I/O Expansion Units

5

5.1 I/O Expansion Units Overview P5-1-1

5.2 RS-485 I/O Expansion Unit P5-2-1

- RU-87P1/87P2/87P4/87P8 - P5-2-3

5.3 Ethernet I/O Expansion Unit P5-3-1

- ET-87P2/87P4/87P8 - P5-3-4

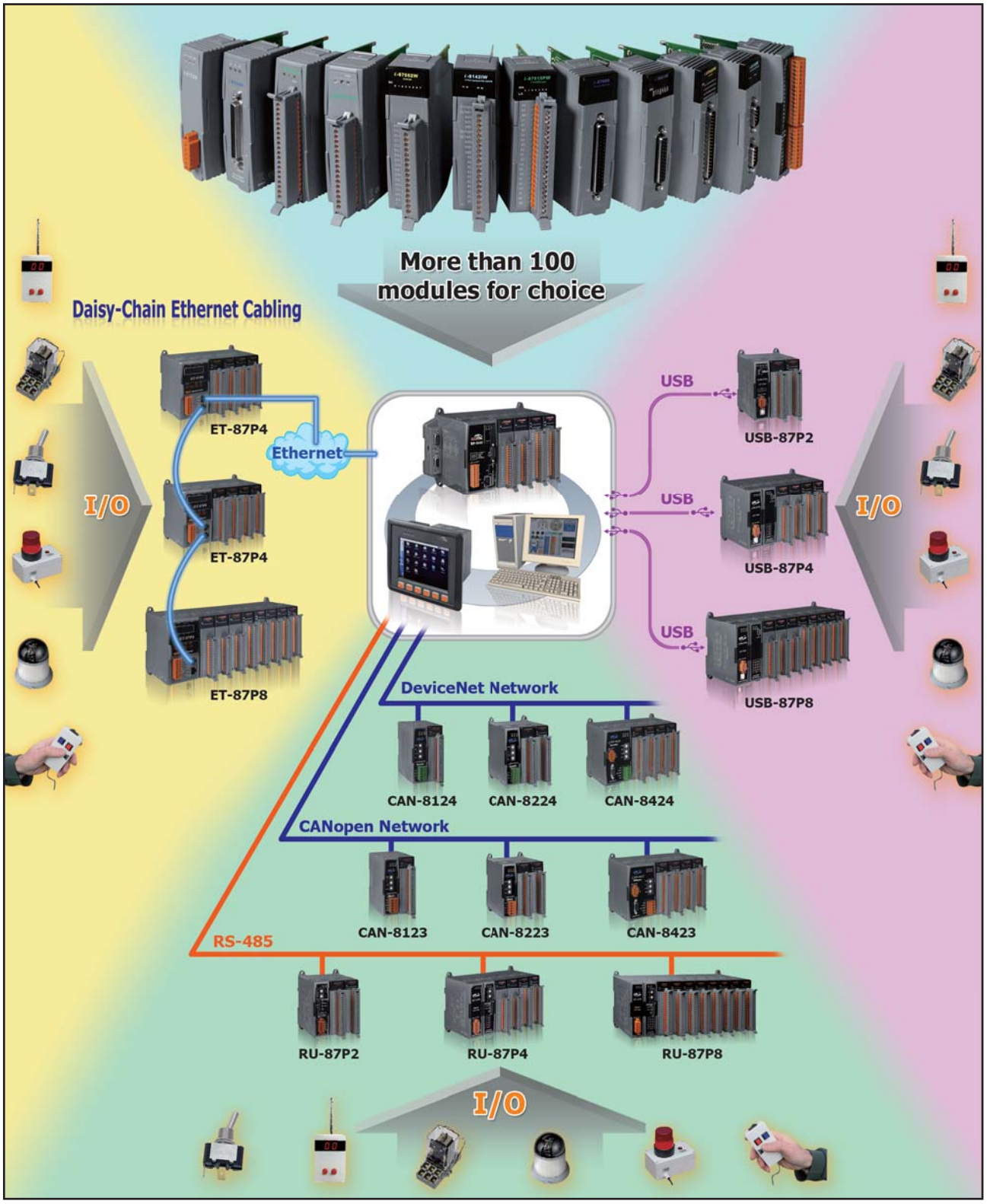
5.4 USB I/O Expansion Unit P5-4-1

- USB-87P1/87P2/87P4/87P8- P5-4-3

5.1. I/O Expansion Units Overview

• Overview

ICP DAS lunches a series of remote I/O unit for industrial monitoring and controlling applications. With the auto configuration and hot swap features, the unit can eliminate your nightmare of extensive labor on the set-up and maintenance of the automation system. The available I/O modules are also highly flexible and compatible for every kind of application to reduce your inventory of different types of I/O modules. Furthermore, there are various communication interface and protocols for choice in various remote I/O applications.

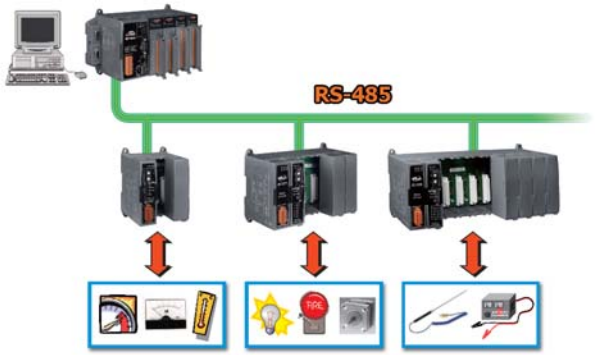


5.2. RS-485 I/O Expansion Unit

• RU-87Pn Introduction

The RU-87Pn series RS-485 remote I/O expansion unit is designed to acquire and control remote I/O through RS-485 connections. It comprises

- A CPU module with none-volatile memory to backup/restore I/O module configurations; LED indicators to diagnose the I/O module; and a RS-485 port for 1.2 Km long distance communication.
- A power module
- A backplane with a number of I/O slots for flexible I/O configuration.



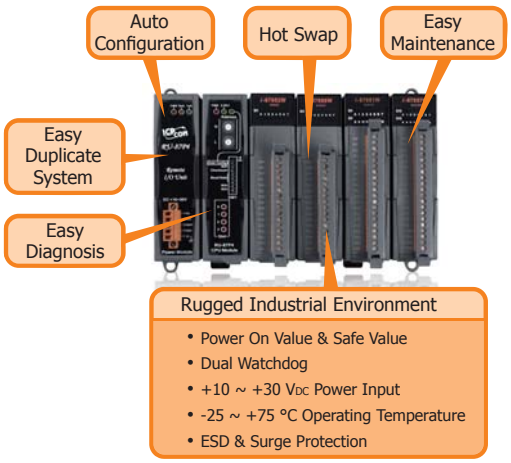
With its patent-pending technologies, namely auto configuration and hot swap, it saves lots of labor on the set up and maintenance of the automation systems. Reliable 3-piece construction enables users to hot swap modules during operation, without rewiring. All I/O module data are backed up in the non-volatile memory of the RU-87Pn. After hot-swapping a module, all settings are automatically loaded to recover.

Furthermore, with the RS-485 network communication interface and more than 30 I/O modules for choice, users can apply the unit to nearly any automation system.

• Features

1. Hot Swap

Reliable 3-piece construction enables users to hot swap modules during operation, without rewiring. All I/O module data are backed up in the non-volatile memory of the RU-87Pn. After hot-swapping a module, all settings are automatically loaded to recover.



2. Auto Configuration

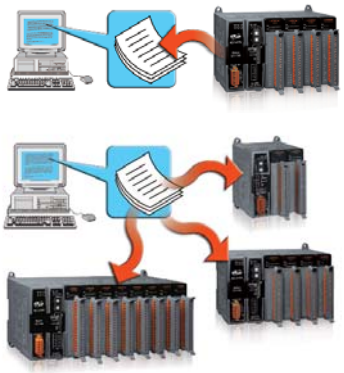
The I-87K I/O modules can be pre-configured and backed up in the non-volatile memory of the RU-87Pn. When the RU-87Pn is power on or plugged in, the RU-87Pn will automatically checks and restores these configurations to each I-87K I/O modules on it.

3. Easy Duplicate System

Using the DCON Utility, you can easily make a backup of the I-87K module configurations and write to another RU-87Pn. This design can easily and quickly duplicate many RU-87Pn.

4. Easy Maintenance and Diagnosis

The basic configurations (includes station number, baudrate) are set by the rotary and DIP switches. The operator can use only one screwdriver to set the RU-87Pn. And there are several LED status indicators to show whether I-87K modules are configured and work properly.



