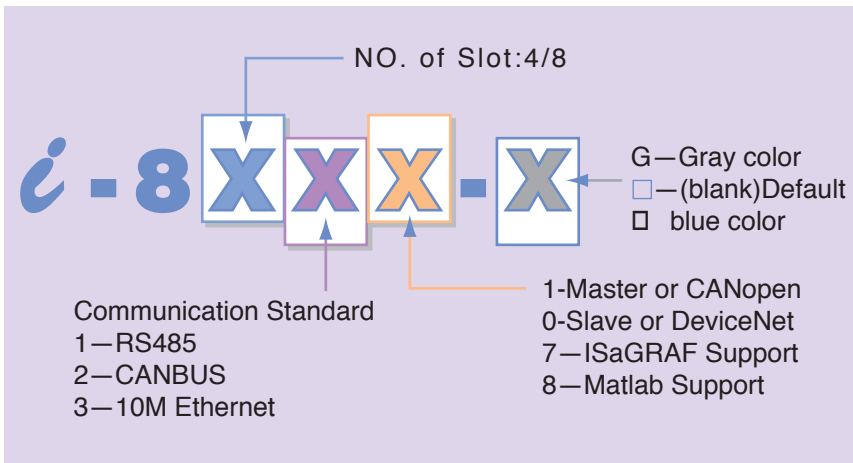
Configuration D



i-8000 Main Control Unit (MCU) SERIES

1. Main Control Unit (MCU):

The MCU is the powerhouse of the I-8000. Each MCU is comprised of a central processor module (CPM), a power supply, and a four (4) or eight (8) slot backplane for either 4 or 8 Parallel I/O modules. The CPM is a powerfully integrated processing engine consisting of a CPU, RAM, ROM, and an option of communication interfaces including RS-485, Ethernet and CANbus.



i-8000 Main Control Unit (MCU) SERIES

Main Control Unit Selection Guide

| Model | Description (Note1) | CPU 80188 40MHz | Flash | SRAM | Slot | COM1 Note2 | COM2 | COM3 Note4 | COM4 Note5 |
|------------------|-----------------------------|-----------------|-------|-------|--------|------------|------------------|------------|------------|
| I-8410 I-8810 | Embedded Controller | Y Note 6 | 256KB | 256KB | 4 8 | Y | RS-485 NOTE3 | Y | - |
| I-8411 I-8811 | Embedded Controller | Y Note 6 | 512KB | 512KB | 4 8 | Y | RS-485 NOTE3 | Y | Y |
| I-8417 I-8817 | ISaGRAF Embedded Controller | Y Note 6 | 512KB | 512KB | 4 8 | Y | RS-485 NOTE3 | Y | Y |
| I-8418 I-8818 | Matlab Embedded Controller | 80186 80MHz | 512KB | 512KB | 4 8 | Y | RS-485 NOTE3 | Y | Y |
| I-8420 I-8820 | Embedded Controller | 80186 80MHz | 512KB | 512KB | 4 8 | Y | CAN DeviceNet | Y | - |
| I-8421 I-8821 | Embedded Controller | 80186 80MHz | 512KB | 512KB | 4 8 | Y | CAN open | Y | Y |
| I-8430 I-8830 | Embedded Controller | Y Note 6 | 512KB | 256KB | 4 8 | Y | 10 Base T | Y | - |
| I-8431 I-8831 | Embedded Controller | Y Note 6 | 512KB | 512KB | 4 8 | Y | 10 Base T | Y | Y |
| I-8437 I-8837 | ISaGRAF Embedded Controller | Y Note 6 | 512KB | 512KB | 4 8 | Y | 10 Base T | Y | Y |
| I-8438 I-8838 | Matlab Embedded Controller | 80186 80MHz | 512KB | 512KB | 4 8 | Y | 10 Base T | Y | Y |

Note1: □ All of the above embedded Controllers are equipped with MiniOS7 and Self-tuner chip.

Note2: □ RS-232 port; 115.2K bps; TXD, RXD signal; Program download port.

