Remote I/O

ICP DAS

PAC & Local I/O Modules

RS-485 I/O Modules

Ethernet I/O Modules

USB I/O Modules

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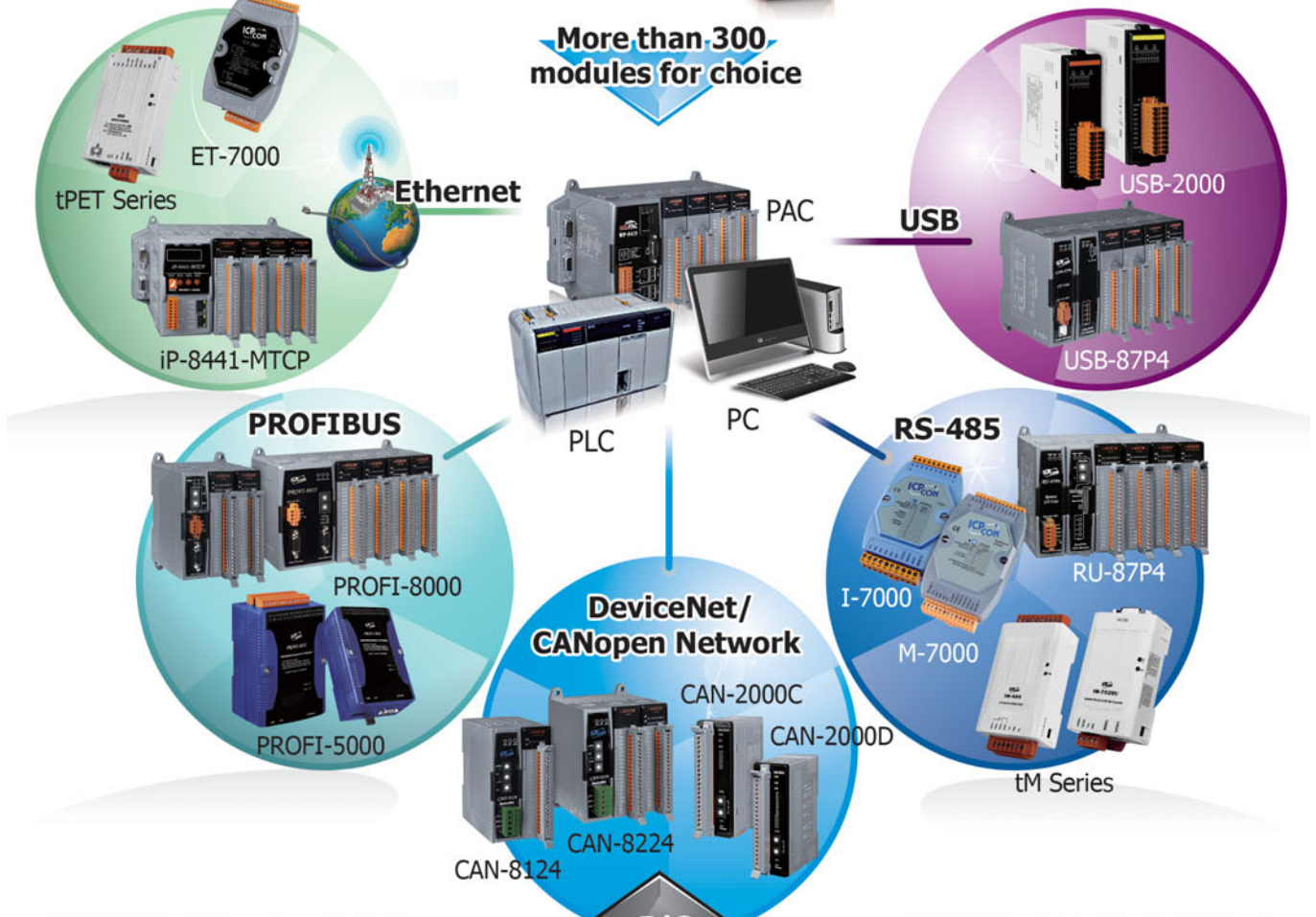
Contents

RS-485 I/O Products

Overview

ICP DAS launches a series of remote I/O modules and I/O expansion units for industrial monitoring and controlling applications, various communication interfaces are available for PAC, PC and PLC, such as RS-485, Ethernet, EtherCAT, EtherNet/IP, Profinet, FRnet, CAN bus, Profibus and Hart.

1. RS-485 I/O Products

Our RS-485 remote I/O module supports DCON protocol, Modbus RTU/ASCII protocol. According to the different applications, we have developed various RS-485 I/O modules. The module has diversified I/O interface, such as overvoltage-protection analog input module, relay output, digital input/output, counter, timer...etc.

Model Name		tM series	I-7000	M-7000	M-2000
Pictures					
Communication					
Protocol		DCON, Modbus RTU, Modbus ASCII	DCON	DCON, Modbus RTU	
Data Format		(N, 8, 1), (N, 8, 2), (O, 8, 1), (E, 8, 1)	(N,8,1)		(N, 8, 1), (N, 8, 2), (O, 8, 1), (E, 8, 1)
Max. Nodes		32	256		
Bias resistor		Yes, 10 KΩ	No (Note1)		
Dual Watchdog		Yes, Module (2.3 second), Communication (Programmable)	Yes, Module (1.6 second), Communication (Programmable)		
I/O					
DIO max. channel		8	16		16
AIO	Resolution	12/14 bits	12/16 bits		
	Max. channel	8 (tM-AD8)	20 (I-7017Z, M-7017Z)		16
	Individual Channel Configuration	-	Yes		
Display					
Power and Communication LED		Yes			
I/O Status LED		-	Yes (for D version only)		-
7-Segment LED		-	Yes (for D version only)		-
Mechanical					
Dimensions (W × L × H)		52 × 98 × 27 mm	72 × 123 × 35 mm		33 x 117 x 88 mm 31 x 157 x 132 mm 33 × 110 × 96 mm 33 × 176 × 130 mm
Note1: The RS-485 master is required to provide the bias. Otherwise, the tM-SG4 or SG-785 should be added to provide the bias. All ICP DAS controllers and converters provide the bias.					

Furthermore, we also developed RU-87Pn, a series of RS-485 remote I/O unit for compact and modular I/O expansion. 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.

RU-87P8

RU-87P4

RU-87P2

Features:
- Hot Swap
- Auto Configuration
- Easy Duplicate System
- Easy Maintenance and Diagnosis
- DCON Protocol

1.1 I-7000 and M-7000 Series
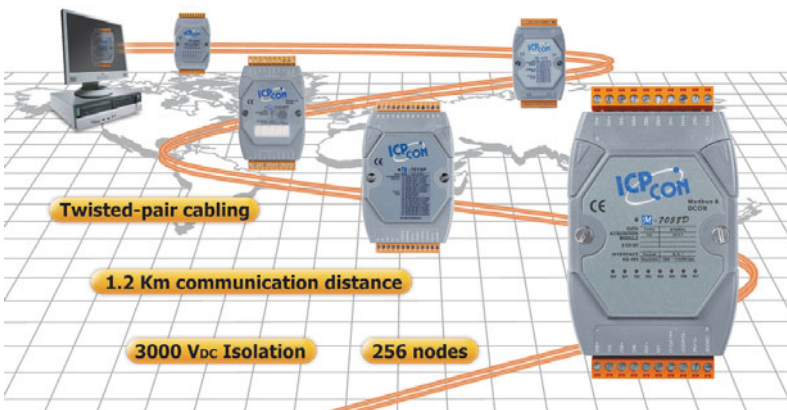
The product line includes sensor-to-computer, computer-to-sensor, digital I/O, timer/counter, RS-232 to RS-485 converter, USB to RS-485 converter, RS-485 repeater, RS-485 hub and RS-232/422/485 to Fiber Optics. I-7000 supports DCON protocol, and M-7000 modules support Modbus RTU and DCON protocols.

Applications:

Solar energy system, Internet of Things, Industrial 4.0 .

Features:

■ RS-485 Industrial Multi-Drop Network

I-7000/M-7000 series modules use the industrial EIA RS-485 communication interface to transmit and receive data at high speed over long distance.

■ I/O type and Range Programmable

The analog modules support several types and ranges which can be selected remotely by issuing command from the host.

■ Easy Mounting and Connection

■ Dual Watchdog Design

The module watchdog is a hardware watchdog designed to automatically reset the micro-processor when the module hangs. The host watchdog is a software watchdog that monitors the communication status of the host controller, such as PC, PLC and PAC. The output of module will go to the safe value state when the host fails to prevent any erroneous operations. The Dual Watchdog design ensures higher reliability and stability.

● **Programmable Power-on Value and Safe Value**

The DO and AO I/O modules provide programmable power-on value and safe value. When the host watchdog is active, the DO and AO output go to the pre-configured safe value.
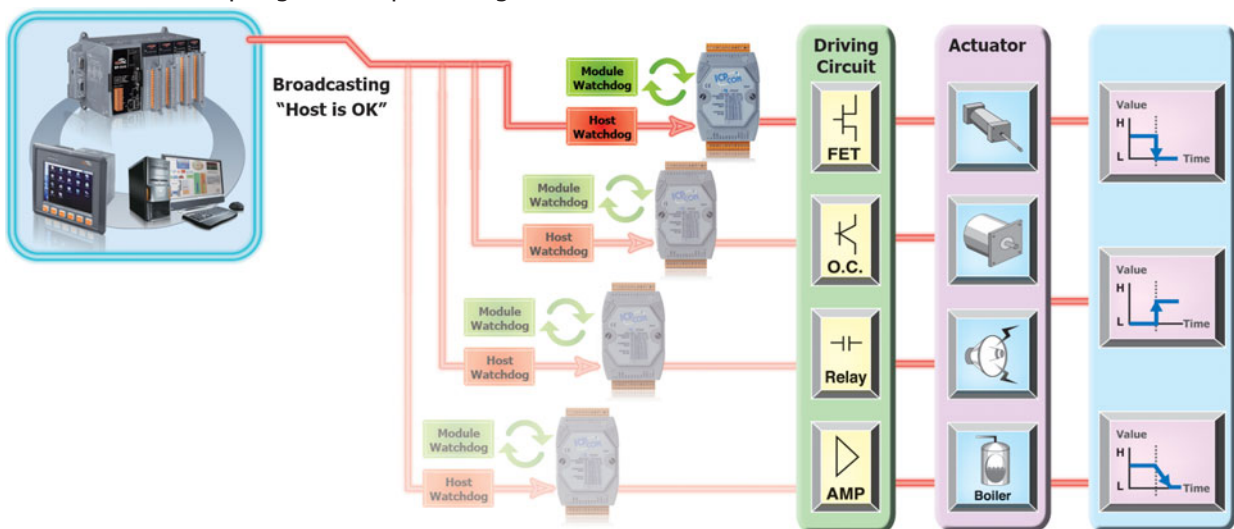
Advanced DI Functions

DI channel is not only for reading digital input status but also provides several advanced functions in the meanwhile.

• DI latch Function

All DI channels provide Latch function to keep the high/low events in the internal registers of the module.

In general, the host controller gets all DI status through polls modules separately.

With the DI latch function, no longer lose short duration (>=5 ms) signals anymore.

• Low Speed Counter

The DI module automatically counts the DI signal in the background. The signal under 100 Hz can be detected and counted.

Overvoltage Protection

Many of our analog input modules provide high overvoltage protection for the analog input channels. This feature improves the reliability, reduces maintenance frequency, and makes the whole system more robust.
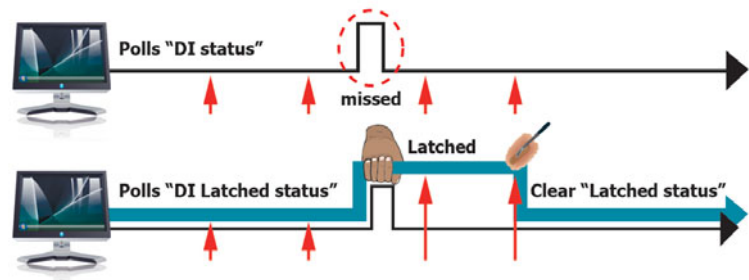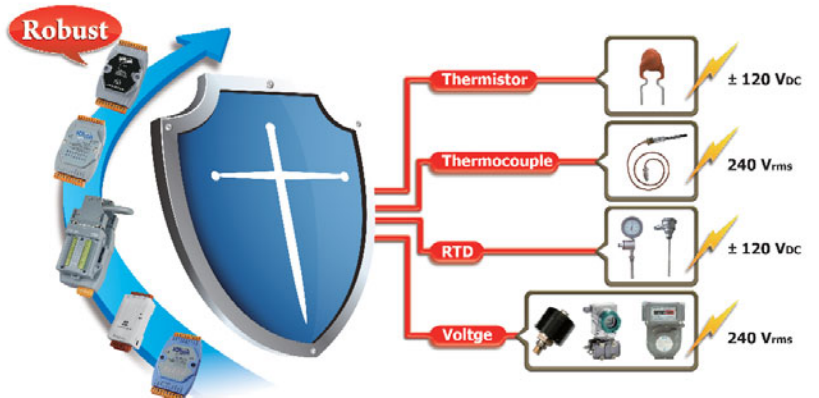
Open Wire Detection

The thermocouple, RTD and thermistor sensors are widely used in temperature control applications. If the system cannot monitor the open wire status of the sensors, it may be very dangerous and cause large damage to life and property. When the wire of sensor is broken and the controller does not know the open wire status, the system may heat the boiler continuously and result in fire or explosion. Our thermocouple, RTD, thermistor modules provide open wire detection and make the system safer.
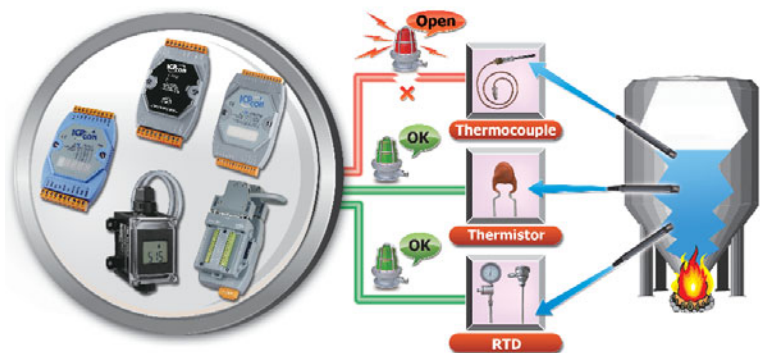
Over-current Protection