If one I-87K module fails, the operator just needs to replace it with one good I-87K module with the same item number. And then checks the LED indicators to know whether the replacement is performed correctly. The switch and LED design makes it easy for maintenance. There is no PC and Notebook needed.

5. Communication

- RS-485 industrial multi-drop network
  The RU-87Pn uses the industrial EIA RS-485 communication to transmit and receive data over long distance (1.2 Km).
- DCON protocol
  I-87K series I/O modules plugged in a RU-87Pn provides a simple command/response protocol (named DCON protocol) for communication. All command/response are in easy use ASCII format.

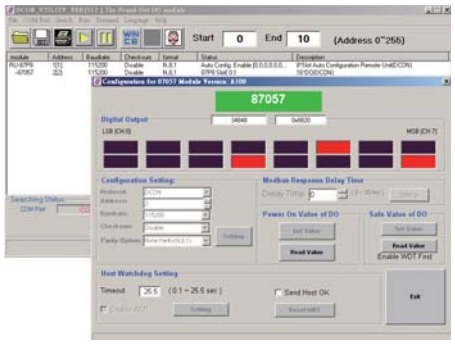
6. Rugged Industrial Environment

- Dual watchdog design
  The I-87K series I/O modules provides module watchdog and host watchdog. The module watchdog is a hardware watchdog; the host watchdog is a software watchdog. The module watchdog is designed to automatically reset the microprocessor when the module hangs. The host watchdog monitors the host controller (PC or PLC). The output of module can go to the safe value state when the host fails.
- Programmable Power On Value & Safe Value
  The DO and AO type I-87K I/O modules provide programmable Power On Value & Safe Value. When RU-87Pn is power on or plugged in, the DO or AO modules output preconfigured Power On Value. When host watchdog is acted, DO or AO modules output preconfigured Safe Value.
- Wide range power input (10 ~ 30 V_{DC})
- Wide range operating temperature (-25 ~ +75°C)

7. Fully Software Support

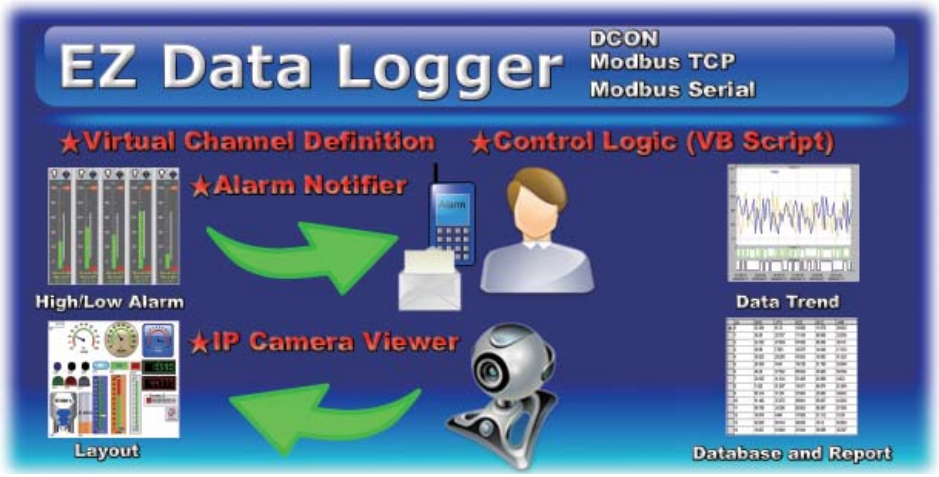
The free charge software utility and development kits include

- DCON Utility: for configuration



- OPC Servers:
  OPC is an industrial standard interface based on OLE technology. With the OPC server, I/O modules can be easily integrated to any software that has OPC client capability.

8. EZ Data Logger



EZ Data Logger is a small data logger software. It can be applied to small remote I/O system. With its user-friendly interface, users can quickly and easily build a data logger software without any programming skill.

9. Various Software Develop Toolkits

DLL, ActiveX, Labview driver, Indusoft driver, DasyLab driver, Linux driver

Highlight Information

- One RS-485 Port for Multi-Drop Topology
- Hot Swap Allowed
- Auto Configuration
- LED Indicators for Fault Detection
- Switches to Configure Communication
- DCON Protocol
- 1/2/4/8 I/O Slots for I-87K Modules
- Operating Temperature: -25 ~ +75 °C

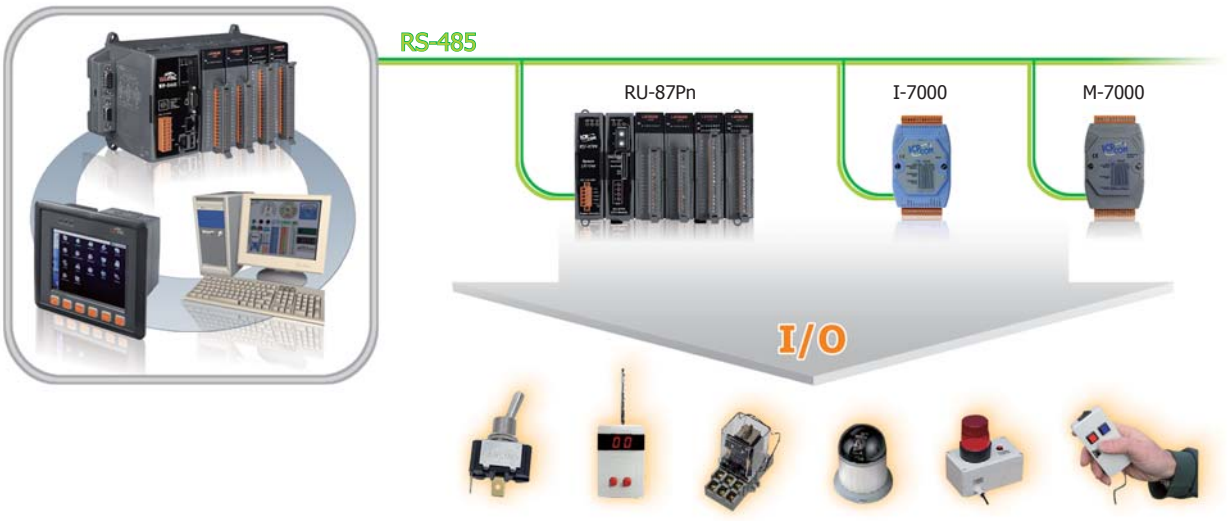
Introduction

RU-87Pn series is a remote intelligent I/O expansion unit to expand I-87K series I/O modules over the RS-485 for industrial monitoring and controlling applications.
RU-87Pn is designed to be used in harsh and noisy environment, so the hardware is manufactured with wide power input range (10 ~ 30 VDC), isolated power input and can operate under wide temperature (-25 ~ +75 °C). To simplify installation and maintenance of I/O modules, it provides many useful features, such as: hot swap allowed, auto configuration, LED indicators for fault detection, dual watchdog to keep alive, programmable power on and safe values for safety.

There are more than 30 I/O modules supported with the unit, including analog input/output, digital input/output, counter, frequency I/O modules. We provide various software development kits (SDK) and demos, 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.