Note3: □ Isolated RS-485 port; 115.2K bps; Data+, Data-

Note4: □ RS-232/RS-485; 115.2K bps; RS-232/TXD, RXD, RTS, CTS, GND; RS-485/Data+, Data-

Note5: □ RS-232 port; 115.2K bps; RS-232/TXD, RXD, RTS, CTS, DSR, DTR, DCD, RI, GND;

□□ Modem control

Note6: □ CPU can be upgraded to 80186,80MHz.

Optional:

The X-socket of Main control unit can be installed with an SRAM module. There are two options as follows:

1. S256: 256K battery backup SRAM module for all I-8000 Embedded Controller
2. S512: 512K battery backup SRAM module for all I-8000 Embedded Controller



Ordering Information:

I-8410: Embedded Controller

I-8410-G: I-8410 with Gary color



Ordering Information:

I-8411: Embedded Controller

I-8411-G: I-8411 with Gary color



Ordering Information:

I-8810: Embedded Controller

I-8810-G: I-8810 with Gary color



Ordering Information:

I-8811: Embedded Controller

I-8811-G: I-8811 with Gary color

Specifications & Features

- CPU 80188, 40MHz
- SRAM:
 - 256K bytes (for I-8410/8810)
 - 512K bytes (for I-8411/8811)
- Flash Memory:
 - 256K bytes (for I-8410/8810)
 - 512K bytes (for I-8411/8811)
- EEPROM: 2K bytes
- 64-bit hardware unique serial
 - number (for I-8411/8811)
- Built-in Watchdog Timer
- Real Time Clock
 - (for I-8411/8811)
- COM0: Internal use
- COM1: RS-232/Program
 - download port
- COM2: RS-485
- COM3: RS-232/485
- COM4: RS-232 (I-8411/8811)
- S-MMI:
 - Small Man Machine Interface
- I/O Expansion Slot
 - 4-slot for I-8410/8411
 - 8-slot for I-8810/8811
- Power Supply: 20W
 - Unregulated +10Vdc to
 - +30Vdc
- Power Consumption:
 - I-8410/I-8411: 3.9W
 - I-8810/I-8811: 5.1W
- Environment
 - Operating Temp.:
 - -25°C to + 75°C
 - Storage Temp.:
 - -30°C to + 85°C
- Humidity: 5 ~95%
- Dimensions:
 - 354 x 110 x 75.5 mm (8-slot)
 - 230 x 110 x 75.5 mm (4-slot)

i-8000 Compact Embedded Controller

SERIES



Ordering Information:

I-8430: Embedded Controller
I-8430-G: I-8430 with Gray color



Ordering Information:

I-8431: Embedded Controller
I-8431-G: I-8431 with Gray color



Ordering Information:

I-8830: Embedded Controller
I-8830-G: I-8830 with Gray color



Ordering Information:

I-8831: Embedded Controller
I-8831-G: I-8831 with Gray color

Specifications & Features

- CPU 80188, 40MHz
- SRAM:
 - 256K bytes (for I-8430/8830)
 - 512K bytes (for I-8431/8831)
- Flash Memory: 512K bytes
- EEPROM: 2K bytes
- 64-bit hardware unique serial number (for I-8431/8831)
- Built-in Watchdog Timer
- Real Time Clock (for I-8431/8831)
- COM0: Internal use
- COM1: RS-232/Program download port
- 10 Base T: NE2000 compatible
- COM3: RS-232/485
- COM4: RS-232 (I-8431/8831)
- S-MMI:
 - Small Man Machine Interface
- I/O Expansion Slot
 - 4-slot for I-8430/8431
 - 8-slot for I-8830/8831
- Power Supply: 20W
 - Unregulated +10Vdc to +30Vdc
- Power Consumption:
 - I-8430/I-8431: 3.9W
 - I-8830/I-8831: 5.1W
- Environment
 - Operating Temp.: -25°C to + 75°C
 - Storage Temp.: -30°C to + 85°C
- Humidity: 5 ~95%
- Dimensions:
 - 354 x 110 x 75.5 mm (8-slot)
 - 230 x 110 x 75.5 mm (4-slot)
- **Support VxComm technique & Xserver**

i-8000 Modbus/TCP Embedded Controller SERIES

What is Modbus

What is Modbus protocol ?