For the current measurement module, it may be damaged when there is high current or voltage introduced into the current loop. The protection for current measurement is improved to ±120 VDC and ±1000 mA.
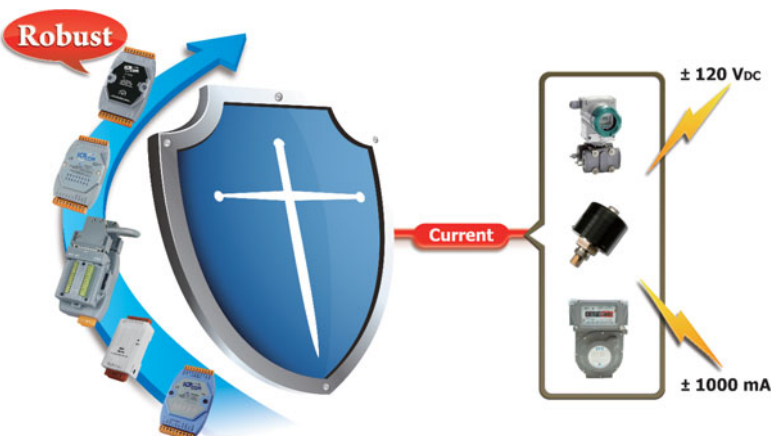
Virtual Channel to Channel Isolation

The "R" and "Z" version of analog input modules provide ±400 VDC virtual channel to channel isolation to avoid the noise interference from adjacent channel in the industrial environment. To name a few of the modules, they are I-7017R, I-7017Z, I-7018R, I-7018Z, I-7019R, and I-7019Z.
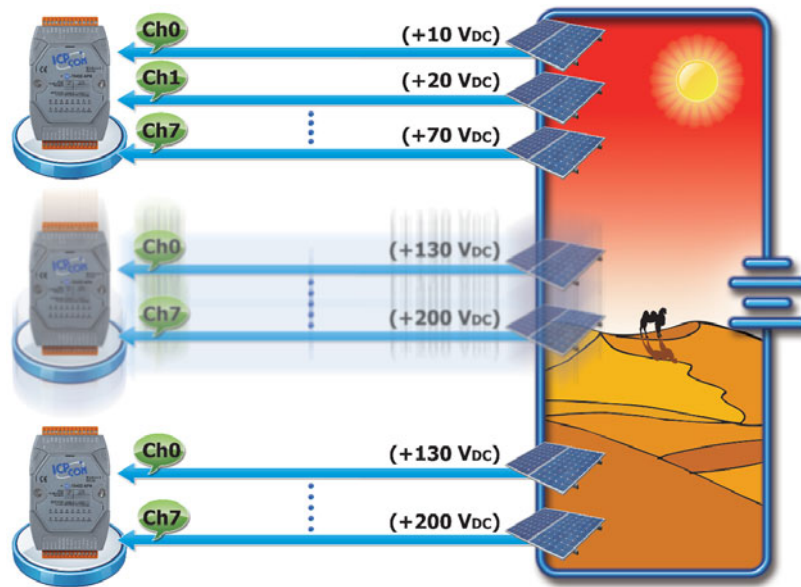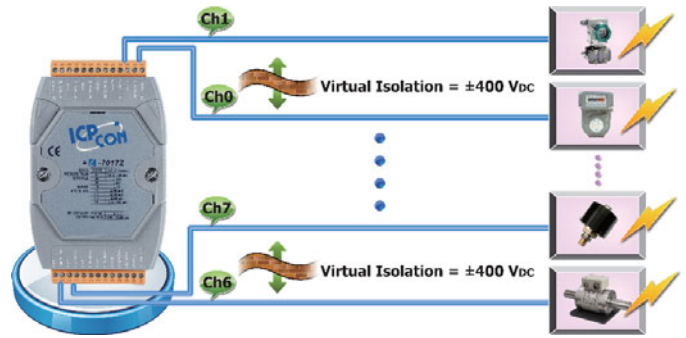
Common Voltage Protection

The typical application is to monitor the charging status of the batteries in series. The voltage of each battery is +10 VDC so the first battery is +10 VDC , the second battery is +20 VDC etc. The differential voltage of the 20th battery is only +10 VDC between vin+ and vin- terminal, while the common voltage is up to 200 VDC . If the common voltage of the analog input module is not large enough, then it cannot measure the correct voltage of the battery in charging.

ESD Protection

The I-7K and M-7K modules all pass ±4 KV ESD contact and ±8 KV ESD air tests by static electricity gun in our laboratory. The test procedures follow the IEC 61000-4-2 standard. Our modules are immunity to the electrostatic discharges by using components that can clamp and resist to the high voltages defined by IEC 61000-4-2 standard.
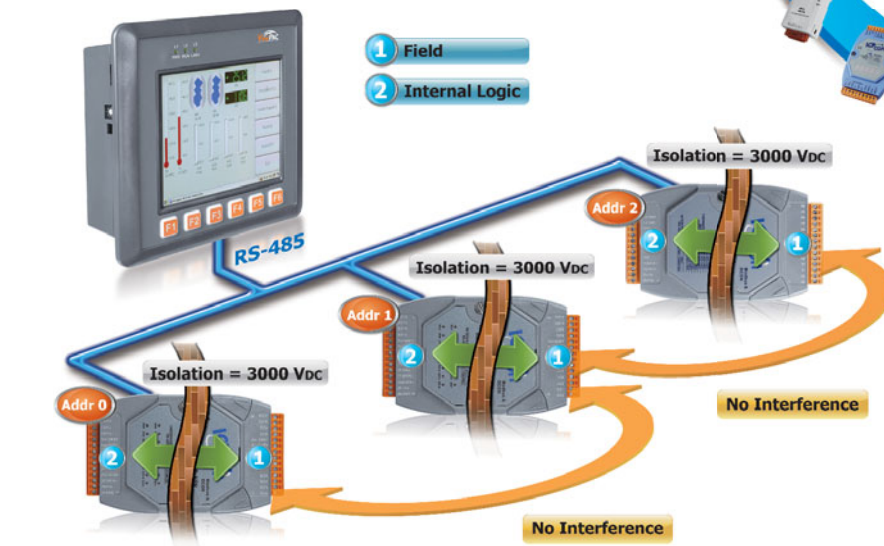
3000 VDC Isolation

The I-7K and M-7K series have 3000 VDC isolation between the field and the internal logic. This isolation prevents the noise from the field to the internal logic that can damage the module.

Dual Communication Protocols

All I-7000 and M-7000 modules use a simple command /response protocol for communication. M-7000 also supports the industrial standard Modbus RTU protocol. The user can use high-level language, such as C, VB, Delphi, and others to write their application programs. Some famous software package can control I-7000 and M-7000 directly, such as LabVIEW, InduSoft, TRACE MODE, EZ data logger, EZ Prog..etc.

I-7000: supports DCON protocol
M-7000: supports Modbus RTU and DCON protocols

Self-Tuner Inside

"Self-Tuner" is a patented ASIC. It auto-tunes the baud rate and data format in whole RS-485 network, andauto-handles the direction of the RS-485 communication line. Since the unique features of this ASIC, the user can implement a very flexible remote I/O configuration via the RS-485 network.

Expandable Network

"Self-Tuner" ASIC is built-in. It has some outstanding features, such as 3000V isolation, 115K max. speed, variable baud rate and data format. Each I-7510 repeater can let you extend the network to another 4,000 ft long.

Hardware:

1. Installation

DIN-Rail Mounting

Stack Mounting

2. Dimensions (Units: mm)

| Front View | Front View | Left View | Right View | Rear View | Bottom View |

Software Support:

Our free charge software utility and development kit include
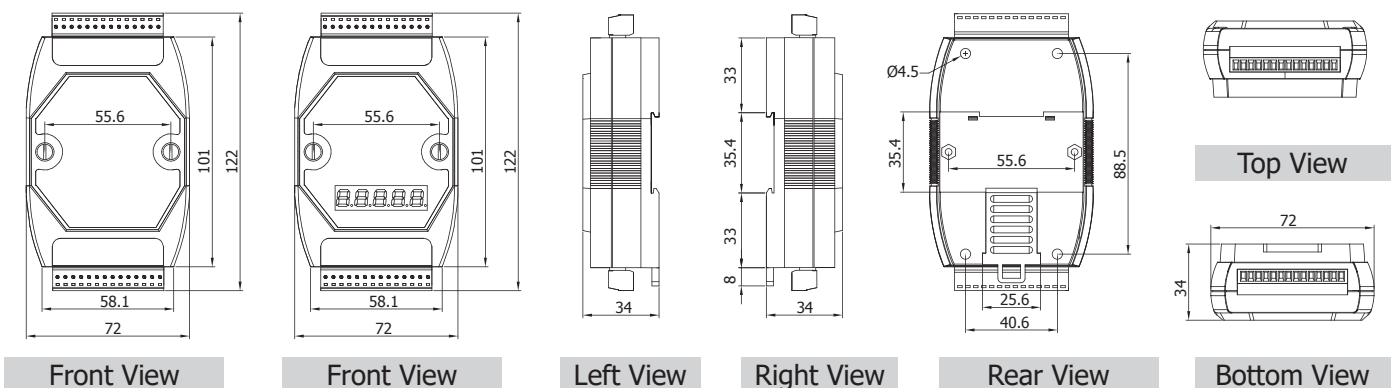
1. DCON Utility

DCON Utility is used to search, configure and test simply the I-7000 and M-7000 modules via the serial port (RS-232/485).

2. OPC Server

NAPOPC_ST DA Server is a **free** OPC DA Server ("**OPC**" stands for "OLE for Process Control" and "**DA**" stands for "Data Access") for ICP DAS products. Based on Microsoft's OLE COM (component object model) and DCOM (distributed component object model) technologies, NAPOPC_ST DA Server defines a standard set of objects, interfaces and methods for use in process control and manufacturing automation applications to facilitate the interoperability.

Using NAPOPC_ST DA Server, system integrates data with SCADA/HMI/Database software on the same computer and others. SCADA/HMI/Database sends a request and NAPOPC DA Server fulfills the request by gathering the data of ICP DAS modules (**License Free**) and third-party devices (**License Charge**) to SCADA/HMI/Database.

For different OS of PAC products, ICP DAS provides several professional DA Servers:

Version	NAPOPC_ST	NAPOPC_XPE	NAPOPC_CE5	NAPOPC_CE6
Platform	Desktop Windows	Windows XP Embedded	Windows CE5	Windows CE6
Price	Free/$	Free	Free	Free

For more Information please visit **http://opc.icpdas.com**

3. EZ Data Logger

EZ Data Logger is the software that ICP DAS provides for users to easily build a small SCADA system on Windows 2000/XP/Vista. It comes with two versions, "Lite" & "Professional". The Lite version is not only full-functioned but free to all ICP DAS users!

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.

4. Various Software Development Toolkits

Plenty of library functions and demo programs are provided to let user develop programs easily under Windows, Linux and DOS operating systems. We also provide LabVIEW driver and InduSoft driver for all I-7000 and M-7000 modules. The SDK includes: DLL, LabVIEW driver, InduSoft driver, Linux driver.

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Industrial Computer Products and Data Acquisition Systems
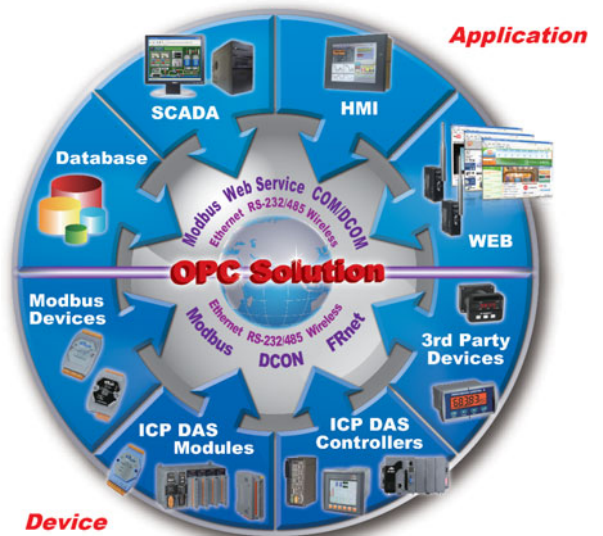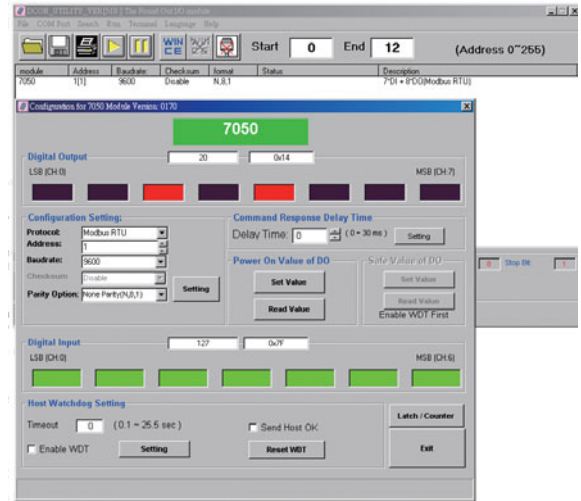
Selection Guide:

✓ Voltage & Current Input

Model Name		Analog Input							Note
		Channels	Resolution	Sampling Rate (total)	Range	Common Voltage Protection	Individual Channel Configurable	Overvoltage Protection	
I-7012 I-7012D	-	1 diff.	16-bit	10 Hz	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA (Note1)	±100 VDC	-	±120 VDC	DI × 1 (Note3) DO × 2 (Note4)
I-7012F I-7012FD	-			10/100 Hz		±100 VDC		±120 VDC	
I-7017	M-7017	8 diff.		10 Hz	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA (Note1)	±15 VDC	-	±120 VDC	-
I-7017C	M-7017C			10 Hz	0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Note2)			-	
I-7017F	-			10/60 Hz	±150 mV, ±500 mV, ±1V, ±5 V, ±10 V, ±20 mA (Note1)			±120 VDC	
I-7017FC	-			10/60 Hz	0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Note2)			-	
I-7017R	M-7017R			10/60 Hz	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA (Note1)	±200 VDC	Yes (Note6)	±240 Vrms	
I-7017R-A5	M-7017R-A5			10/50 Hz	±50 V, ±150 V,		-	200 VDC	
I-7017RC	M-7017RC			10/60 Hz	0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Note2)			-	
-	M-7017RMS			10 Hz	0 ~ +10 Vrms, 0 ~ +5 Vrms, 0 ~ 1 Vrms, 0 ~ 500 mVrms, 0 ~ 150 mVrms	-		±35 VDC	
I-7017Z	M-7017Z	10 diff. or 20 SE		10/60 Hz	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA ±20 mA (Note5)	±200 VDC	Yes	240 Vrms (diff.) 150 Vrms (SE)	
-	M-7017mc-16	16 diff/SE		10/200 Hz	0 ~ 20 mA, 4 ~ 20 mA ±20 mA	25 VDC		±110 VDC	100,000 records for 16 AI Data Logger

Note1: Need external 125 Ω resistors.
Note2: Doesn't need external 125 Ω resistors.
Note3: Can be used as DI and low speed (50 Hz) counter.
Note4: Can be used as DO or High/Low Alarm.
Note5: Jumper selectable.
Note6: Only available with the firmware version of 7017R series is B3.9 and later.