Applications

Rich I/O Expansion Ability

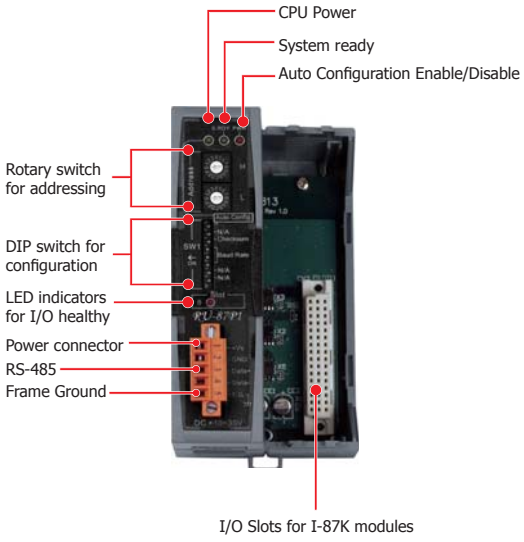


Specifications

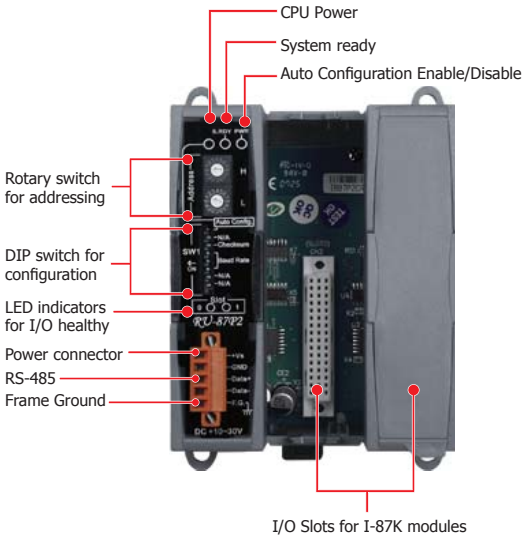
Models	RU-87P1	RU-87P2	RU-87P4	RU-87P8
Interface Type (RS-485)				
Baud Rate	115200 bps maximum			
Distance	1.2 km (4000 ft) maximum			
Isolation	3000 V_{DC}			
ESD Protection	+/-4 K Contact Discharge and +/-8 K Air Discharge			
Communication Protocol	DCON Protocol (ASCII Format)			
Switch				
Rotary Switch	x2, For RS-485 address			
DIP Switch	8-bit × 1, For auto configuration, check sum and baud rate			
LED Indicators				
Power	Yes			
System Ready	Yes			
Auto Configuration	Yes			
Slot Status	Yes			
I/O Expansion Slots				
Hot Swap	Yes			
Auto Configuration	Yes			
Support Module Type	High profile I-87K module only			
Slots Numbers	1	2	4	8
Mechanical				
Dimensions (W x L x H)	64 mm x 120 mm x 110 mm	95 mm x 132 mm x 111 mm	188 mm x 132 mm x 111 mm	312 mm x 132 mm x 111 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}			
Reverse Polarity Protection	Yes			
Isolation	1000 V_{DC}			
Frame Ground	Yes			
Consumption	1 W	1 W	2 W	2.4 W
Power Board Driving	5 W	8 W	30 W	30 W

Appearance

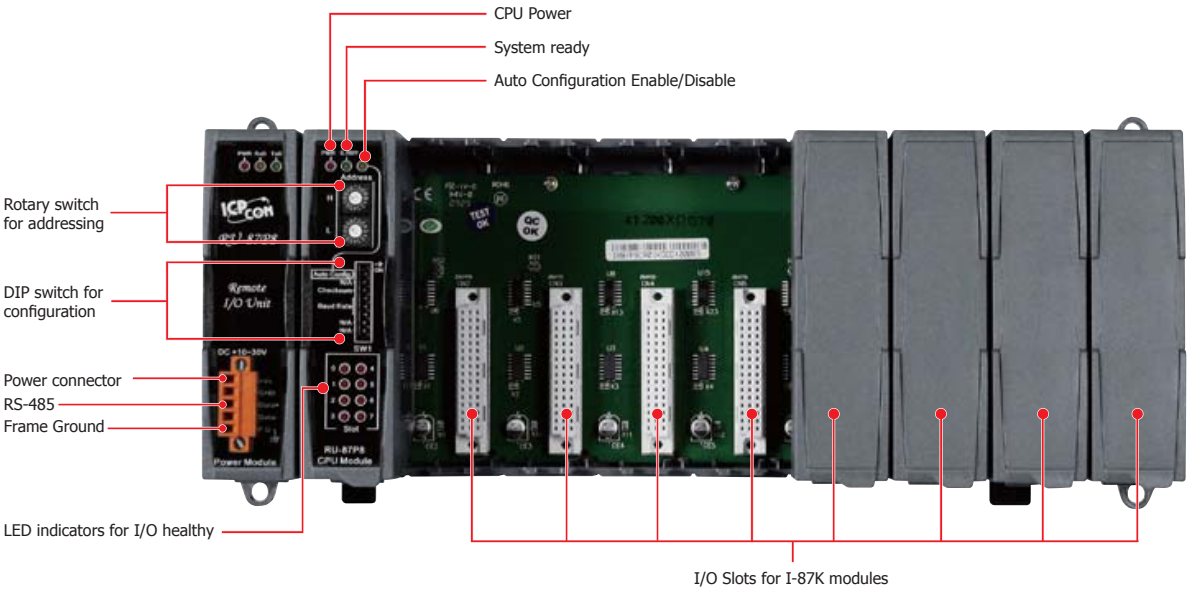
RU-87P1



RU-87P2



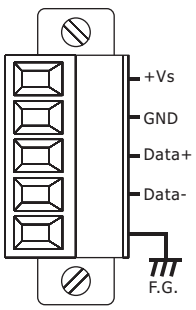
RU-87P8



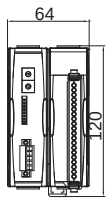
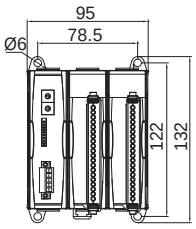
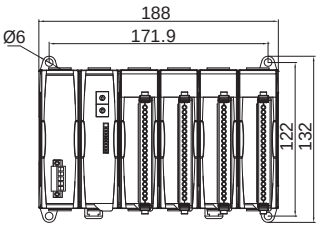
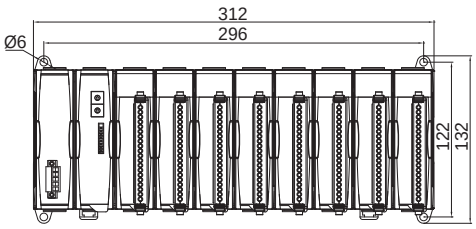
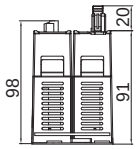
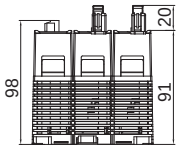
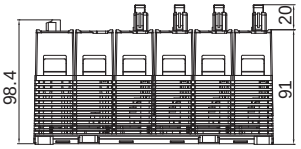
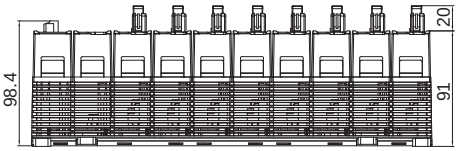
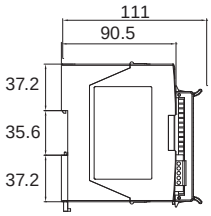
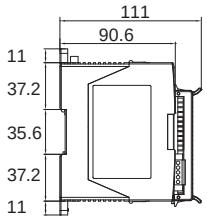
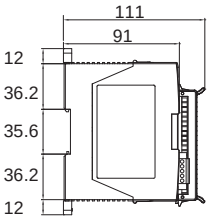
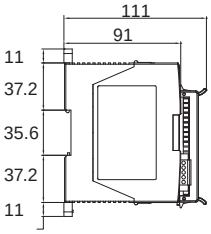
Pin Assignments

RU-87Px Terminal Block

PWR: +10 ~ 30 V_{DC}
RS-485



Dimensions (Units: mm)

RU-87P1	RU-87P2	RU-87P4	RU-87P8
			
Front View	Front View	Front View	Front View
			
Top View	Top View	Top View	Top View
			
Right Side View	Right Side View	Right Side View	Right Side View

Ordering Information

RU-87P1 CR	1 slot I/O Expansion Unit (RoHS)
RU-87P2 CR	2 slots I/O Expansion Unit (RoHS)
RU-87P4 CR	4 slots I/O Expansion Unit (RoHS)
RU-87P8 CR	8 slots I/O Expansion Unit (RoHS)

Accessories

DP-660	24 V_{DC}/2.5 A, 60 W and 5 V_{DC}/0.5 A, 2.5 W Power Supply with DIN-Rail Mounting
DP-665	24 V_{DC}/2.7 A, 65 W Power Supply with DIN-Rail Mounting
DP-1200 CR	24 V_{DC}/5.0 A, 120 W Power Supply with DIN-Rail Mounting (RoHS)
MDR-20-24 CR	24 V_{DC}/1.0 A, 24 W Power Supply with DIN-Rail Mounting (RoHS)
I-7560 CR	USB to RS-232 Converter (RoHS)