Modbus is a communication protocol developed by MODICON Inc. in 1979. It's a standard, truly opened and the most widely used network communication protocol in industrial automation field. SCADA and HMI software can easily integrate serial devices together via Modbus protocol.

What is Modbus/TCP protocol ?

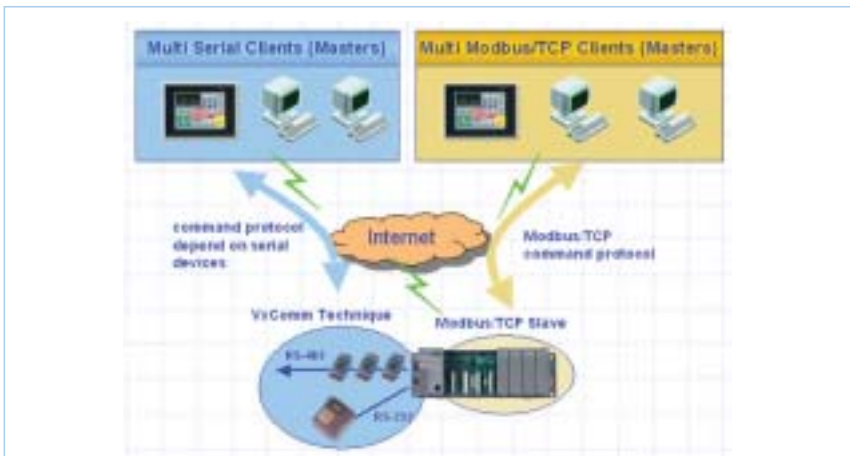
Modbus/TCP protocol is a variant of Modbus protocol. It was developed in 1999 to allow Internet community access Ethernet devices.

What software supports Modbus and Modbus/TCP protocol?

Citect, ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Wizcon, Trace Mode and Wonderware ... etc

What are the benefits of using Modbus and Modbus/TCP protocol ?

1. Openness, no license fees.
2. Widely supported by SCADA and HMI software
3. Easy to use
4. Easily integrate different devices
5. Low development cost
6. Widely knowledge resource



i-8000 Modbus/TCP Embedded Controller

SERIES

Default firmware features

- Supports Modbus/TCP communication protocol to access I/Os that plugged in slots.
- Supports VxComm technique for every COM port of controllers.
- Supports 8K and 87K DI/DO/AI/AO modules.
- Please refer detail list in Modbus Utility on-line help.
- Automatically scan I/O modules.
- You can plug I/O modules in any slot. Don't mind the slot order, it's doesn't mater
- Allowed a maximum of 8 host PCs access simultaneously.
- In fact, it can allow 16 host PCs access simultaneously.
- But for getting better stability, we recommend you don't use more than 8 host PCs to access a Modbus/TCP controller.
- Firmware updateable

Modbus SDK (in C language)

We provide Modbus SDK to users. You can use it to integrate several serial devices. Thus the controller can be a Modbus/TCP slave and Modbus/RTU master. The Modbus SDK has below features:

- Supports extra user-defined command protocol
- Register based programming method (easy to use)
- Can link Modbus/RTU slave devices
- Supports user-defined registers
- Can link to non-standard serial devices
- Xserver SDK compatible

Hardware specifications

Same as I-8430, I-8431, I-8830, I-8831

Ordering Information

- **I-8430 -MTCP:** Modbus/TCP Embedded Controller with 4 slots
- **I-8431 -MTCP:** Modbus/TCP Embedded Controller with 4 slots
- **I-8830 -MTCP:** Modbus/TCP Embedded Controller with 8 slots
- **I-8831 -MTCP:** Modbus/TCP Embedded Controller with 8 slots

i-8KE4 / i-8KE8 Ethernet Expansion Unit

Features

- Supports DCON communication protocol to access I/Os that plugged in slots.
- Supports VxComm technique for every COM port of controllers.
- Supports 8K and 87K DI/DO/AI/AO modules.
- Automatically scan I/O modules.
- You can plug I/O modules in any slot. Don't mind the slot order, it's doesn't matter
- Allowed a maximum of 8 host PCs access simultaneously.
- In fact, it can allow 16 host PCs access simultaneously.
- But for getting better stability, we recommend you don't use more than 8 host PCs to access a single controller.