☑ Thermocouple Input

Model Name		Analog Input								Note
		Channels	Resolution	Sampling Rate (total)	Range	Sensor Type	Open Wire Detection	Individual Channel Configurable	Overvoltage Protection	
I-7011 I-7011D	-	1 diff.	16-bit	10 Hz	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA (Note1)	Thermocouple J.K.T.E.R. S.B.N.C	Yes		±5 VDC	DI × 1 (Note2) DO × 2 (Note3)
I-7011P I-7011PD	-					Thermocouple J.K.T.E.R. S.B.N.C.L.M				
-	M-7018-16	16 diff.			±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, 0 ~ 20 mA, 4 ~ 20 mA ±20 mA (Note1)	Thermocouple J.K.T.E.R. S.B.N.C		-	±30 VDC	-
I-7018	M-7018	8 diff.					-		±120 VDC	
I-7018P	-					Thermocouple J.K.T.E.R. S.B.N.C.L.M			±80 VDC	
I-7018R	M-7018R					Thermocouple J.K.T.E.R. S.B.N.C				
I-7019R	M-7019R	8 diff.			±15 mV, ±50 mV, ±100 mV, ±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, ±20 mA (Note4)	Thermocouple J.K.T.E.R.S. B.N.C.L.M, └DIN43710		Yes	±240 Vrms	
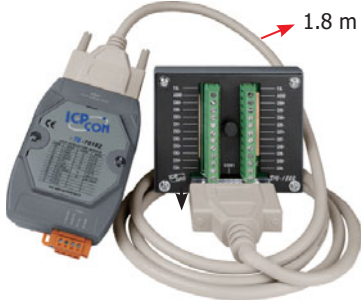
Note1: Need external 125 Ω resistors.
Note2: Can be used as DI and low speed (50 Hz) counter.
Note3: Can be used as DO or Alarm.
Note4: Jumper selectable.

✅ Thermocouple Input

Model Name		Analog Input								Note
		Channels	Resolution	Sampling Rate (total)	Range	Sensor Type	Open Wire Detection	Individual Channel Configurable	Overvoltage Protection	
I-7018Z	M-7018Z	10 diff.	16-bit	10 Hz	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, 0 ~ 20 mA, 4 ~ 20 mA ±20 mA (Note1)	Thermocouple J.K.T.E.R.S. B.N.C.L.M, ∟DIN43710	Yes	Yes	±240 Vrms	-
-	M-7019Z				±15 mV, ±50 mV, ±100 mV, ±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA ±20 mA(Note2)					

Note1: Need external 125 Ω resistors.
Note2: Jumper selectable.

Front　　　　　　Rear

1.8 m

15 cm

I-7018Z-G/S =
DB-1820 Connects to the I-7018Z Directly
M-7018Z-G/S =
DB-1820 Connects to the M-7018Z Directly
M-7019Z-G/S =
DB-1820 Connects to the M-7018Z Directly

I-7018Z-G/S2 =
DN-1822 Connects to the I-7018Z Directly
M-7018Z-G/S2 =
DN-1822 Connects to the M-7019Z Directly
M-7019Z-G/S2 =
DN-1822 Connects to the M-7019Z Directly

I-7018Z-G/S3 =
DN-1823 Connects to the I-7018Z Directly
M-7018Z-G/S3 =
DN-1823 Connects to the M-7018Z Directly
M-7019Z-G/S3 =
DN-1823 Connects to the M-7018Z Directly

✅ RTD Input

Model Name		Analog Input							
		Channels	Resolution	Sampling Rate (total)	Sensor Type	Open Wire Detection	Individual Channel Configurable	3 Wire RTD long distance measurement	Overvoltage Protection
I-7013 I-7013D	-	1	16-bit	10 Hz	Pt100, Pt1000, Ni120	Yes	-	Yes	±5 V
-	M-7013P M-7013PD	1 (Note1)							±30 V
I-7015	M-7015	6 diff.		12 Hz	Pt100, Pt1000, Ni120, Cu50, Cu100, CU1000		Yes	-	±110 V
I-7015P	M-7015P							Yes	
I-7033 I-7033D	M-7033 M-7033D	3 diff.		15 Hz	Pt100, Pt1000, Ni120		-		±5 V

Note1: M-7013P also includes 1 × DI (Dry contact, Source), 2 × DO (Open Collector, MOSFET, Sink, 700mA)

☑ DS18B20 Sensor

Model Name		Analog Input							
		Ports	Resolution	Sampling Rate	Sensor Type	Temperature Measurement Range	Open Wire Detection	Sensor Wiring Cables Length	Sensors per Ports
-	M-7004	4	12-bit	1 Hz	DS18B20	-55°C ~ +125°C	-	100m per port	20

☑ Optional Accessories

CA-TP1-M100-L020
3-wire DS18B20, Stainless steel, 2M (-30 °C ~ 125 °C)

CA-TP1-M200-L020
3-wire DS18B20, copper nickel plated, 2 M (-30 °C ~ 125 °C)

☑ Thermistor Input

Model Name		Analog Input							Digital I/O
		Channels	Resolution	Sampling Rate	Sensor Type	Open Wire Detection	Individual Channel Configurable	Overvoltage Protection	
I-7005	M-7005	8 diff.	16-bit	8 Hz	Precon ST-A3, Fenwell U, YSI L100, YSI L300, YSI L1000, YSI B2252, YSI B3000, YSI B5000, YSI B6000, YSI B10000, YSI H10000, YSI H30000, User-defined	Yes	Yes	±120 V$_{DC}$	DO × 6 (Note1)
Note1: Can be used as DO or High/Low Alarm.									

☑ Optional Accessories

CA-TM-P100-L020
NTC Thermistor, Epoxy Resin Cable, 2 M (-40 °C ~ +80 °C)

CA-TM-P100-L050
NTC Thermistor, Epoxy Resin Cable, 5 M (-40 °C ~ +80 °C)

☑ Transmitter Input

Model Name		Analog Input								Digital I/O
		Channels	Resolution	Sampling Rate	Range	Input Linear Scaling	Open Wire Detection	Individual Channel Configurable	Overvoltage Protection	
I-7014D	-	1 diff.	16-bit	10 Hz	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA (Note1)	Yes	-	-	±15 V$_{DC}$	DI × 1 (Note2) DO × 2 (Note3)
Note1: Need external 125 Ω resistors.										
Note2: Can be used as DI and low speed (100 Hz) counter.										
Note3: Can be used as DO or High/Low Alarm.										

Strain Gauge

Model Name		Strain Gauge Input						Digital I/O
		Channels	Resolution	Sampling Rate	Sensor Type	Input Linear Scaling	Overvoltage Protection	
I-7016 I-7016D	M-7016 M-7016D	2 diff.	16-bit	10 Hz for 1-channel mode, 2 Hz for 2-channel mode	4 Wire Strain Gauge	Yes	±5 V	DI × 1 (Note1) DO × 4 (Note2)
I-7016P I-7016PD	-	1 diff.		10 Hz	6 Wire Strain Gauge			
Note1: Can be used as DI and low speed (50 Hz) counter. Note2: Can be used as DO or Alarm.								

Analog Output

Model Name		Analog Output					
		Channels	Resolution	Voltage Output	Current Output	Safe Value	Power-on Value
I-7021	-	1	12-bit	0 ~ 10 V	0 ~ +20 mA, +4 ~ +20 mA	Yes	Yes
I-7021P	-		16-bit				
I-7022	M-7022	2 (Note1)	12-bit	0 ~ +5 V, 0 ~ +10 V			
I-7024	M-7024	4	14-bit	±10 V, 0 ~ 10 V, ±5 V, 0 ~ 5 V			
I-7024R	M-7024R	4 (Note2)					
-	M-7024U M-7024UD (Note3)	4 (Note4)	16-bit				
	M-7024L	4	12-bit				
-	M-7028 M-7028D	8					
Note1: Channel-to-channel isolation. Note2: M-7024R also includes 5 channel DI (Dry Contact). Note3: M-7024UD includes LED for DI and DO status. Note4: M-7024U and M-7024UD also include 4 × DI(Dry and Wet contact)							

Multi-function
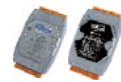
Model Name	Analog Input		Analog Output		Digital Input		Digital Output	
	Channels	Range	Channels	Range	Channels	ON Voltage Level	Type	Load Current
M-7002	4	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA, ±20 mA (Note1)	-	-	5	10 ~ 50 VDC	Power Relay (Form A)	5 A @ 250 VAC/ 30 VDC
M-7003	8				-	-		
M-7026	6		2	±10 V, 0 ~ 10 V, ±5 V ,0 ~ 5 V, 0 ~ 20 mA, 4 ~ 20 mA (Note1)	3	Close to GND	Open Collector × 3	Sink, 700 mA
Note1: Jumper selectable.								

☑ DC Input

Model Name		Digital Input				
		Channels (Note1)	Type	ON Voltage Level	OFF Voltage Level	Intra-module Isolation
I-7041 I-7041D	M-7041 M-7041D	14 (Sink/Source)	Common Source	+1 VDC Max. | +4 ~ +30 VDC	+4 ~ +30 VDC | +1 VDC Max.	3750 VDC
I-7041P I-7041PD	M-7041P M-7041PD			+11 VDC Max. | +19 ~ +30 VDC	+19 ~ +30 VDC | +11 VDC Max.	
-	M-7041-A5 M-7041D-A5			+68 ~ +150 VDC	+48 VDC Max.	
	M-7046 M-7046D	15 (Sink/Source)	Wet Contact	+3.5 ~ +50 VDC	+1 VDC Max.	5000 VDC
I-7051 I-7051D	M-7051 M-7051D	16 (Sink/Source)	Common Source or Common Ground	+10 ~ +50 V	+4 V Max.	3750 VDC
I-7052 I-7052D	M-7052 M-7052D	8 (Sink/Source)	6 Differential and 2 Common Ground (Note2)	+4 ~ +30 V	+1 V Max.	5000 Vrms
I-7053_FG I-7053D_FG	M-7053 M-7053D	16 (Source)	Dry Contact	Open	Close to GND	-

Note1: DI channel can be used as DI and low speed (100Hz) counter.
Note2: 6 differential inputs provide 2 KV channel to channel isolation.

☑ DC Output

Model Name		Digital Output					
		Channels	Type	Load Voltage	Load Current	Short-circuit Protection	Intra-module Isolation
I-7042 I-7042D	-	13 (Sink)	Open Collector (NPN)	+3.5 ~ +30 V	100 mA/Channel	-	3750 Vrms
I-7043 I-7043D	-	16 (Sink)	Open Collector (NPN)	+10 ~ +30 V	100 mA/Channel	-	-
I-7045 I-7045D	M-7045 M-7045D	16 (Source)	Open Source (N-MOSFET)	+10 ~ +40 V	650 mA/Channel	Yes	3750 Vrms
I-7045-NPN I-7045D-NPN	M-7045-NPN M-7045D-NPN	16 (Sink)	Open Collector (NPN)	+3.5 ~ +50 V	700 mA/Channel	Yes	3750 VDC

☑ DC Input/Output

Model Name		Digital Input			Digital Output			
		Channels (Note1)	ON Voltage Level	OFF Voltage Level	Channels	Load Voltage	Load Current	Short-circuit Protection
I-7044 I-7044D	-	4 (Sink/Source, 3750 Vrms)	+1 VDC Max.	+4 ~ +30 VDC	8 Open Collector (Sink, 3750 Vrms)	+3.5 ~ +30 V	375 mA	-
I-7050 I-7050D	M-7050 M-7050D	7 (Source, Non-Isolation)	Open	Close to GND	8 Open Collector (Sink, Non-Isolation)	+3.5 ~ +30 V	30 mA	-
I-7050A I-7050AD	-	7 (Sink, Non-Isolation)	+4 ~ +30 VDC	+1 VDC Max.	8 Open Collector (Source, Non-Isolation)	+3.5 ~ +30 V	50 mA	-
I-7055 I-7055D	M-7055 M-7055D	8 (Sink/Source, 3750 VDC)	Dry: Close to GND Wet: +10 ~ +50 V	Dry: Open Wet: +4 V Max.	8 Open Source (Source, 3750 VDC)	+10 ~ +40 V	650 mA	Yes
I-7055-NPN I-7055D-NPN	M-7055-NPN M-7055D-NPN	8 (Sink/Source, 3750 VDC)			8 Open Collector (Sink, 3750 VDC)	+3.5 ~ +50 V	700 mA	Yes
-	M-7055U M-7055UD	8 (Sink/Source, 2000 VDC)			8 Push-Pull (Sink/Source, 2000 VDC)	+3.5 ~ +80 V	500 mA	-

Note1: DI channel can be used as DI and low speed (100 Hz) counter.

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DC Universal Digital Input/Output

Model Name		DI + DO	Digital Input		Digital Output			
		Channel	Type	Sink/Source	Type	Load Voltage	Load Current	Short-circuit Protection
-	M-7054 M-7054D	16	Dry Contact	Source	Open Collector (Sink)	+ 5 ~ + 30 VDC	100 mA/channel	-
-	M-7054P M-7054PD					+ 5 ~ + 50 VDC	500 mA/channel	Yes
Note1: DI channel can be used as DI and low speed (100 Hz) counter.								

AC/DC Digital Input

Model Name		Digital Input				Digital Output			
		Channels (Note1)	Type	Sink/Source	ON Voltage Level	Channels	Type	Sink/Source	Load Current
I-7058 I-7058D	M-7058 M-7058D	8	Wet Contact	Sink/Source	80 ~ 250 VAC ±80 ~ ±250 VDC	-	-	-	-
I-7059 I-7059D	M-7059 M-7059D				10 ~ 80 VAC ±15 ~ ±80 VDC				
-	M-7058-16 M-7058D-16	16			80 ~ 250 VAC ±100 ~ ±250 VDC	2	Isolated Open Collector	Sink	600 mA/ Channel
-	M-7059-16 M-7059D-16				10 ~ 80 VAC ±15 ~ ±80 VDC				
Note1: DI channel can be used as DI and low speed (100 Hz) counter.									