5.3. Ethernet I/O Expansion Unit

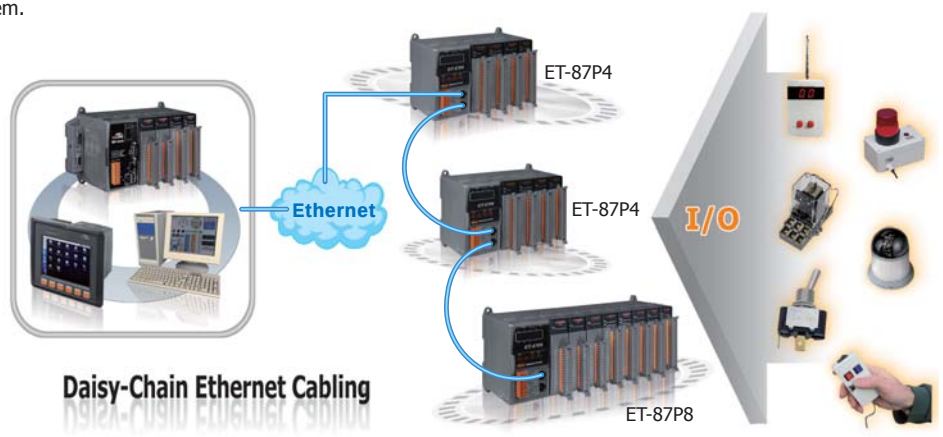
• Introduction

The ET-87Pn series Ethernet remote I/O expansion unit is designed to acquire and control remote I/O through Ethernet connections. It comprises

- A CPU module with none-volatile memory to backup/restore I/O module configurations; LED indicators to diagnose the I/O module; and a two-port Ethernet switch for long distance communication.
- A power module
- A backplane with a number of I/O slots for flexible I/O configuration.

With its patent-pending technologies, namely auto configuration and hot swap, it saves lots of labor on the set up and maintenance of the automation systems. Reliable 3-piece construction enables users to hot swap modules during operation, without rewiring. All I/O module data are backed up in the non-volatile memory of the ET-87Pn. After hot-swapping a module, all settings are automatically loaded to recover.

Furthermore, with the Ethernet network communication interface and more than 30 I/O modules for choice, users can apply the unit to nearly any automation system.



• Features

1. Hot Swap

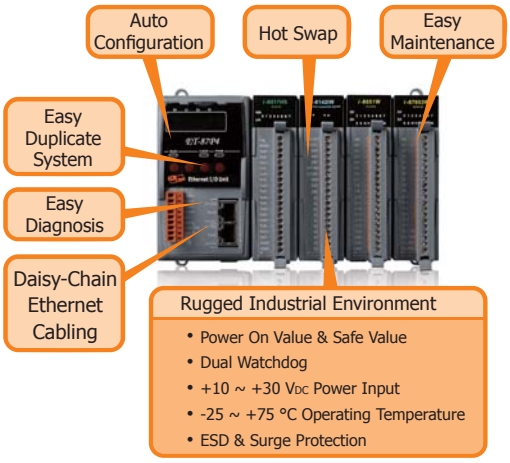
Reliable 3-piece construction enables users to hot swap modules during operation, without rewiring. All I/O module data are backed up in the non-volatile memory of the ET-87Pn. After hot-swapping a module, all settings are automatically loaded to recover.

2. Auto Configuration

The I-87K I/O modules can be pre-configured and backed up in the non-volatile memory of the RU-87Pn. When the ET-87Pn is power on or plugged in, the ET-87Pn will automatically checks and restores these configurations to each I-87K I/O modules on it.

3. Easy Duplicate System

Using the DCON Utility, you can easily make a backup of the I-87K module configurations and write to another RU-87Pn. This design can easily and quickly duplicate many ET-87Pn.



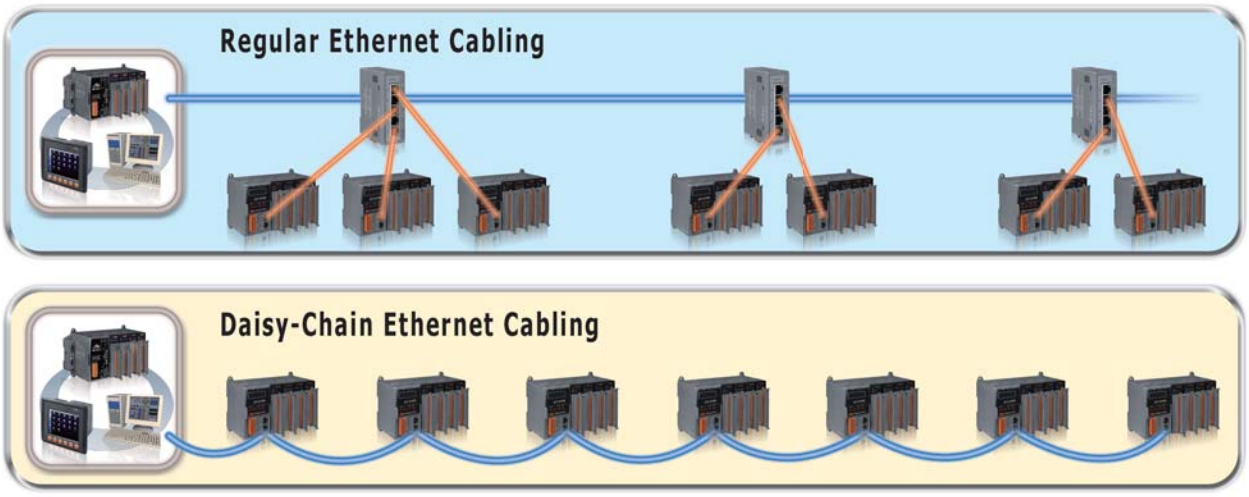
4. Easy Maintenance and Diagnosis

The basic configurations (includes IP settings) are set by the push buttons and 7-segment LED display. The operator can easily set the ET-87Pn. And there are several LED status indicators to show whether I-87K modules are configured and work properly.

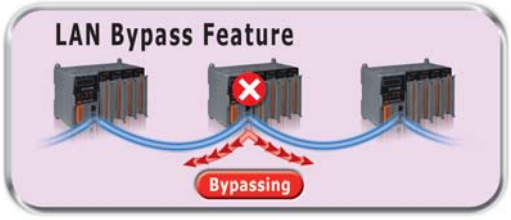
If one I-87K module fails, the operator just needs to replace it with one good I-87K module with the same item number. And then checks the LED indicators to know whether the replacement is performed correctly. The push buttons and LED display design makes it easy for maintenance. There is no PC and Notebook needed.

5. Communication

- Daisy-Chain Ethernet topology
  The ET-87Pn has a built-in two-port Ethernet switch to implement daisy-chain topology. The cabling is much easier and total costs of cable and switch are significantly reduced.



- LAN Bypass Feature
  LAN Bypass feature guarantees the Ethernet communication. It will automatically active to continue the network traffic when ET-87Pn looses its power.



- DCON protocol
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  All command/response are in easy used ASCII format.

6. Rugged Industrial Environment

- Dual watchdog design
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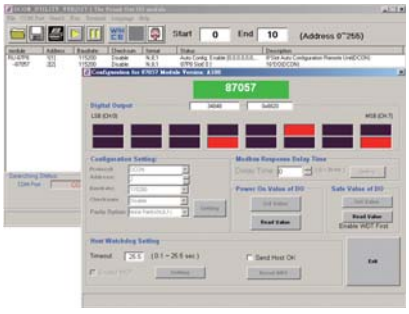
- DCON Utility: for configuration



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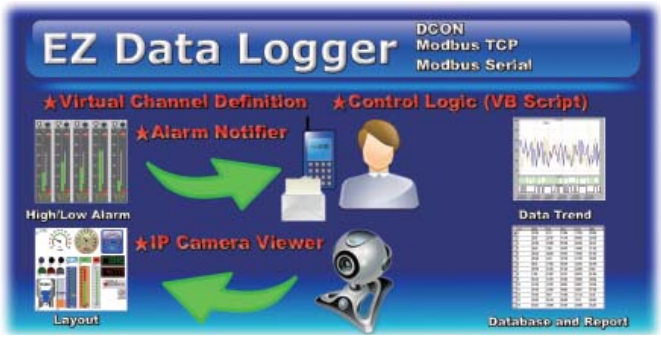