Hardware specifications

- CPU: 80186, 80M Hz
- SRAM: 512K (16 bits)
- FLASH: 512K
- EPROM: 2K
- Com 0: Internal use
- Com 1: RS-232
- 10BaseT: NE 2000 compatible
- I/O Expansion Slot
 - 4-slot for 8KE4
 - 8-slot for 8KE8
- Power Supply: 20W
 - Unregulated +10Vdc to +30Vdc
- Environment
 - Operation Temp.: -25 ℃ to +75 ℃
 - Storage Temp.: -30 ℃ to +85 ℃
 - Humidity: 5 ~ 95 %
- Dimensions:
 - 354 x 110 x 75.5 mm (8-slot)
 - 230 x 110 x 75.5 mm (4-slot)



Ordering Information:

- I-8KE4:** 4 Expansion Slot Ethernet I/O
- I-8KE4-G:** I-8KE4 with Gary color



Ordering Information:

- I-8KE8:** 8 Expansion Slot Ethernet I/O
- I-8KE8-G:** I-8KE8 with Gary color

i-8000 **CAN Bus Embedded Controller**

SERIES

What is CAN?

The Controller Area Network (CAN) is a serial communications protocol, which efficiently supports distributed real-time control with a very high level of security. It provides the error process mechanisms and message priority concepts. These features can improve the network reliability and transmission efficiency. Furthermore, CAN supplies the multi-master capabilities, and is especially suited for networking "intelligent" devices as well as sensors and actuators within a system or sub-system.



DeviceNet based on the CAN bus is one of the world's leading device-level networks for industrial automation. In fact, more than 40% of end users surveyed by independent industry analysis report choosing DeviceNet over other networks. It offers robust, efficient data handling because it is based on Producer/Consumer technology. This modern communications model offers key capabilities that allow the user to effectively determine what information is needed and when. The features of DeviceNet are showed as below:

- ¥ Multi-vendor interoperability
- ¥ Fast, easy installation - resulting in space and time savings
- ¥ Future-ready, for easy additions as your needs expand and change
- ¥ Improved uptime through intelligent insight into device operations
- ¥ Efficient bandwidth utilization through producer/consumer communications
- ¥ On-the-fly configuration/re-configuration and additions without powering down

CANopen is a networking system based on the CAN bus. It unleashes the full power of CAN by allowing direct peer to peer data exchange between nodes in an organized and, if necessary, deterministic manner. The network management functions specified in CANopen simplify project design, implementation and diagnosis by providing standard mechanisms for network start-up and error management. The features of CANopen are showed as below:

- ¥ Auto configuration of the network
- ¥ Easy access to all device parameters
- ¥ Device synchronization
- ¥ Cyclic and event-driven data transfer
- ¥ Synchronous reading or setting of inputs, outputs or parameters