M-7058(D)/M-7059(D)
123 mm x 72 mm x 35 mm (W x L x H)

M-7058(D)-16/M-7059(D)-16
121 mm x 76 mm x 42 mm (W x L x H)

✓ DC Input/Power Relay Output

Model Name		Digital Input		Power Relay Output				
		Channels	ON Voltage Level	Channels	Contact Rating	Operate Time	Release Time	Electrical Endurance
I-7060 I-7060D	M-7060 M-7060D	4 (3750 Vrms)	+1 VDC Max.	RL1,RL2: Form A × 2 RL3,RL4: Form C × 2	0.6 A @ 125 VAC 2 A @ 30 VDC	3 ms	2 ms	5×10^5 ops.
-	M-7060P M-7060PD		+4 VDC Max.		Form A: 16 A @ 250 VAC 10 A @ 30 VDC Form C: NO: 10 A @ 250 VAC NC: 6 A @ 250 VAC	10 ms	5 ms	1×10^7 ops.
I-7061 I-7061D	M-7061 M-7061D	-	-	Form A × 12	5 A @ 250 VAC 5 A @ 30 VDC	10 ms	5 ms	1×10^5 ops.
I-7063 I-7063D	-	8 (3750 Vrms)	+1 VDC Max.	Form A × 3		6 ms	3 ms	
I-7065 I-7065D	M-7065 M-7065D	4 (3750 Vrms)		Form A × 5				
I-7067 I-7067D	M-7067 M-7067D	-	-	Form A × 7	0.5 A @ 120 VAC 1.0 A @ 24 VDC	5 ms	2 ms	
-	M-7068 M-7068D			Form A × 4 Form C × 4	2 A @ 30 VDC 0.24 A @ 220 VDC 0.25 A @ 250 VAC	3 ms	4 ms	2×10^5 ops.
-	M-7069 M-7069D	-	-	Form A × 4 Form C × 4	Form A: 6 A @ 35 VDC 6 A @ 240 VAC Form C: 5 A @ 30 VDC 5 A @ 250 VAC	5 ms	1 ms	1×10^5 ops.

✓ DC Input/Solid-State Relay Output

Model Name		Digital Input		Solid-State Relay Output			
		Digital Input Channels	ON Voltage Level	Channels	Contact Rating	Operate Time	Release Time
I-7063A I-7063AD	-	8 Isolation with common Source (3750 Vrms)	+1 VDC Max.	3 AC-SSR	24 ~ 265 VAC @ 1A	1/2 cycle +1 mS	
I-7063B I-7063BD	-			3 DC-SSR	3 ~ 30 VDC @ 1A	1 mS	
I-7065A I-7065AD	-	4 Isolation with common Source (3750 Vrms)		5 AC-SSR	24 ~ 265 VAC @ 1A	1/2 cycle +1 mS	
I-7065B I-7065BD	M-7065B M-7065BD			3 DC-SSR	3 ~ 30 VDC @ 1A	1 mS	

✓ PhotoMos Relay Output

Model Name		PhotoMos Relay Output					
		Channels	Contact Rating		Intra-module Isolation	Operate Time	Release Time
I-7066 I-7066D	-	Form A × 7	350 V @ 0.13 A	AC peck or DC: 0.24 A @ 220 VDC 0.25 A @ 250 VAC	5000 VDC	2 ms Max.	1 ms Max.
-	M-7066P M-7066PD		80 V @ 1 A		2000 VDC	5 ms Max.	0.2 ms Max.

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✅ Counter/Frequency

Model Name		Counter/Frequency							
		Channel	Counter Mode	Encoder Mode	Counter/ Encoder Bits	ON Voltage Level	Max. Speed	Frequency Accuracy	Virtual Battery Backup
I-7080 I-7080D	M-7080 M-7080D	2	Up	-	32-bit	Isolated: +3.5 ~ +30 VDC	100 kHz	1 Hz or 10 Hz	-
I-7080B I-7080BD	M-7080B M-7080BD					Non-isolated: +2.4 ~ +5 VDC			Yes
-	M-7084	4/8	Up or Up/Down	CW/CCW, Dir/Pulse, AB Phase		+3.5 ~ +30 VDC	+3.5 ~ +10 VDC : 200 kHz +10 ~ +30 VDC : 150 kHz	1 Hz ~ 200 kHz (±0.025% of Input Frequency)	Yes

✅ Encoder/Counter

Model Name		Encoder/Counter						
		Channels	Type	Encoder Mode	Bits	ON Voltage Level	Max. Speed	Virtual Battery Backup
I-7083 I-7083D	-	3-axis	Encoder	CW/CCW, Pulse/Dir, AB Phase	32-bit	5 V: +3.5 ~ +5 VDC 12 V with 1 kΩ External Resistor: +5 ~ +12 VDC 24 V with 2 kΩ External Resistor: +7 ~ +24 VDC	1 MHz	-
I-7083B I-7083BD	-							Yes

✅ PWM Output/Counter Input

Model Name		Counter Input							PWM Output			
		Channels	Type	Counter Mode	Bits	ON Voltage Level	Max. Speed	Virtual Battery Backup	Channels	Load Voltage	Duty Cycle	Frequency
I-7088 I-7088D	M-7088 M-7088D	8	Counter	Up	32-bit	+3.5 ~ +5 VDC	1 MHz	Yes	8	+5 VDC	0.1 ~ 99.9%	1 Hz ~ 500 KHz
I-7088/S I-7088D/S	M-7088/S M-7088D/S					+3.5 ~ +50 VDC				+5 ~ +50 VDC		
-	M-7088-16								16			

I-7088D/M-7088D
123 mm x 72 mm x 35 mm (W x L x H)

I-7088-G/S = DN-8P8C-CA Connects to the I-7088 Directly
M-7088-G/S = DN-8P8C-CA Connects to the M-7088 Directly

M-7088-16
121 mm x 76 mm x 42 mm (W x L x H)

1.2 M-2000 Series I/O Modules
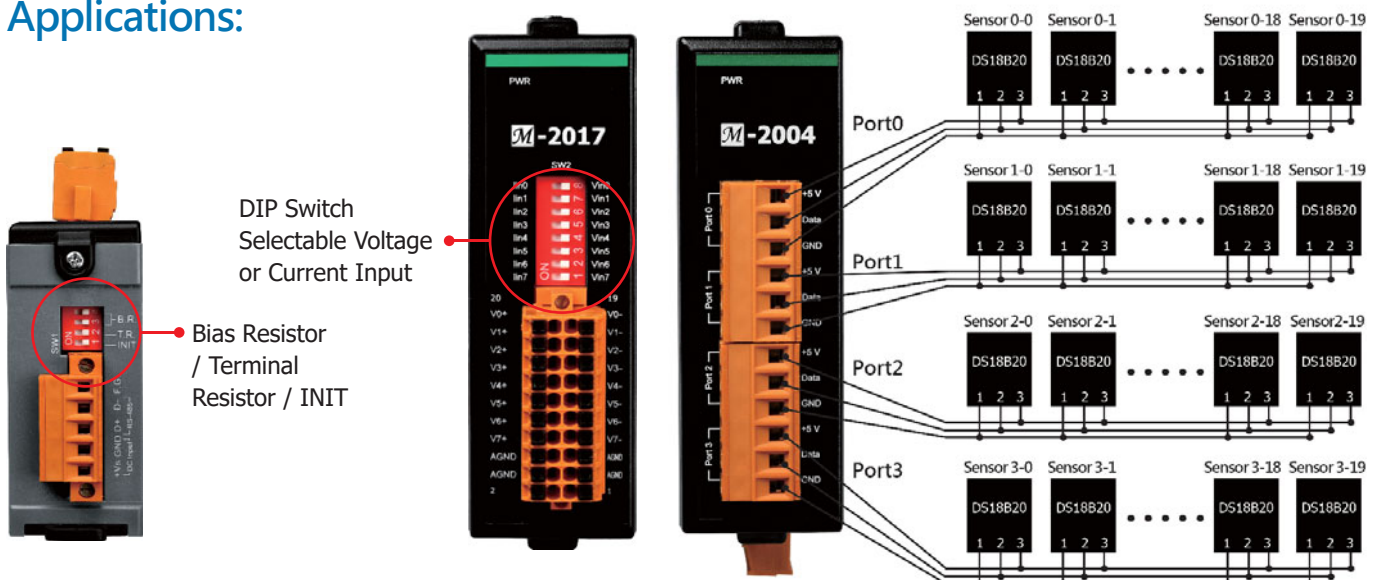
Introduction:

The M-2000 series is a family of network data acquisition and control modules with digital or analog I/O functions. The modules can be remotely controlled through an RS-485 serial bus by using DCON and Modbus RTU/ASCII protocols. The selectable transmission speed of the RS-485 port is up to 115,200 bps. Modbus has facto standard communications protocol in industry, and is now the most commonly available means of connecting industrial electronic devices. The M-2000 series is slim-type Form Factor I/O that provides the saving space for the installation, easy wiring and distributed I/O points applications. The bias resistor and terminal resistor by switch selectable that is used to improve the communication and solve the communication fail of RS-485 network.

Features:

- RS-485 Industrial Multi-Drop Network
- Communication Protocols: **DCON, Modbus RTU**
- Programmable I/O Type and Range
- Programmable Power-on Value and Safe Value
- Dual Watchdog Design
- 240 Vrms OverVoltagle Protection for AI Modules
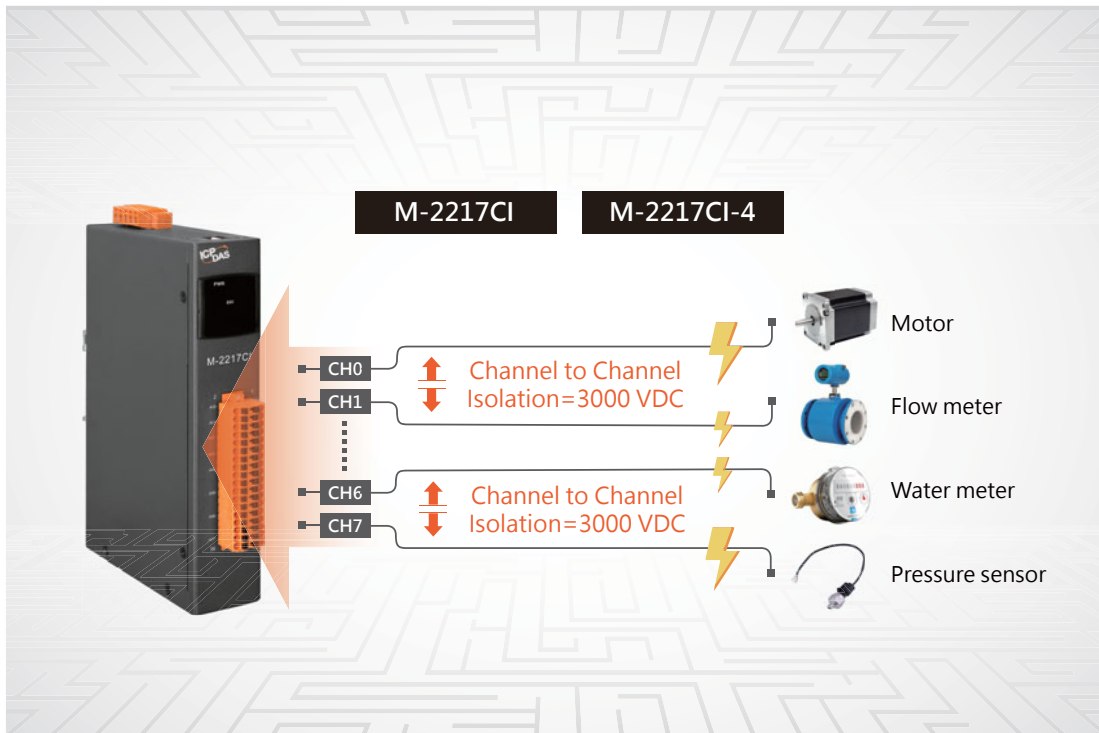- Slim-Type Form Factor

Applications:

DIP Switch Selectable Voltage or Current Input

Bias Resistor / Terminal Resistor / INIT

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Selection Guide:

✔ Analog Input

Model Name	Analog Input				
	Channel	Resolution	Voltage & Current Input	Sensor Type	Sampling Rate
M-2004	4 (Note1)	12-bit	–	2/3-wire DS18B20	1 Hz
M-2017	8	16-bit	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	–	Normal: 10 Hz Fast: 60 Hz
M-2018-16	16		±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA (requires an optional external 125 Ω resistor)	Thermocouple: J, K, T, E, R, S, B, N, C	10 Hz
Note1: M-2004: each port can connect a maximum of 20 DS18B20 sensors. Total 80 sensors.					

✔ Analog Input with Channel to Channel Isolation

Model Name	Analog Input				
	Channel	Resolution	Voltage & Current Input	Sensor Type	Sampling Rate
Available Soon M-2217CI-4	4	16-bit	±1 V, ±2.5 V, ±5 V, ±10 V,±20 mA	–	Normal: 10 Hz Fast: 200 Hz
Available Soon M-2217CI	8				

M-2217CI   M-2217CI-4

CH0
CH1
Channel to Channel Isolation=3000 VDC

CH6
CH7
Channel to Channel Isolation=3000 VDC

Motor

Flow meter

Water meter

Pressure sensor

✓ Analog Output with Channel to Channel Isolation

Model Name	Analog Output			
	Channel	Resolution	Voltage Output	Current Output
Available Soon **M-2224CI**	4	12-bit	0 ~ +5 V, 0 ~ +10 V, ±5 V, ±10 V	0 ~ +20 mA, +4 ~ +20 mA
Available Soon **M-2228CI**	8			
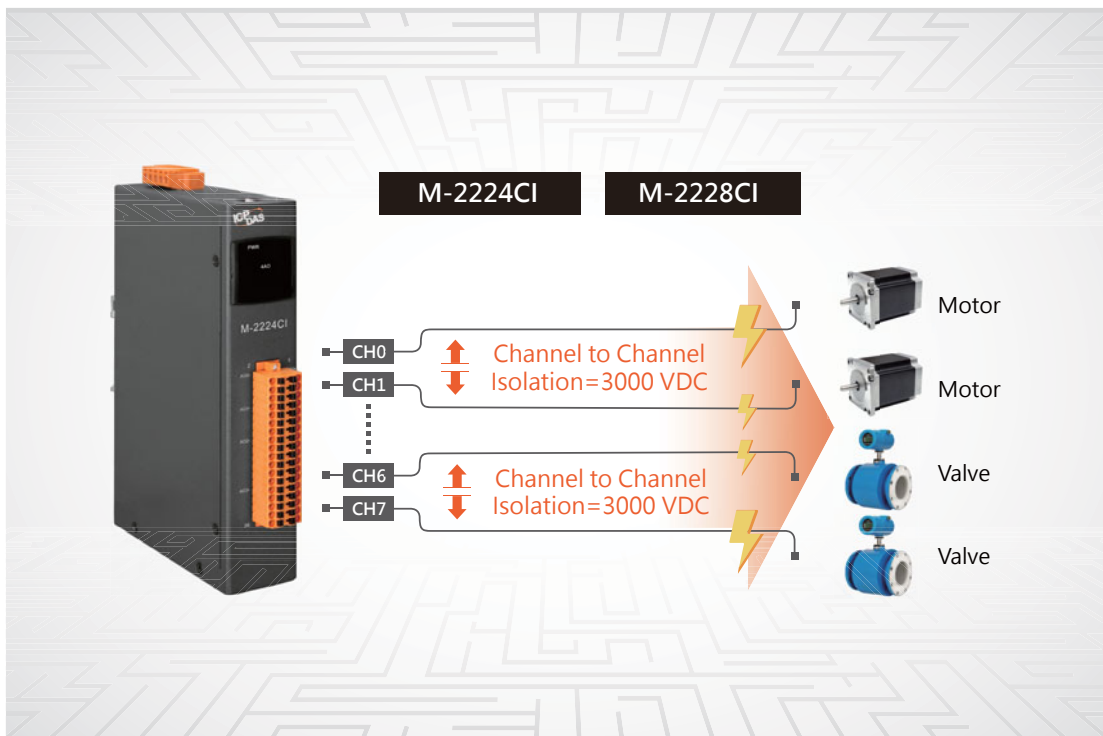
1.3 tM Series Modules

Introduction:

The tM series is a family of network data acquisition and control modules with digital or analog I/O functions. The modules can be remotely controlled through an RS-485 serial bus by using DCON and Modbus RTU/ASCII protocols. The selectable transmission speed of the RS-485 port is up to 115,200 bps. Modbus has facto standard communications protocol in industry, and is now the most commonly available means of connecting industrial electronic devices.