9. Various Software Develop Toolkits

DLL, ActiveX, Labview driver, Indusoft driver, DasyLab driver, Linux driver

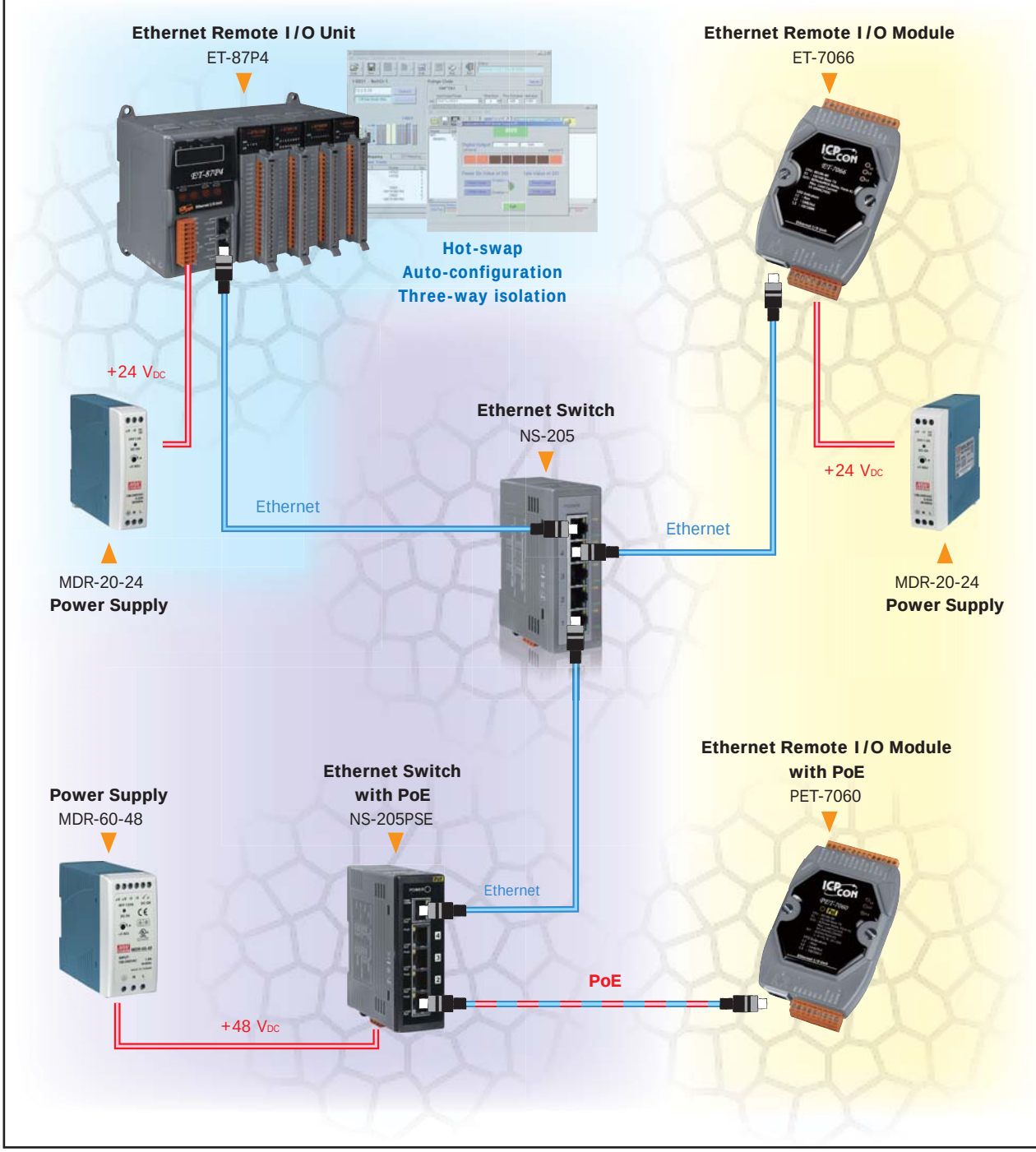
Ethernet Remote I/O unit & I/O Module

Ethernet Remote I/O Unit

The ET-87Pn series, Ethernet remote I/O unit, consists of a power supply, CPU module and a backplane with 4, 8 I/O expansion slots. The ET-87Pn unit supports DCON protocol and has a 10/100 Base-T port to connect to the main control unit directly or via Ethernet switch.

Ethernet Remote I/O Module

Both of ET-7000 series and PET-7000 series, Ethernet remote I/O module, support Modbus protocol. Those remote I/O modules are equipped with a 10/100 Base-T port, which link the remote I/O modules to the main control unit directly or via switch. PET-7000 series needs a PoE switch, such as NS-205PSE.



Highlight Information

- Two Ethernet Ports for Daisy-Chain Topology
- LAN Bypass Feature
- Hot Swap Allowed
- Auto Configuration
- LED Indicators for Fault Detection
- Push Buttons to Configure IP Address
- DCON Protocol
- 2/4/8 I/O Slots for I-87K Modules
- Operating Temperature: -25 ~ +75 °C

Introduction

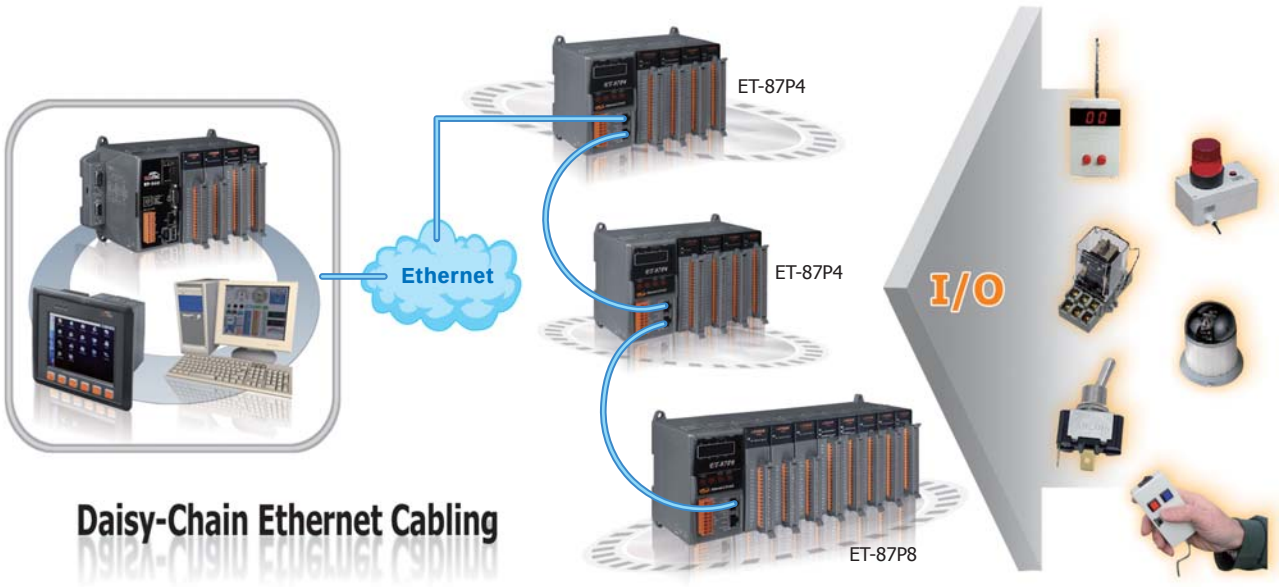
ET-87Pn series is a remote intelligent I/O expansion unit to expand I-87K series I/O modules over the Ethernet for industrial monitoring and controlling applications. It offers two Ethernet switch ports to form a daisy-chain topology. The daisy-chain feature allows ET-87Pn to connect in series to each other or other Ethernet devices. Uses can easily simplify the cabling and save installation space with the feature.

ET-87Pn is designed to be used in harsh and noisy environment, so the hardware is manufactured with wide power input range (10 ~ 30 VDC), isolated power input and can operate under wide temperature (-25 ~ +75 °C). To simplify installation and maintenance of I/O modules, it provides many useful features, such as: hot swap allowed, auto configuration, LED indicators for fault detection, dual watchdog to keep alive, programmable power on and safe values for safety.

There are more than 30 I/O modules supported with the unit, including analog input/output, digital input/output, counter, frequency I/O modules. We provide various software development kits (SDK) and demos, such as DLL, ActiveX, Labview driver, InduSoft driver, Linux driver, OPC server, etc. The I-87K series I/O modules plugged in the ET-87Pn can be easily integrated into variant software system.