i-8000 **CAN Bus Embedded Controller**

SERIES

Will be available

Specifications & Features



DeviceNet

Ordering Information:
I-8420-G: DeviceNet Embedded Controller with 4 empty slots



CANopen

Ordering Information:
I-8421-G: CANopen Embedded Controller with 4 empty slots



DeviceNet

Ordering Information:
I-8820-G: DeviceNet Embedded Controller with 8 empty slots



CANopen

Ordering Information:
I-8821-G: CANopen Embedded Controller with 8 empty slots

- CPU 80186, 80M Hz
- SRAM: 512K bytes
- Flash Memory: 512K bytes
- EEPROM: 2K bytes (Can upto 128K bytes or change to 2K/8K FRAM)
- Built-in Watchdog Timer
- Real Time Clock
- COM1: RS-232 (Program download port)
- CAN Port: 5-pin screw terminal connector
- CAN controller: Phillip SJA1000T.
- CAN transceiver: Phillip 82C250/251.
- Support both CAN 2.0A and CAN 2.0B
- Isolated : 2500Vrms on CAN side
- 120 ohm terminal resister selected by jumper
- Programmable transfer rate up to 1 Mbps.
- I/O Expansion Slot
 - 4-slot for I-8420/8421
 - 8-slot for I-8820/8821
- Power Supply: 20W
Unregulated +10Vdc to +30Vdc
- Environment
 - Operating Temp.: -25°C to + 75°C
 - Storage Temp.: -30°C to + 85°C
- Humidity: 5 ~95%
- Dimensions:
 - 354 x 110 x 75.5 mm (8-slot)
 - 230 x 110 x 75.5 mm (4-slot)
- I-8420 and I-8820 are for DeviceNet Products
- I-8421 and I-8821 are for CANopen Products

i-8000 **ISaGRAF Embedded Controller**

SERIES

What is ISaGRAF ?

ISaGRAF is a PLC-like software running on Windows 95/ 98/ NT/ 2000/ XP. It supports all five IEC61131-3 languages, Ladder Diagram (LD), Structured Text (ST), Function Block Diagram (FBD), Sequential Function Chart (SFC), and Instruction List (IL). Additionally, for the ultimate in power and flexibility, ISaGRAF supports off-line simulation, on-line debugging, monitoring and control. More information at <http://www.icpdas.com/products/8000/isagraf.htm>



ISaGRAF Embedded Controllers

ICP DAS provides many controller types supporting ISaGRAF. They are I-8417/8817/8437/8837, I-7188EG/XG and Wincon-8037/8337/8737. They can be easily integrated with many HMI softwares and devices such as Indusoft, iFix, Iconics, Wizcon, Intouch, Citect, Modbus OPC server, ICP DAS's MMICON, Touch 506S, 506L & 510T, etc.

Features:

1. All five IEC61131-3 languages, LD, ST, FBD, SFC and IL, plus Flow Chart.
2. Modbus RTU protocol (RS-232/485) to integrate to SCADA softwares and HMI.
3. Modbus TCP/IP to integrate to SCADA softwares and HMI. (I-8437/8837, I-7188EG & Wincon-8037/8337/8737)
4. Controller to Controller Data Exchange via RS485.
5. Controller to Controller Data Exchange via Ethernet. (I-8437/8837, I-7188EG & Wincon-8037/8337/8737)
6. Remotely download and monitor the program via a modem.
7. Modbus Master protocol to link to other devices which support Modbus RTU protocol.
8. All I-7000 & I-87K series I/O modules can be integrated as remote I/O modules.
9. Wincon-8037/8337/8737 support Web HMI that allow other PCs to browse it via Internet Explorer.
10. Spotlight-A Simple HMI included in ISaGRAF to make application more friendly.
11. Auto-scan I/O : Automatically scan I/O boards & declare I/O variables.
12. Data log: data, date & time can be stored at S256/S512 for I-8xx7, while X607/X608 for I-7188EG/XG, and then PC can load these data via RS232/RS485, ethernet & Modem.
13. SMS: When integrating with a GSM Modem, Short Message Service is available.
14. Motion: Motion control is available when i-8091 boards integrated.

Ordering Information:

ISaGRAF-256-E: ISaGRAF Workbench Software up to 256 I/O Tags + one English Manual.