The tM series tiny RS-485 I/O modules support various I/O types, like photo-isolated digital input, power relay, photoMOS relay, open collector output, and analog input (voltage and current). Compared with the M-7000 series, the tM series is more cost-effective with low channel count design that is suitable for distributed I/O points applications.

The tM series provides dual watchdog: module watchdog and host 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), and the output of the module can go to predefined safe value state when the host fails.

Features:

- RS-485 Industrial Multi-Drop Network
- Communication Protocols:
  DCON, Modbus RTU/ASCII
- Programmable I/O Type and Range
- Dual Watchdog Design
- DI Latch Function
- Low Speed Counter
- Programmable Power-on Value and Safe Value

Dimensions (Units: mm):

| Left View | Front View | Rear View |
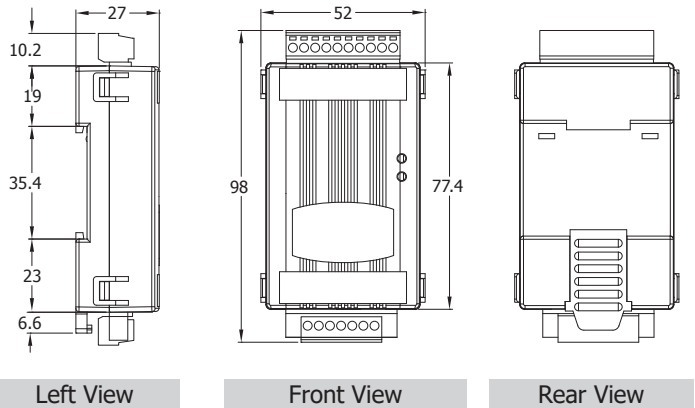
Selection Guide:

tM Series Models				
Model Name	AI	AO	DI	DO
tM-AD2	2-ch Single-Ended, (Voltage/Current)	-	-	-
tM-AD5	5-ch Differential (Voltage)	-	-	-
tM-AD5C	5-ch Differential (Current)	-	-	-
tM-AD8	8-ch Single-Ended (Voltage)	-	-	-
tM-AD8C	8-ch Single-Ended (Current)	-	-	-
tM-AD4P2C2	2-ch Single-Ended (Voltage/Current)	-	2-ch (Source)	2-ch (Sink)
tM-DA1P1R1	-	1-ch (Voltage/Current)	1-ch (Sink/Source)	1-ch Form A Relay
tM-TH8	8-ch (Thermistor)	-	-	-
tM-P8	-	-	8-ch (Sink/Source)	-
tM-PDW8	-	-	8-ch (Sink/Source)	
tM-C8	-	-	-	8-ch (Sink)
tM-P4C4	-	-	4-ch (Source)	4-ch (Sink)
tM-P4A4	-	-	4-ch (Sink)	4-ch (Source)
tM-P3R3	-	-	3-ch (Sink/Source)	3-ch Form A Relay
tM-PD3R3	-	-	3-ch (Source)	3-ch Form A Relay
tM-R5	-	-	-	5-ch Form A Relay
tM-P3POR3	-	-	3-ch (Sink/Source)	3-ch PhotoMos Relay

1.4 RS-485 I/O Expansion Unit

Patent

Taiwan	096134568
China	200710181138.6
USA	11/979,474

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.

Features:

❶ 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.

❷ 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.

❸ 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.

❹ 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.

Auto Configuration | Hot Swap | Easy Maintenance

Easy Duplicate System

Easy Diagnosis

Rugged Industrial Environment
- Power On Value & Safe Value
- Dual Watchdog
- +10 ~ +30 VDC Power Input
- -25 ~ +75°C Operating Temperature
- ESD & Surge Protection

❺ 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.
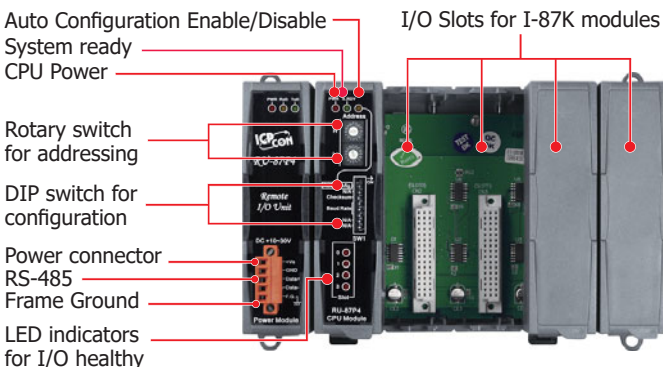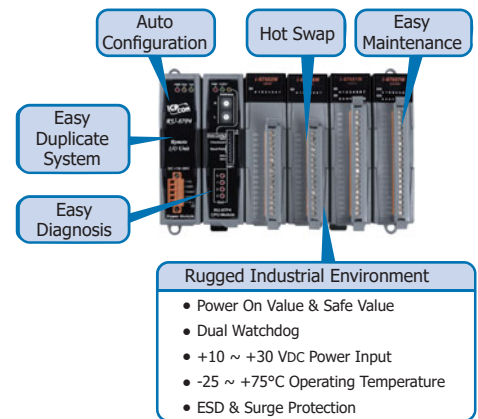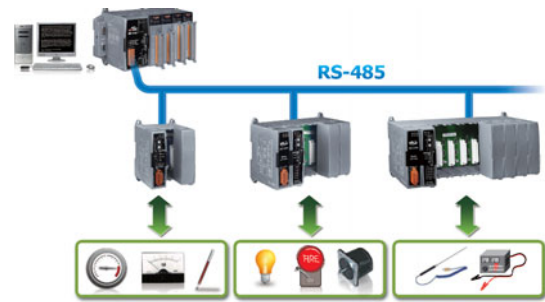
❻ Fully Software Support

The free charge software utility and development kits include

A: DCON Utility: for configuration
B: 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.
C: 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.
D: Various Software Development Toolkits
   DLL, ActiveX, LabVIEW driver, InduSoft driver, DASYLab driver, Linux driver

Appearance:

Auto Configuration Enable/Disable
System ready
CPU Power
I/O Slots for I-87K modules
Rotary switch for addressing
DIP switch for configuration
Power connector
RS-485
Frame Ground
LED indicators for I/O healthy

Ordering Information:

| Model No.	Description
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)

Ethernet I/O Products

2. Ethernet I/O Products

Although the RS-485 remote I/O module is still selling well, we found more and more demand of Ethernet based remote I/O modules. Our Ethernet remote I/O modules support Modbus TCP, Modbus UDP protocol. We also provide web HMI, Web server, OPC server, security mechanism..etc. According to different application, we have developed various Ethernet I/O units and modules, such as compact size ET-87Pn-MTCP and ET-8KPn-MTCP, palm-size ET-7000/PET-7000/ET-7200/PET-7200 series , tiny-size tET/tPET and slim-type ET-2200 series. The module has diversified I/O interface, such as overvoltage-protection analog input, relay output, digital input/output, counter, timer.

The brief comparison is as the following table. Besides those regular Ethernet I/O modules, we will release EtherCAT, Ethernet/IP and PROFINET I/O modules.

Model Name	tET/tPET	ET-2200	ET-7000 PET-7000	ET-7200 PET-7200
Pictures				
Communication				
Ethernet	10/100 M, RJ-45 × 1	10/100 M, RJ-45 x2	10/100 M, RJ-45 × 1	10/100 M, RJ-45 × 2
Protocol	Modbus TCP/UDP, MQTT, and SNMP V2c (Not all modules support SNMP V2c)		Modbus TCP/UDP	
Security	Password and IP Filter		ID, Password and IP Filter	
Multi-client	32		12	
Web Server	Yes			
Web HMI	Yes			
I/O				
I/O pins	10 pins	20 pins	21 pins	22 pins
DI as Counter (32-bit)	3.5 kHz (without filter)	2.5 or 3 kHz	100 or 500 Hz	100 Hz
DIO LED Indicators	-	Yes	-	Yes
Pair Connection	Yes (Pull/Push Mode)		Yes (Pull Mode)	
Mechanical				
Reset Button	-	-	-	Yes
Power Input Pins	1 pair	1 pair	1 pair	2 pair
Dimensions (W × L × H)	52 x 96 x 27 mm	31 x 157 x 126 mm 33 x 126 x 108 mm 33 x 126 x 117 mm 33 x 127 x 117 mm 33 x 176 x 129 mm	72 × 123 × 35 mm	76 × 120 × 38 mm

Furthermore, we also developed ET-87Pn-MTCP and ET-8KPn-MTCP, a series of Ethernet remote I/O unit for compact and modular I/O expansion. It comprises a CPU, a power module and a backplane with a number of I/O slots for flexible I/O configuration.
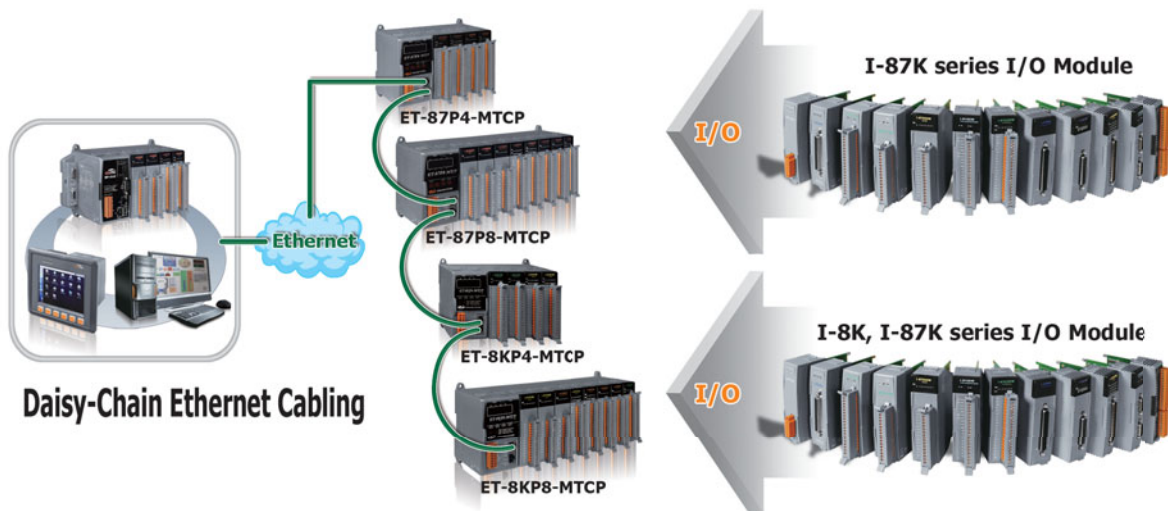
2.1 Ethernet High-speed Data Acquisition Module: PET-7H16M / PET-7H24M

Model	PET-7H24M	PET-7H16M
AI	4 Differential (Simultaneously) 24-bit A/D.	8 Single-ended (Simultaneously) 16-bit A/D.
AO	2	-
Encoder Input	32-bit	-
DI	3	4
DO	4	4
External Trigger	-	32 bits Max. Count, 30 kHz Max. Input Frequency

The **PET-7H16M/PET-7H24M** is a high speed data acquisition devices with a built-in POE Ethernet communication port for data transfer over a network. PET-7H16M includes 8 high-speed 16-bit singleended Analog input channels (200 kHz sample and hold for all 8 channels) and PET-7H24M includes 4 highspeed 24-bit diff erential Analog input channels (128 kHz sample and hold for all 4 channels). All high speed data acquisition modules allow A/D signal conversion simultaneously on each channel and provide the programmable input range on all analog input channels. In addition to supporting Analog Input channels, the module also provides Digital Input/Digital Output/Counter/Encoder with diff erent combinations and different numbers of channels. The module provides 4 kV ESD protection as well as 2500 VDC intra-module isolation.

Features:

❶ Data transmission mode

1. Continuous Transmission
After starting A/D acquisition, data is continuously transmitted to the Host PC.

Model	Channels	Max. Sampling Rate per Ch.
PET-7H16M	8-ch, Simultaneously	30 KHz
PET-7H24M	4-ch, Simultaneously	30 KHz

2. After collecting N data samples, the data is transferred to the Host PC
a. After starting A/D acquisition, the data will be temporarily stored in the memory, and wait until a command is received from the Host PC, before transferring the collected data to the Host PC.
b. The memory capacity allows temporary storage of up to 30 million data samples.

Model	Channels	Max. Sampling Rate per Ch.
PET-7H16M	1 ~ 8-ch, Simultaneously	200 KHz
PET-7H24M	1 ~ 4-ch, Simultaneously	128 KHz
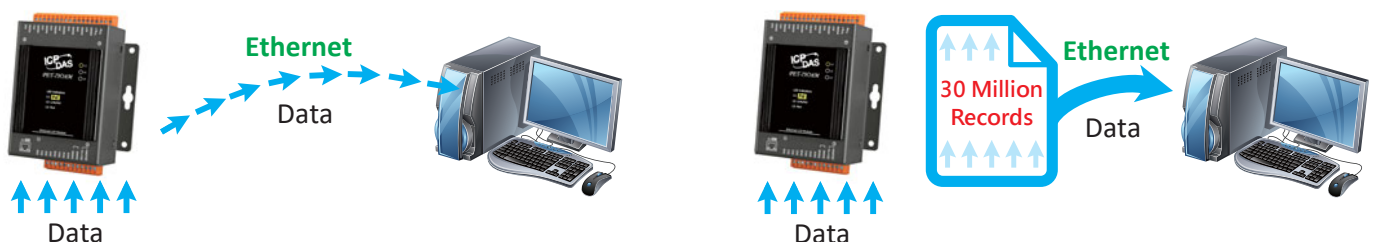
❷ A/D trigger mode

1. Software AD Data Acquisition mode

The A/D acquisition parameters are confi gured via a command from the Host PC. The continuous A/D acquisition or the acquisition of N data samples begins after the command is triggered.