Applications

Rich I/O Expansion Ability

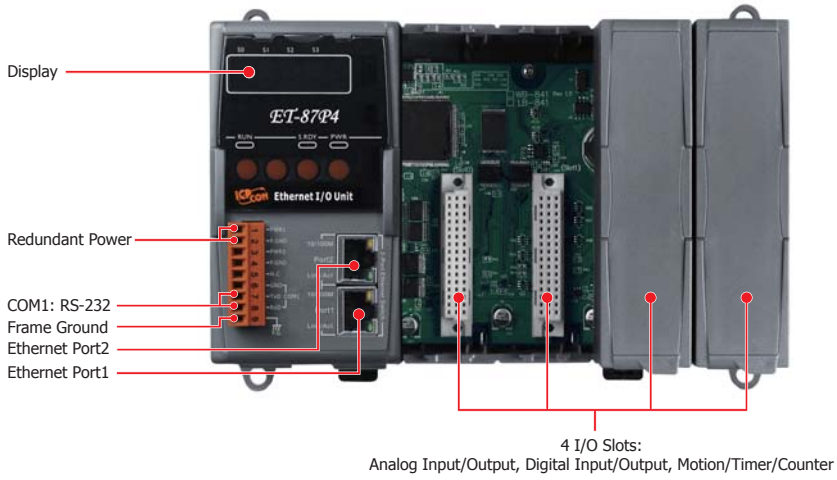


Specifications

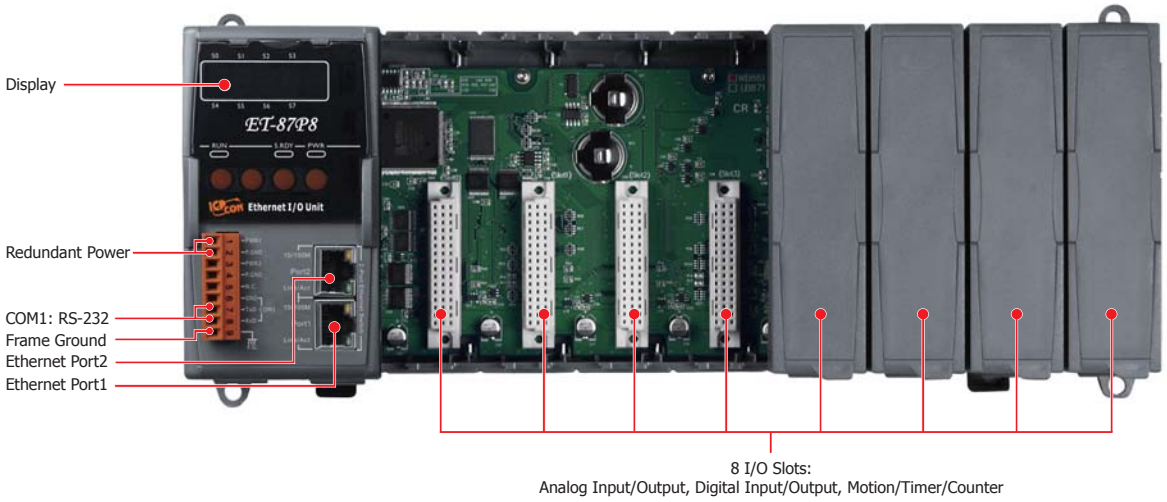
Models	ET-87P2	ET-87P4	ET-87P8
Interface Type: Ethernet			
Port	RJ-45 × 2 10/100Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)		
Cabling	Daisy-Chain Ethernet Cabling		
Isolation	1500 V_{DC}		
ESD Protection	+/- 4 K Contact Discharge and +/- 8 K Air Discharge		
Communication Protocol	DCON Protocol (ASCII format)		
LED Display/Indicators			
Power	Yes		
System Ready	Yes		
Auto Configuration	Yes		
Slot Status	Yes		
IP Address	Yes (with push buttons to configure IP address)		
I/O Expansion Slots			
Hot Swap	Yes		
Auto Configuration	Yes		
Support Module Type	High profile I-87K module only		
Slots Numbers	2	4	8
Mechanical			
Dimensions (W x H x D)	126 mm x 132 mm x 111 mm	188 mm x 132 mm x 111 mm	312 mm x 132 mm x 111 mm
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}		
Redundant Input	Yes		
Reverse Polarity Protection	Yes		
Isolation	1000 V_{DC}		
Frame Ground	Yes		
Consumption	2 W	2 W	2.4 W
Power Board Driving	30 W		

Appearance

ET-87P4

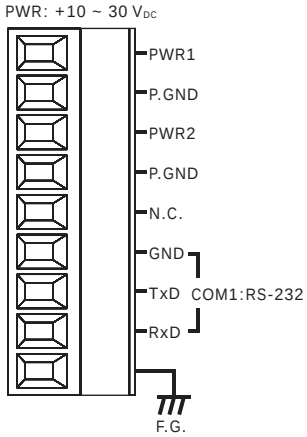


ET-87P8

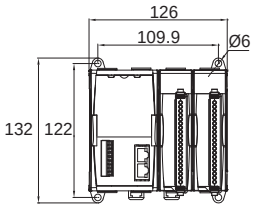
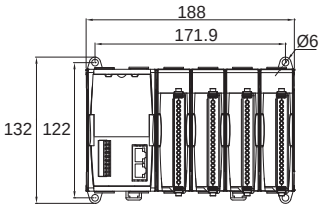
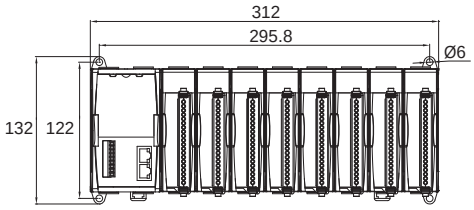
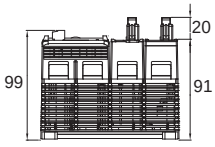
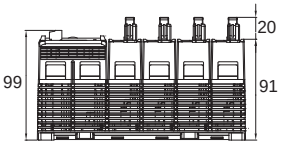
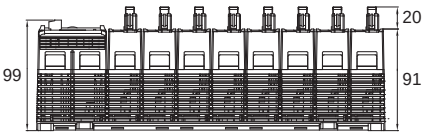
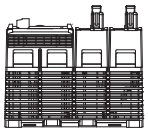
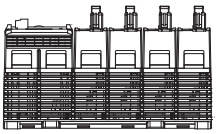
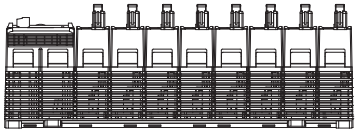
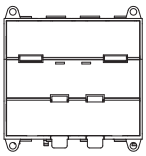
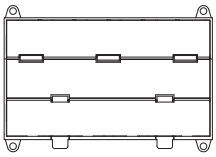
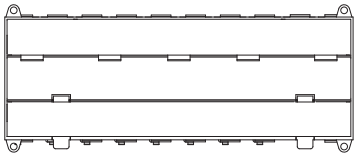
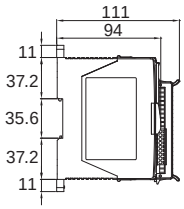
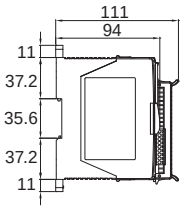
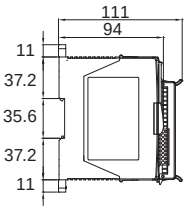
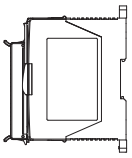
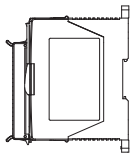
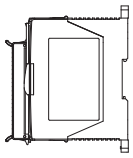


Pin Assignments

ET-87P2/ET-87P4/ET-87P8 Terminal Block



Dimensions (Units: mm)

ET-87P2	ET-87P4	ET-87P8
Front View	Front View	Front View
		
Top View	Top View	Top View
		
Bottom View	Bottom View	Bottom View
		
Rear View	Rear View	Rear View
		
Left Side View	Left Side View	Left Side View
		
Right Side View	Right Side View	Right Side View
		

Ordering Information

ET-87P2 CR	2 slots I/O Expansion Unit
ET-87P4 CR	4 slots I/O Expansion Unit
ET-87P8 CR	8 slots I/O Expansion Unit

Accessories

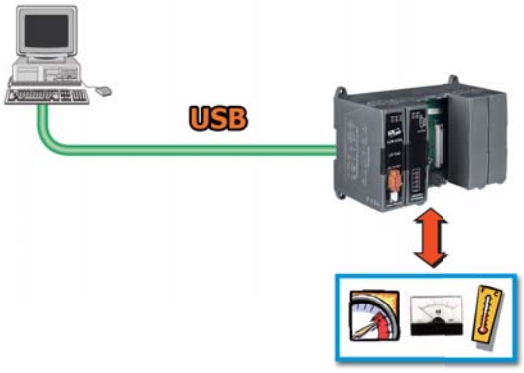
DP-660	24 V_{DC}/2.5 A, 60 W and 5 V_{DC}/0.5 A, 2.5 W Power Supply with DIN-Rail Mounting
DP-665	24 V_{DC}/2.7 A, 65 W Power Supply with DIN-Rail Mounting
DP-1200 CR	24 V_{DC}/5.0 A, 120 W Power Supply with DIN-Rail Mounting (RoHS)
MDR-20-24 CR	24 V_{DC}/1.0 A, 24 W Power Supply with DIN-Rail Mounting (RoHS)
I-7560 CR	USB to RS-232 Converter (RoHS)

5.4. USB I/O Expansion Unit

• Introduction

The USB-87Pn series USB I/O expansion unit is designed to acquire and control I/O through USB connections. It comprises

- A CPU module with none-volatile memory to backup/restore I/O module configurations; LED indicators to diagnose the I/O module; and a USB port for communication.
- A power module
- A backplane with a number of I/O slots for flexible I/O configuration.