ISaGRAF-256-C: ISaGRAF Workbench Software up to 256 I/O Tags + one Chinese Manual.

i-8000 **ISaGRAF Embedded Controller** SERIES



Ordering Information:

I-8417: ISaGRAF Embedded Controller
I-8417-G: I-8417 with Gray color



Ordering Information:

I-8437: ISaGRAF Embedded Controller
I-8437-G: I-8437 with Gray color



Ordering Information:

I-8817: ISaGRAF Embedded Controller
I-8817-G: I-8817 with Gray color



Ordering Information:

I-8837: ISaGRAF Embedded Controller
I-8837-G: I-8837 with Gray color

Specifications & Features

- The hardware of I-8417 is
 - the same as I-8411.
 - The I-8000 Target driver and
 - ISaGRAF Target license are
 - included

- The hardware of I-8437 is
 - the same as I-8431.
 - The I-8000 Target driver and
 - ISaGRAF Target license are
 - included

- The hardware of I-8817 is
 - the same as I-8811.
 - The I-8000 Target driver and
 - ISaGRAF Target license are
 - included

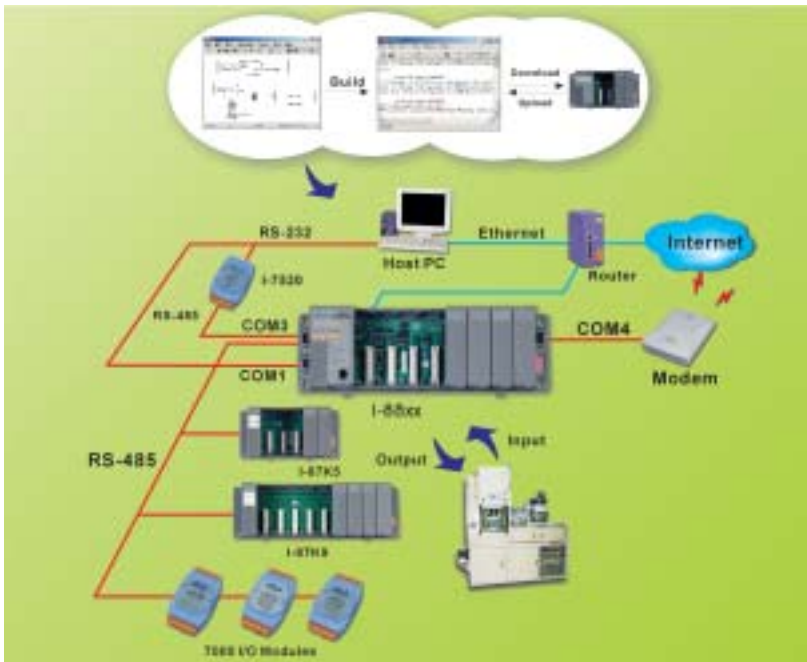
- The hardware of I-8837 is
 - the same as I-8831.
 - The I-8000 Target driver and
 - ISaGRAF Target license are
 - included

i-8000 **Matlab Embedded Controller** SERIES

I-8438/8838 is the ICP DAS MATLAB Embedded Controller solution built in Ethernet and series interface with I/O expansion slots for Matlab development environment. For this application there are over 20 I/O bridges and system-level Simulink Blocksets have been developed. By using Simulink development environment and these Matlab Driver's blocksets, control algorithm can be easily constructed and verified without writing any code. Once the algorithm has been verified, by pressing a "build" button, users can convert a model to executable code, and download it to I-8438/8838 embedded controller for test or practical application by RS232 and Ethernet. Furthermore, engineers can put more focus on advanced control algorithm design and development.

Software required :

1. Matlab v6.1 or v6.5
2. Simulink v4.1 or v5.0
3. Real-Time Workshop v4.1 or v5.0
4. Real-Time Workshop Embedded Coder v2.0 or v3.0
5. ICPDAS Matlab Embedded Controller Development Kits



i-8000 **Matlab Embedded Controller**

SERIES



NEW!!

Ordering Information:

I-8438-G: Matlab Embedded Controller

COMMON Specifications

- CPU:80186,80MHz

Specifications & Features

- Except CPU, the hardware of I-8438 is the same as I-8431.
- The IO bridge for I-8000 is included



NEW!!

Ordering Information:

I-8838-G: Matlab Embedded Controller

- Except CPU, the hardware of I-8838 is the same as I-8831.
- The IO bridge for I-8000 is included