2. External Digital Signal Event Trigger mode (*Only for PET-7H16M)

The A/D acquisition parameters are configured via a command from the Host PC, and then triggered via an external electrical signal. The A/D acquisition of the N data samples is then started.

3. Analog Input Trigger mode

The A/D acquisition parameters are confi gured via a command from the Host PC. When the analog input value is higher or lower than the set specifi c voltage value, the A/D acquisition of the N data is started.
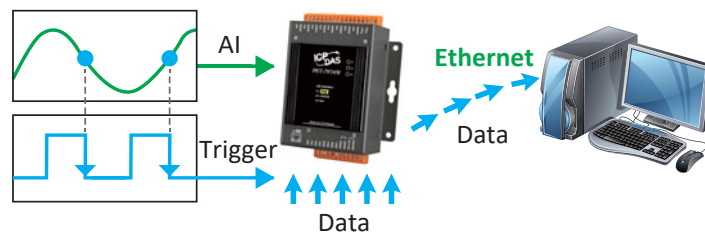
4. External Clock Signal synchronization A/D Acquisition mode (*Only for PET-7H16M)

The speed of the A/D acquisition and the amount of data acquired are controlled by external electrical signals. A falling edge for each output waveform triggers an AD conversion.

External Clock Signal synchronization A/D Acquisition mode

❸ External Digital Signal Event Trigger mode

A/D acquisition is performed in external digital event trigger mode (triggering the electrical signal is the falling edge trigger). The maximum sampling rate per channel is 200 kHz, and A/D acquisition of N data samples is performed.

1. Pre-Trigger (acquisition of N data samples)

The A/D data is continually collected and is temporarily stored in the memory on the PET-7H16M until the trigger signal is received. Once the trigger signal is received, the collected N data samples are then transferred to the Host PC.

2. Post-Trigger (acquisition of N data samples)

In this mode, the A/D acquisition of the N data samples is started once the trigger signal is received.

3. Delay-Trigger(acquisition of N data samples)

The A/D acquisition of the N data samples is started once the programmed delay period from the trigger has elapsed.
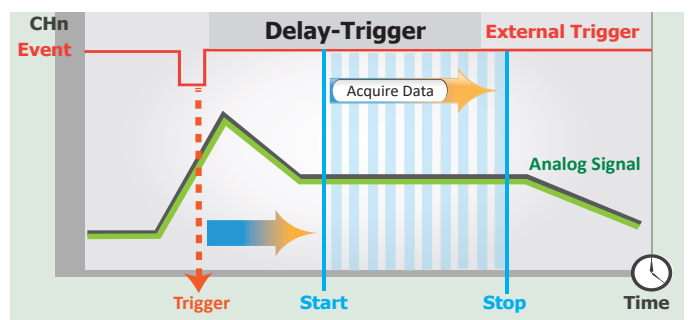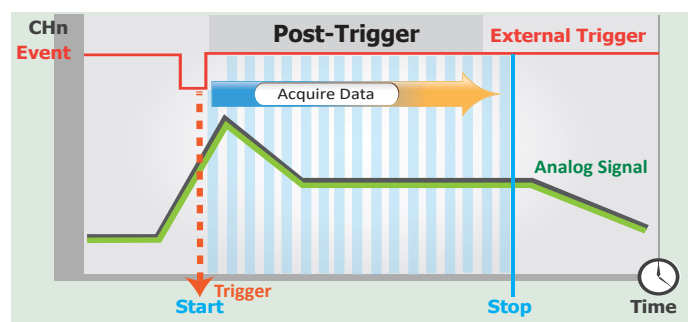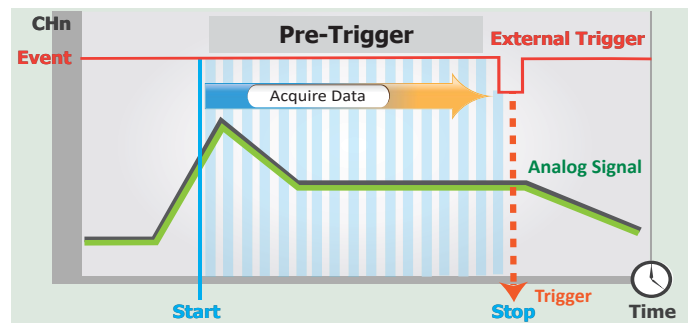
❹ A/D Sync Trigger Between Multiple Modules

Analog Input Trigger is triggered when the voltage signal of the specifi ed analog input channel is higher or lower than a certain voltage setting. In addition, the user can also specify the trigger voltage level range of the input signal. Once the signal leaves the high and low level region or the signal enters the high and low level region, it is triggered to start the acquisition.

1. Above High: The signal is triggered above the high level and collects N data.

2. Below Low: The signal is triggered below the low level and collects N data.
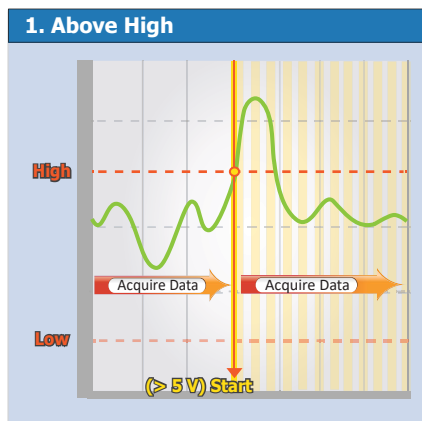
3. Leave-region: Trigger when the signal leaves the high and low level region, collect N data.
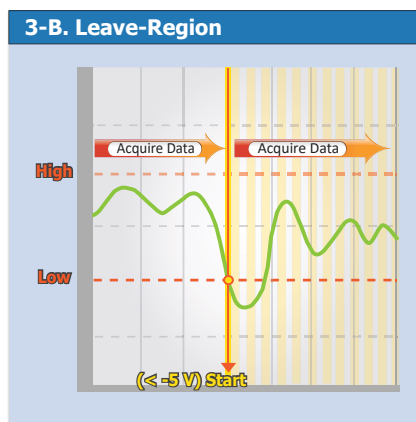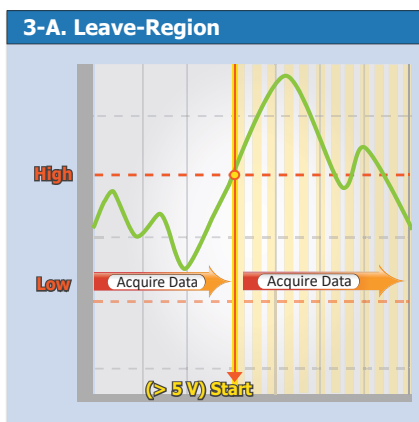
4. Entry-region: Trigger when the signal enters the high and low level region, collect N data.
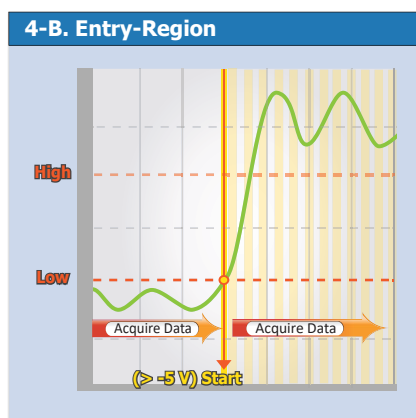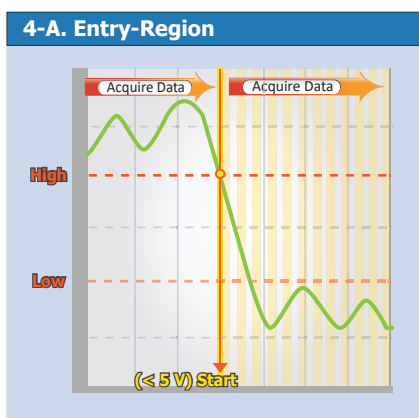
❺ A/D synchronization trigger between multiple modules

The A/D acquisition parameters are configured via a command from the Host PC, and are triggered by an external digital signal event, the A/D acquisition of N data samples, or A/D acquisition via the synchronization of an external clock signal.
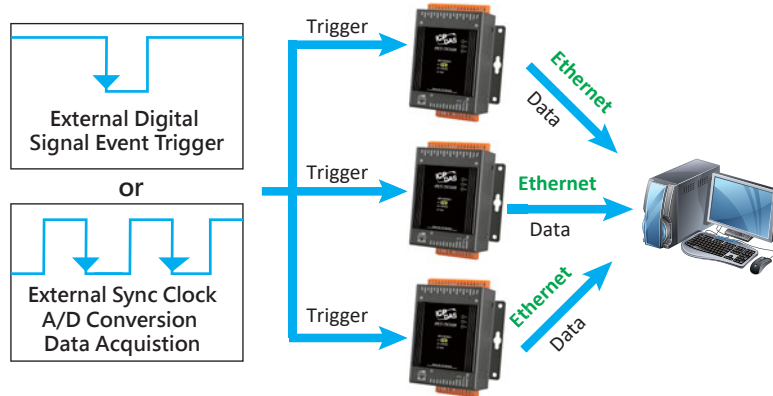
❻ Synchronous input data acquisition with flexible data frame

The high-speed acquisition of the analog input/digital input/digital output read-back and counter input can also be read simultaneously, and these acquisition data can also be transferred to the Host PC with the Analog input sampling data. It is flexibly to defi ne different input types into the Ethernet data frame of synchronous input data acquisition. In synchronous input data acquisition, the sampling rate can be 2 KHz Max.

Ethernet Frame

1460 Bytes	1460 Bytes	1460 Bytes	....	1460 Bytes	1460 Bytes	1460 Bytes	1460 Bytes	....	1460 Bytes

0	2	4	6	14	16	20	22	1452	1454	1456	1460
AI0	AI1	AI2	....	AI7	CNT0	AI0	....	AI6	AI7	CNT0	
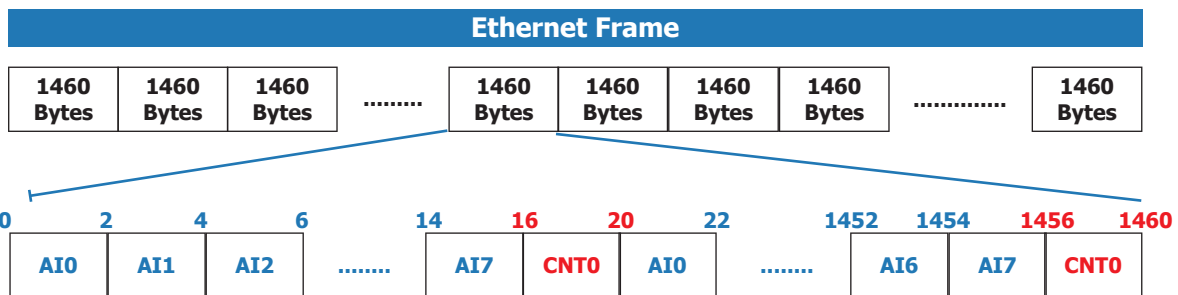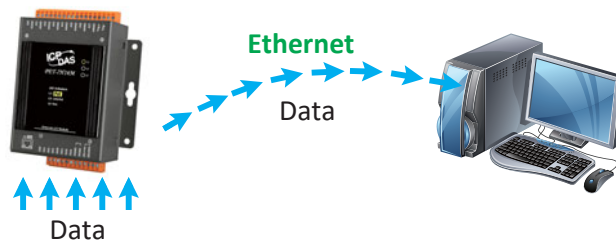
❼ PC Software Support

1. Windows
- ■ Microsoft VC, C#, VB.NET SDK API and Demo
- ■ Python and Demo
- ■ NI LabVIEW Toolkit and Demo

2. Linux
- ■ C/C++ library and Demo
- ■ .NET library and Demo
- ■ Python and Demo
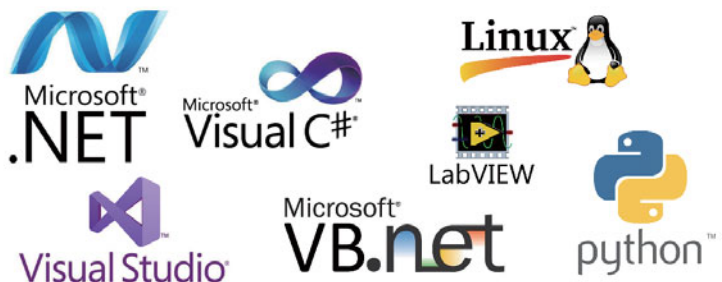
PET-7H16M/PET-7H24M Selection Guide:

✅ System Specifications

Communication	
Ethernet Port	1 x RJ-45, 10/100 Base-TX
PoE	Yes
Security	ID, Password and IP Filter
Protocol	Modbus TCP Slave, TCP Raw Data
LED Indicators	
System Operation	Yes
Ethernet Link/Act	Yes
PoE Power	Yes
Isolation	
I/O	2500 VDC

EMS Protection	
ESD	±4 kV Contact for each Terminal and ±8 kV Air for Random Point
EFT	±4 kV for Power
Power	
Reverse Polarity Protection	Yes
Powered from Terminal Block	+12 ~ +48 VDC
Consumption	2.6 W

Mechanical	
Dimensions (W × L × H)	76 mm × 120 mm × 38 mm
Installation	DIN-Rail or Wall Mounting
Enclosures	Metal
Environment	
Operating Temperature	-25 ~ +75° C
Storage Temperature	-30 ~ +80° C
Humidity	10 to 90 % RH, Non-condensing