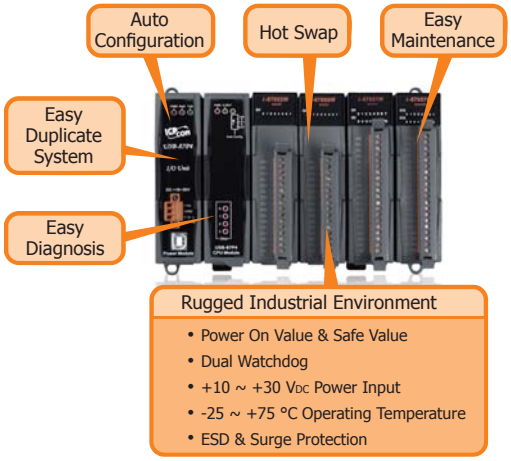
With its patent-pending technologies, namely auto configuration and hot swap, it saves lots of labor on the set up and maintenance of the automation systems. Reliable 3-piece construction enables users to hot swap modules during operation, without rewiring. All I/O module data are backed up in the non-volatile memory of the USB-87Pn. After hot-swapping a module, all settings are automatically loaded to recover.

Furthermore, with the USB communication interface and more than 30 I/O modules for choice, users can apply the unit to nearly any automation system.

• Features

1. Hot Swap

Reliable 3-piece construction enables users to hot swap modules during operation, without rewiring. All I/O module data are backed up in the non-volatile memory of the USB-87Pn. After hot-swapping a module, all settings are automatically loaded to recover.



2. Auto Configuration

The I-87K I/O modules can be pre-configured and backed up in the non-volatile memory of the RU-87Pn. When the USB-87Pn is power on or plugged in, the USB-87Pn will automatically checks and restores these configurations to each I-87K I/O modules on it.

3. Easy Diagnosis System

Using the DCON Utility, you can easily make a backup of the I-87K module configurations and write to another USB-87Pn. This design can easily and quickly duplicate many USB-87Pn.

4. Easy Maintenance and Diagnosis

There are several LED status indicators to show whether I-87K modules are configured and work properly.

If one I-87K module fails, the operator just needs to replace it with one good I-87K module with the same item number. And then checks the LED indicators to know whether the replacement is performed correctly. The LED indicator design makes it easy for maintenance. There is no PC and Notebook needed.

5. Communication

- USB network
  The USB network connects the USB-87Pn to regular PC and notebook without any other media converter.
- DCON protocol
  I-87K series I/O modules plugged in a USB-87Pn provides a simple command/response protocol (named DCON protocol) for communication. All command/response are in easy use ASCII format.

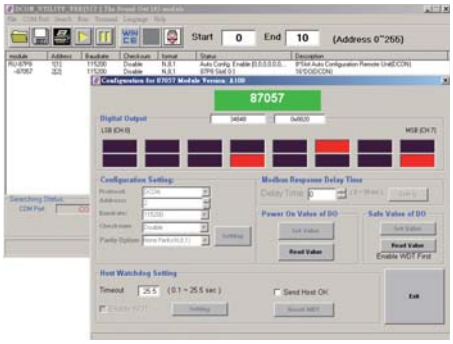
6. Rugged Industrial Environment

- Dual watchdog design
  The I-87K series I/O modules provides module watchdog and host watchdog. The module watchdog is a hardware watchdog; the host watchdog is a software watchdog. The module watchdog is designed to automatically reset the microprocessor when the module hangs. The host watchdog monitors the host controller (PC or PLC). The output of module can go to the safe value state when the host fails.
- Programmable Power On Value & Safe Value
  The DO and AO type I-87K I/O modules provide programmable Power On Value & Safe Value. When USB-87Pn is power on or plugged in, the DO or AO modules output preconfigured Power On Value. When host watchdog is acted, DO or AO modules output preconfigured Safe Value.
- Wide range power input (10 ~ 30 V_{DC})
- Wide range operating temperature (-25°C ~ +75°C)

7. Fully Software Support

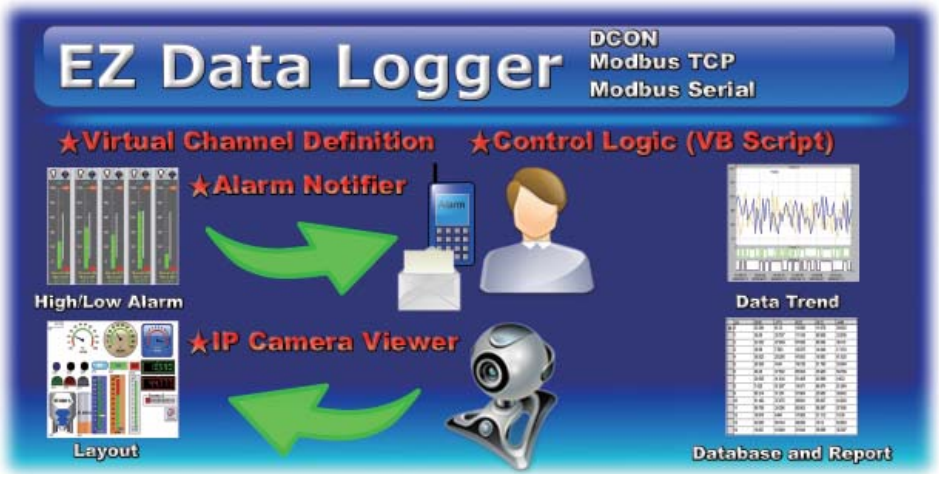
The free charge software utility and development kits include

- DCON Utility: for configuration



- OPC Servers:
  OPC is an industrial standard interface based on OLE technology. With the OPC server, I/O modules can be easily integrated to any software that has OPC client capability.

8. EZ Data Logger



EZ Data Logger is a small data logger software. It can be applied to small remote I/O system. With its user-friendly interface, users can quickly and easily build a data logger software without any programming skill.

9. Various Software Develop Toolkits

DLL, ActiveX, Labview driver, Indusoft driver, DasyLab driver, Linux driver

Highlight Information

- One USB Port
- Hot Swap Allowed
- Auto Configuration
- LED Indicators for Fault Detection
- DCON Protocol
- 1/2/4/8 I/O Slots for I-87K Modules
- Operating Temperature: -25 ~ +75 °C

Introduction

USB-87Pn series is an intelligent I/O expansion unit to expand I-87K series I/O modules over the USB for industrial monitoring and controlling applications.

USB-87Pn is designed to be used in harsh and noisy environment, so the hardware is manufactured with wide power input range (10 ~ 30 V_{DC}), isolated power input and can operate under wide temperature (-25 ~ +75 °C). To simplify installation and maintenance of I/O modules, it provides many useful features, such as: hot swap allowed, auto configuration, LED indicators for fault detection, dual watchdog to keep alive, programmable power on and safe values for safety.