✅ I/O Specifications

| Module	PET-7H24M	PET-7H16M
Analog Input		
Channels	4 differential Simultaneously	8 Single-ended Simultaneously
Resolution	24-bit	16-bit
Sampling Rate	128kS/s (Each Channel)	200 kS/s (Each Channel)
Bipolar Input (Programmabl)	±10 V, ±5 V ±2.5 V ±1.25V ±0.625V ±300mV ±150mV ±75mV ±40mV ±20mV	±10 V, ±5 V
FIFO Size	4 k Samples	2 K Samples
Accuracy	±0.01% of FSR @±10 V, ±0.02% of FSR @±5 V ±2.5 V, ±0.02% of FSR @ ±1.25V ±0.625V ±0.1% of FSR @±300mV ±150mV ±75mV ±40mV, ±0.2% of FSR@±20mV	0.05 % of FSR @ ±10 V, ±5 V
Trigger Mode	Programmable: Software, Analog Threshold Trigger	Programmable: Software/External clock trigger/ Digital trigger (Post-trigger/Pre-trigger/Delay-trigger), Analog threshold trigger
Analog Output		
Channels	2	N/A
Type	±10 V, ±5 V, 0~5V, 0~10V	
Resolution	12-bit	
Accuracy	±0.1% of FSR @ ±10 V, ±5 V, 0 ~ 10 V, 0 ~ 5 V	
Encoder Input		
Counter	32-bit	N/A
Encoder Mode	Quadrant/CW/CCW and Pulse/Dir	
Counting Rate	Quadrant Counting: 2 MHz (Max.) CW/CCW: 6 MHz (Max.); Pulse/Dir: 6 MHz (Max.)	
Voltage Level: On / Off	+3.5 ~ +5 VDC/+0.8 VDC Max.	
Programmable digital filter / Isolation	0.55 ~ 33.3 µs/2500 VDC	
Digital Input		
Channels	3	4
Contact	Wet Contact	Wet Contact
Sink/Source (NPN/PNP)	Sink/Source	Sink
Voltage Level: On / Off	+5 ~ +30 VDC/2 VDC Max.	+5 ~ +30 VDC/1 VDC Max.
Counter	N/A	32 bits Max. Count, 1 kHz Max. Input Frequency
Digital Output		
Channels	4	4
Type	Isolated Open Collector	Isolated Open Collector
Sink/Source (NPN/PNP)	Sink	Sink
Load Voltage	+5 ~ +30 VDC	+5 ~ +30 VDC
Short-circuit Protection	Yes	Yes
Overload Protection	1.3 A	1.3 A
External Clock Trigger / Digital Trigger		
Trigger Pulse Width / Trigger Type	N/A	1.5 µs Min./Falling Edge
Voltage Level: On / Off		+5 ~ +5.5 VDC @ 15 mA/< 0.8 VDC
Counter		32 bits Max. Count, 30 kHz Max. Input Frequency

ICP DAS CO., LTD.
Industrial Computer Products and Data Acquisition Systems

Application:

High Speed Vibration, Strain Gauge and Temperature Measurement Applications

With the PET-7H16M and SG-3000 series signal conditioning modules, users can easy to implement remote sensing applications for measuring multiple analog input signals such as voltage, current, temperature (thermocouple, RTD), vibration (IEPE sensor) and strain gauge based on an Ethernet network, and collect data from various fields for advanced analysis.
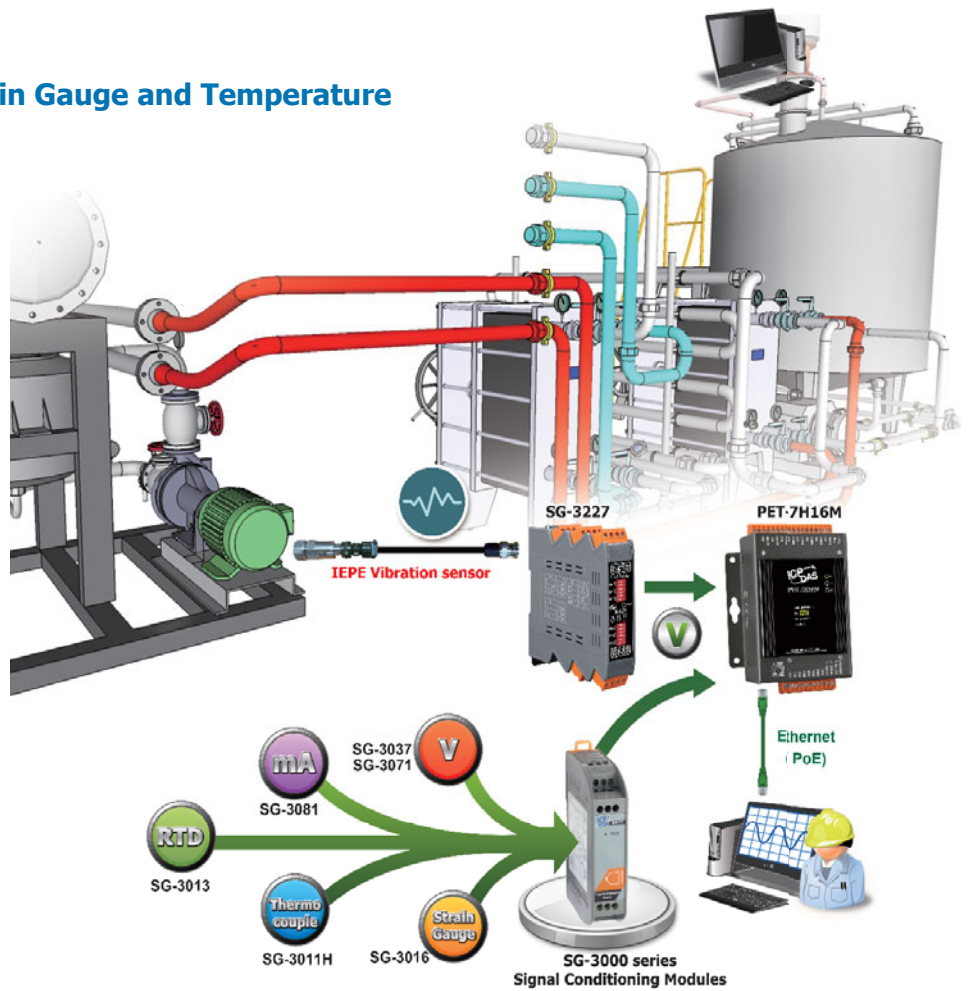
Motor Monitoring Application

PET-7H16M is equipped with a voltage attenuator and current transformer module (DNM-800) to collect the voltage and current signals of the motor and convert them into analog voltages in the general measurement range. The signals are converted into digital data via the PET-7H16M and transmitted back to the host PC via Ethernet. On the PC side, the voltage, current, frequency, energy consumption, harmonics and health status of the motor in operation are calculated through algorithms, and the data results are displayed on the HMI to help customers monitor the energy consumption and health status of the motor at all times. It is currently used in a technology company, deploying 9 sets of PET-7H16M to monitor 9 sets of motor equipment. The AI sampling rate of each channel of this application is 2k~10k Hz.
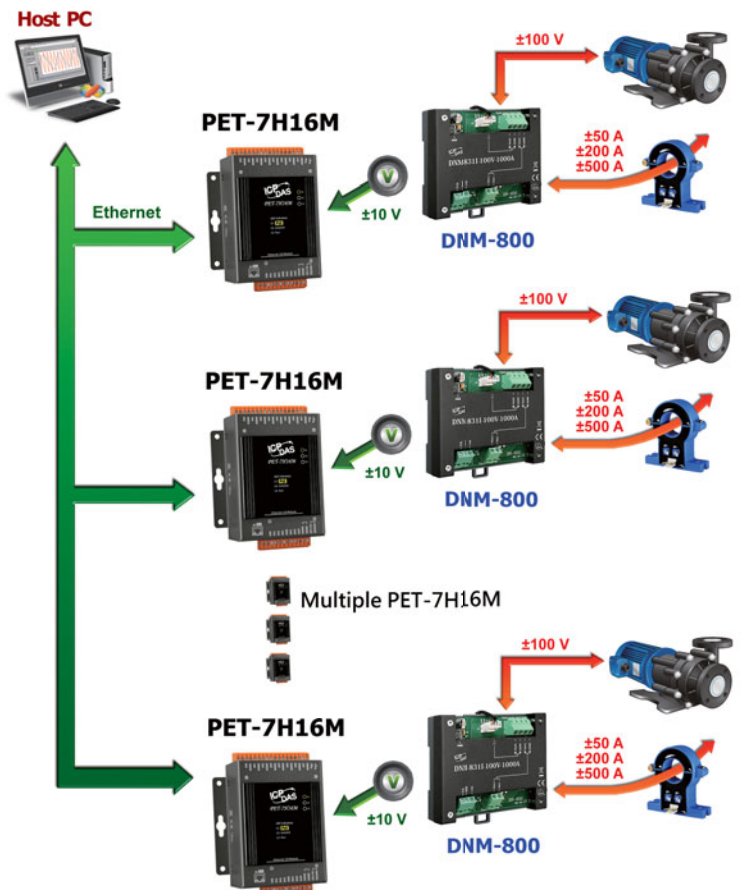
Casting Machine Monitoring Application

The aluminum casting machine pumps the hot aluminum into the mold through its piston. The customer wants to measure the pressure value of the mold and piston pressurization in the die. The piston moves at a very high speed, and its pressure also changes at a high speed. A comparison chart of the relationship between piston position and pressure is established. The two pressure sensors are converted into voltage values and input to the two AI channels of PET-7H16M. The obtained AI value is converted into a pressure value. The position of the piston is linear coded. Connect this linear encoder to trig+/trig- input to the high-speed counter. The position of the piston is obtained from the value of the counter. The counter input and analog input of PET-7H16M can be read simultaneously. The counter input value and the analog input value are read synchronously at the set sampling time. The AI sampling rate of this application is up to 2k Hz.

Position of piston(Counter)

Pressure in shape(AI1)

Pressure in piston(AI0)

PET-7H16M
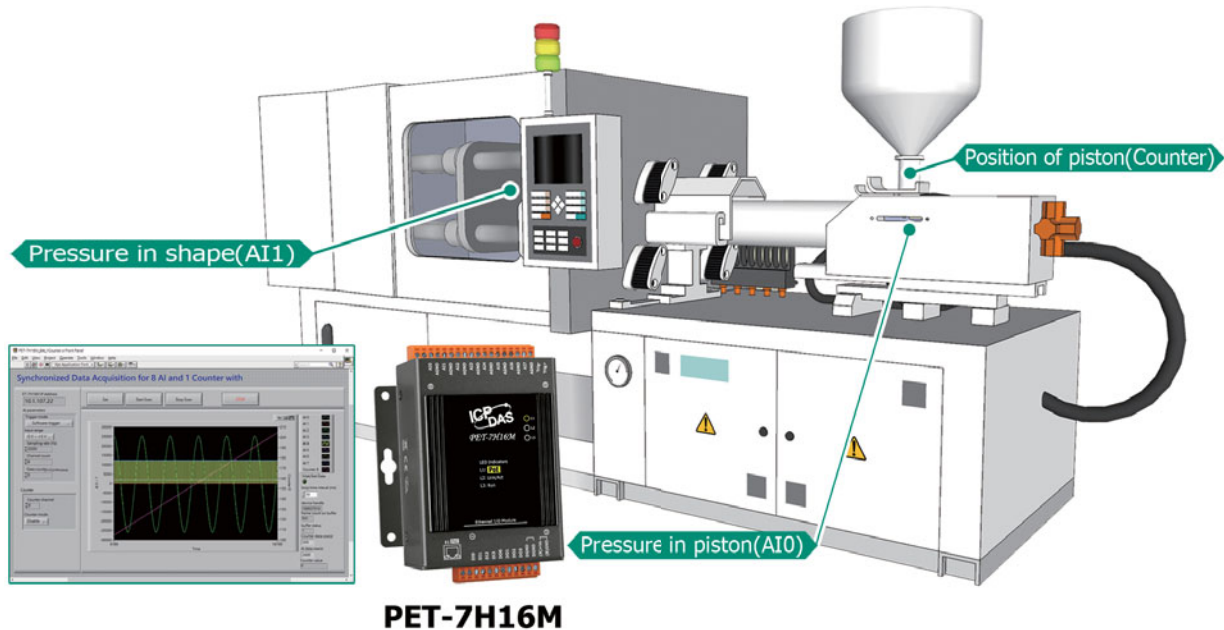
Distributed Remote Multi-channel Strain Gauge Monitoring Application

Strain gauges have been used for stress and strain monitoring of bridges, pipelines, railway tracks, etc. for some time. PET-7H24M has high precision (+/- 20mV range is ±0.2% of FSR) and a variety of low voltage (mV) input ranges, and each AI channel has a maximum acquisition speed of 128kHz, allowing faster and accurate real-time measurement of multiple channels value change of the strain gauge. In this case, 150 strain gauges are measured.

The acquisition rate of each channel needs to be greater than 100Hz. Each strain gauge +/- 20mV is output to one AI channel of PET-7H24M, and one PET-7H24M is used for every four channels, totaling 38 sets PET-7H24M.

(The excitation voltage of the strain gauge is supplied by an external circuit)

Total 150 Strain Gauge measurement channels

PET-7H24M

4-channel Strain Gauge Input

±20 mV

PET-7H24M

4-channel Strain Gauge Input

±20 mV

Ethernet

Host PC

Multiple PET-7H24M

PET-7H24M

4-channel Strain Gauge Input

±20 mV
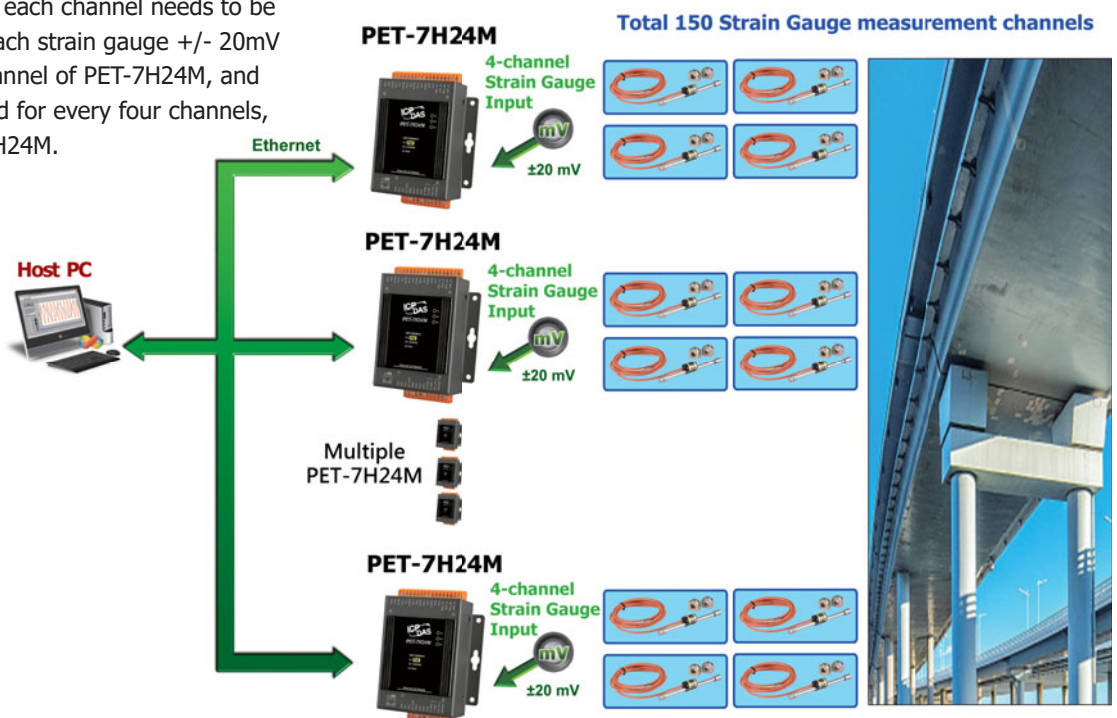
Tool Wear Monitoring and Life Prediction