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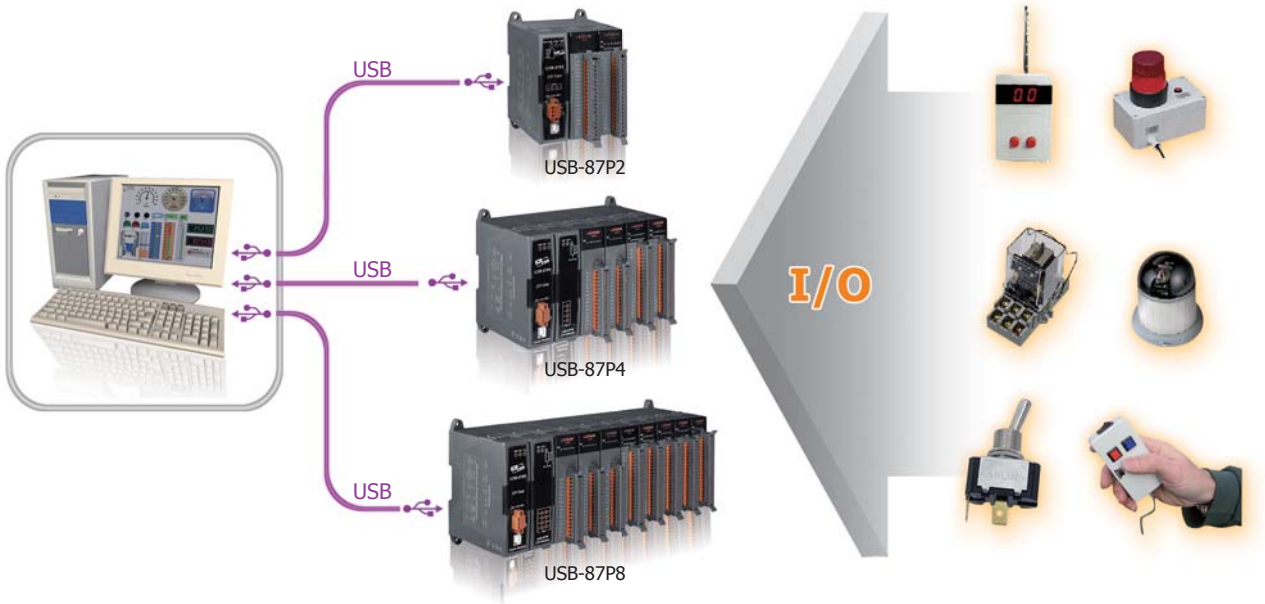
Applications

Rich I/O Expansion Ability

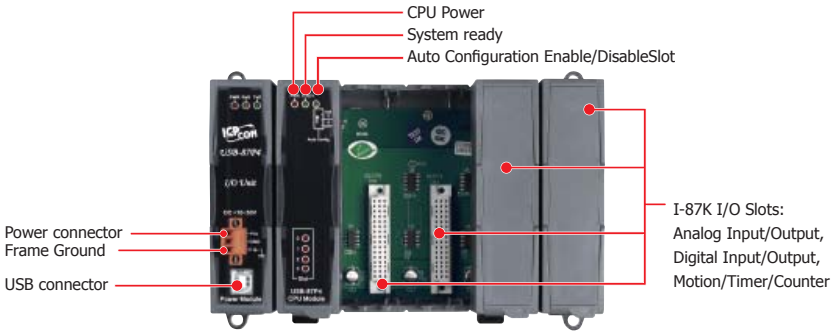


Specifications

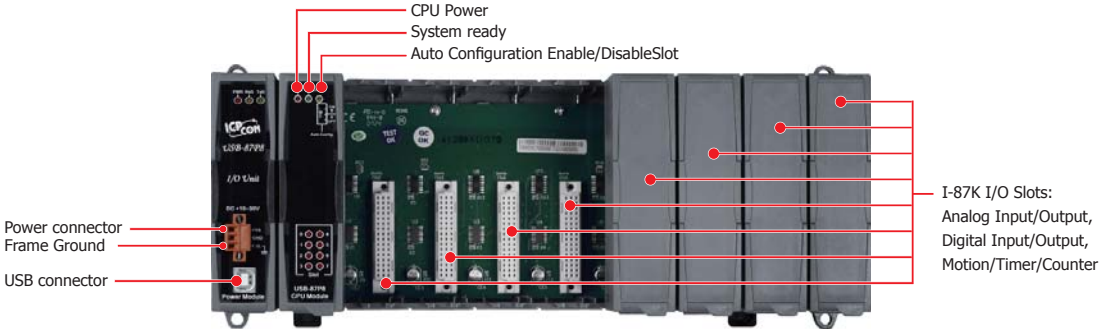
Models	USB-87P1	USB-87P2	USB-87P4	USB-87P8
Interface Type (Full speed with USB 1.1 specifications)				
Cable	USB type A connector			
Baud Rate	115200 bps Default			
Isolation	3000 V_{DC}			
ESD Protection	+/-4 K Contact Discharge and +/-8 K Air Discharge			
Communication Protocol	DCON Protocol (ASCII Format)			
Switch				
DIP Switch	8-bit × 1, For auto configuration			
LED Indicators				
Power	Yes			
System Ready	Yes			
Auto Configuration	Yes			
Slot Status	Yes			
I/O Expansion Slots				
Hot Swap	Yes			
Auto Configuration	Yes			
Support Module Type	High profile I-87K module only			
Slots Numbers	1	2	4	8
Mechanical				
Dimensions (W x L x H)	64 mm x 120 mm x 110 mm	95 mm x 132 mm x 111 mm	188 mm x 132 mm x 111 mm	312 mm x 132 mm x 111 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}			
Reverse Polarity Protection	Yes			
Isolation	1000 V_{DC}			
Frame Ground	Yes			
Consumption	1 W	1 W	2 W	2.4 W
Power Board Driving	5 W	8 W	30 W	

Appearance

USB-87P4



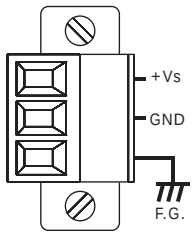
USB-87P8



Pin Assignments

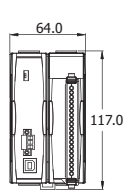
USB-87Px Terminal Block

+Vs: +10 ~ 30 VDC

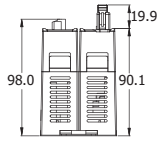


Dimensions (Units: mm)

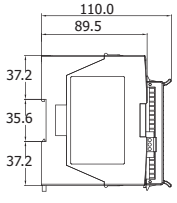
USB-87P1



Front View

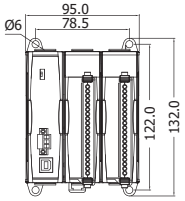


Top View

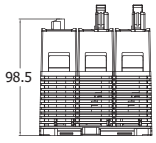


Right Side View

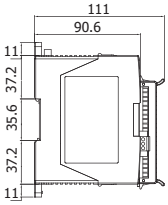
USB-87P2



Front View

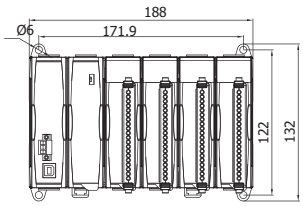


Top View

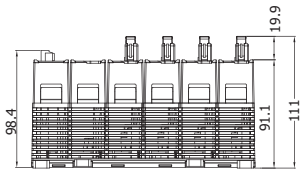


Right Side View

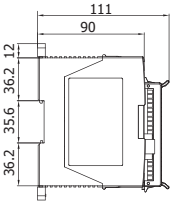
USB-87P4



Front View

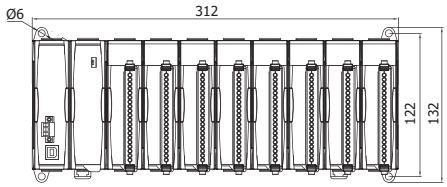


Top View

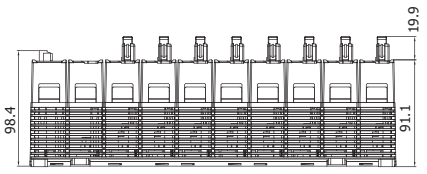


Right Side View

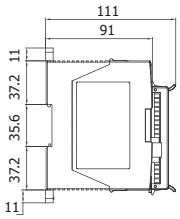
USB-87P8



Front View



Top View



Right Side View

Ordering Information

USB-87P1 CR	1 slot I/O Expansion Unit (RoHS)
USB-87P2 CR	2 slots I/O Expansion Unit (RoHS)
USB-87P4 CR	4 slots I/O Expansion Unit (RoHS)
USB-87P8 CR	8 slots I/O Expansion Unit (RoHS)

Accessories

DP-660	24 VDC/2.5 A, 60 W and 5 VDC/0.5 A, 2.5 W Power Supply with DIN-Rail Mounting
DP-665	24 VDC/2.7 A, 65 W Power Supply with DIN-Rail Mounting
DP-1200 CR	24 VDC/5.0 A, 120 W Power Supply with DIN-Rail Mounting (RoHS)
MDR-20-24 CR	24 VDC/1.0 A, 24 W Power Supply with DIN-Rail Mounting (RoHS)
I-7560 CR	USB to RS-232 Converter (RoHS)