PET-7H16M with Raspberry Pi hardware is used to collect a large number of vibration signal data from the spindle and platform of the processing machine, with tool wear data, and use TensorFlow deep learning to analyze the tool wear prediction during the cutting process. The purpose is to estimate the tool wear in the future through random and short-term measurement of vibration signals. It is used to predict whether to replace unhealthy or unsafe cutting tool before the important material cutting process.
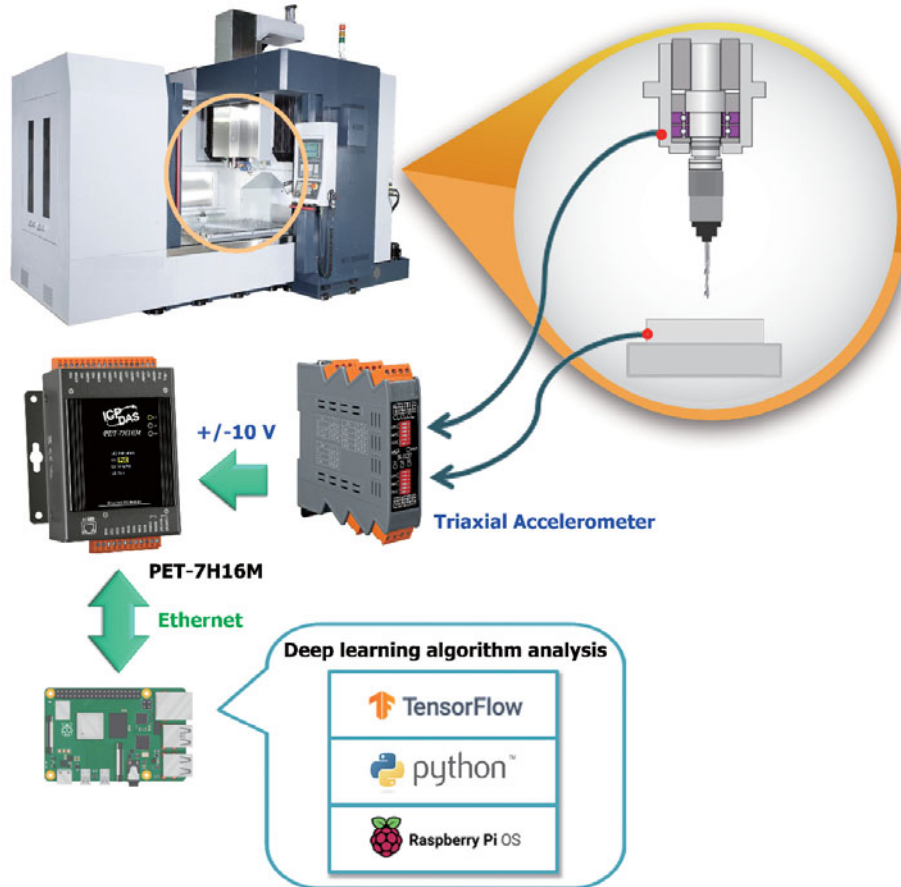
The Raspberry Pi open hardware creates diversified and customized applications in the age of Internet of Things. With python (the most popular development tool for the IoT) or Microsoft's cross-platform development tool .Net, it can provide products and various services more quickly. Raspberry Pi users use the python/.Net library and sample programs provided by the ICP DAS high-speed data acquisition module platform to connect to the PET-7H16M/PET-7H24M to collect high-speed data for data analysis and IoT applications.
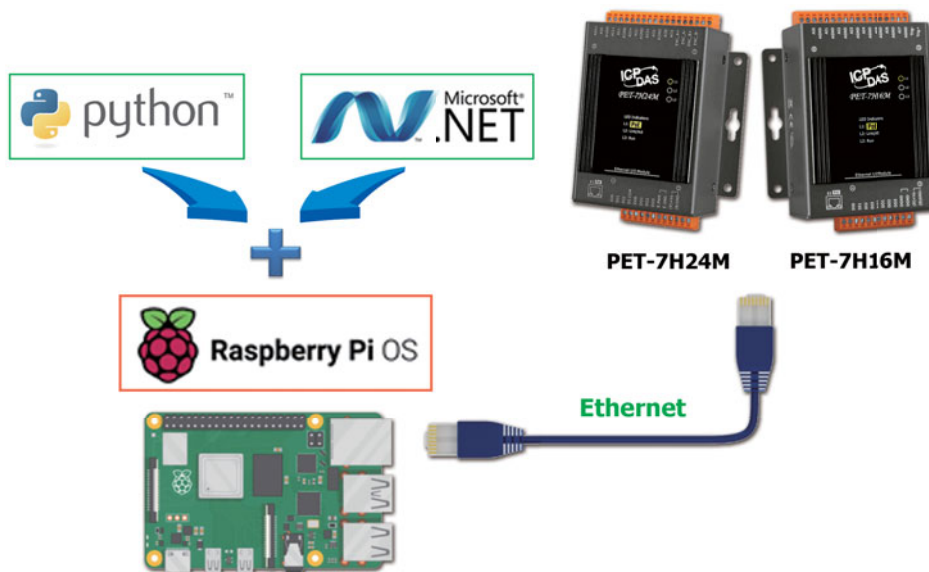
Signal Conditioning Modules for Vibration Sensors

Features:
- 3-channal voltage input & output
- Input voltage range: 0-24V
- Provides signal bandwidth: 50 kHz
- Provides 24V power supply for the accelerometer

SG-3037

Features:
- 2-channel IEPE input
- Individual channel configuration
- Excitation current support: 2 mA / 4 mA / 6 mA / 10 mA
- Signal amplification of x1, x10 and x100
- LED indicators for sensor open, short and normal

SG-3227

Introduction:

SG-3037 and SG-3227 are vibration signal conditioning modules for vibration measurement. SG-3037 with 3 channel analog inputs can connect to the voltage output accelerometer (3-axis of iSN-703-BALT-F1-L015). SG-3227 with 2 channel IEPE interface is suitable for the IEPE accelerometer (1-axis of iSN-701-BALT-F15-L030). SG-3037/SG-3227 can convert the signal measured from the accelerometer into the analog voltage output. It collects the vibration data through the PET-7H16M module, and then send them via high-speed Ethernet to the data center for processing and analysis.

Selection Guide:

Models	SG-3037	SG-3227
Analog Input for Accelerometer		
Channel	3	2
Wiring	5 wires	Differential
Signal	Voltage	IEPE
Type	0 ~ 24 V	0 ~ 28 V
Gain	-	x1, x10, x100
Bandwidth	50 KHz	x1, x10 Gain : 80 kHz ; x100 Gain : 50 kHz
Accuracy	±5% of FSR	
Excitation Current	-	2 mA, 4 mA, 6 mA, 10 mA
Excitation Voltage	24 V	-
Supported Accelerometer	iSN-703-BALT-F1-L015 (3-Axis) x 1	iSN-701-BALT-F15-L030 (1-Axis) x 2
Analog Output		
Channel	3	2

IEPE Interface of SG-3227

iSN-701-BALT-F15-L030

BNC adaptor (2 x adaptor comes with SG-3227)

SG-3227
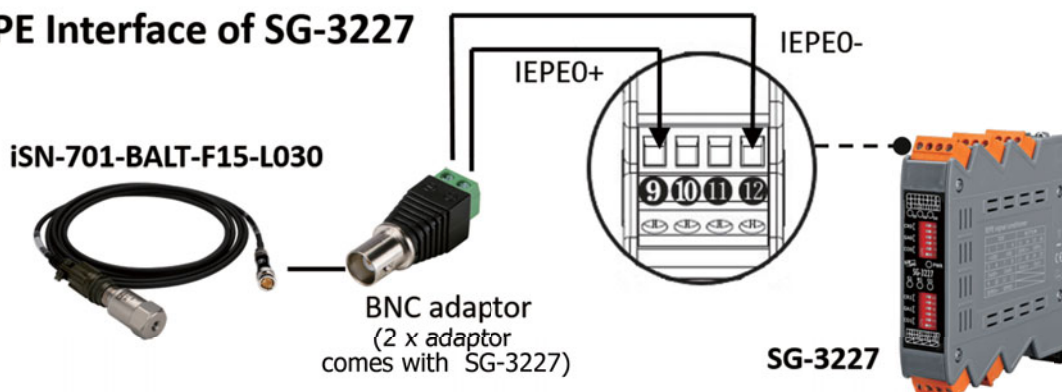
Accelerometer:

iSN-701-BALT-F15-L030
iSN-701-BALT-F15-L060
(1-axis Accelerometer)

iSN-701-BALT-Mbase01
(Magnetic Base)

iSN-703-BALT-F1-L015
(3-axis Accelerometer)

iSN-703-BALT-MBase01
(Magnetic Base)

Introduction:

iSN-701-BALT-F15-L030, iSN-701-BALT-F15-L060 and iSN-703-BALT-F1-L015 are high sensitivity accelerometer. iSN-701-BALT-F15-L030 and iSN-701-BALT-F15-L060 are a homotaxial IEPE accelerometer and iSN-703-BALT-F1-L015 is a triaxial accelerometer that simultaneously measures vibration in three orthogonal axes. These sensors are designed primarily for vibration analysis applications.

Selection Guide:

Models	iSN-701-BALT-F15-L030 iSN-701-BALT-F15-L060	iSN-703-BALT-F1-L015
Type	1-Axis (IEPE)	3-Axis
Sensitivity	100 mV/g	400 mV/g per axis
Frequency Response	0.5 Hz ~ 15 kHz	10 Hz ~ 1 KHz
Measuring range	±80 g	±18 g
Bias Voltage	10-14 VDC	10 ± 0.5 VDC
Power Requirement		
Voltage	18-30 VDC	22 - 26 VDC
Current	2~10 mA	3 mA
Mechanism		
Cable Length	iSN-701-BALT-F15-L030: 3 m iSN-701-BALT-F15-L060: 6 m	1.5 m
Magnetic Base	iSN-701-BALT-Mbase01 (optional)	iSN-703-BALT-Mbase01 (optional)

Dimensions:

iSN-701-BALT-F15-L030
iSN-701-BALT-F15-L060

53.3mm
35.6mm
⌀22.9mm
22mm HEX
1/4-28 MOUNTING HOLE
⌀20.3mm

iSN-703-BALT-F1-L015

21±0.05mm
8.5±0.05 mm
15±0.05mm
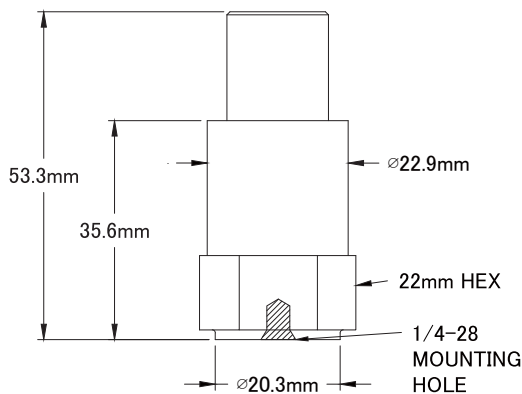
Applications:

● PET-7H16M connect SG-3037 with iSN-703-BALT-F1-L015

● PET-7H16M connect SG-3227 with iSN-701-BALT-F15-L030
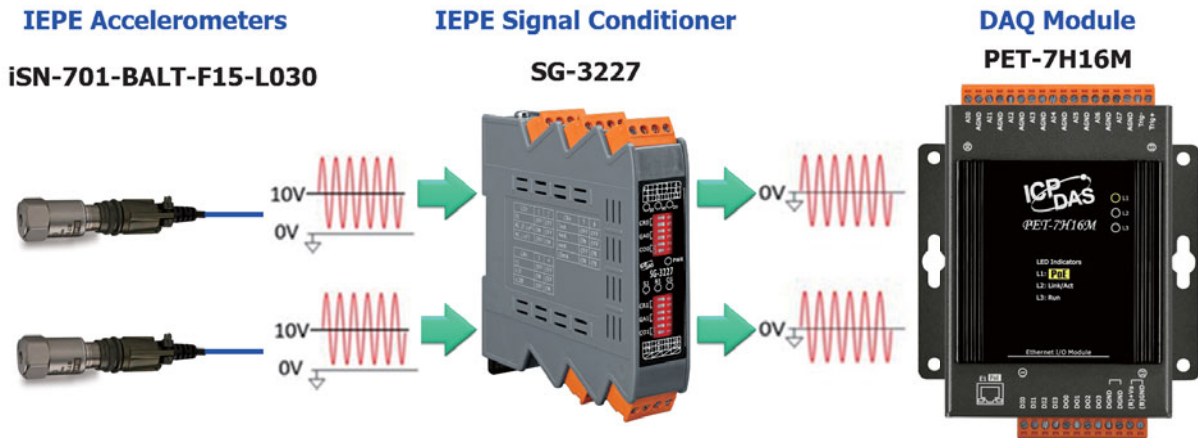
● AR-200/AR-400 with iSN-701-BALT-F15-L030

▲ Real-time Monitor

▲ Historical recording files

AR_Tool Utility
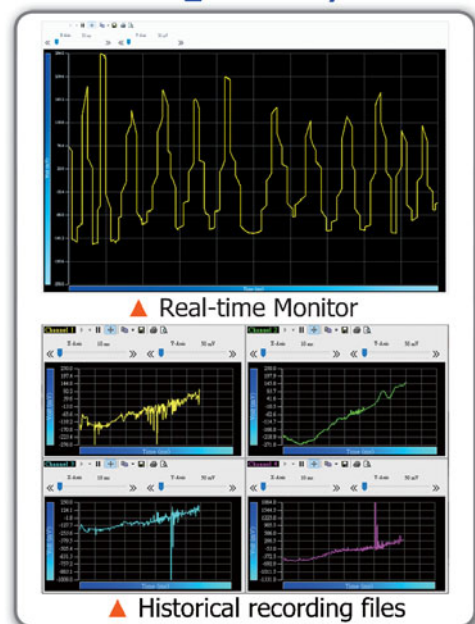
2.2 Ethernet Modbus TCP I/O Modules

Introduction:

The ET-7000/ET-7200, a web-based Ethernet I/O module, features a built-in web server which allows configuration, I/O monitoring and I/O control by simply using a regular web browser. Remote control is as easy as surfing the Internet.

Besides Web HMI function, no more programming or HTML skills are required; creating dynamic and attractive web pages for I/O monitoring and I/O control would be fun to engineers ever after. In addition, the ET-7000/ET-7200 also supports Modbus TCP protocol that makes perfect integration to SCADA software.

Furthermore, PET-7000/PET-7200 features "PoE" that not only Ethernet but also power is carried through an Ethernet cable.

Features:

1. Power over Ethernet (PoE)

The PET-7000/PET-7200 series module can be powered by an IEEE802.3af compliant PoE switch. Both Ethernet and power can be carried by an Ethernet cable eliminating the need for additional wiring and power supply.

2. Daisy-Chain Ethernet Cabling

The ET-7200/PET-7200 Series 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.
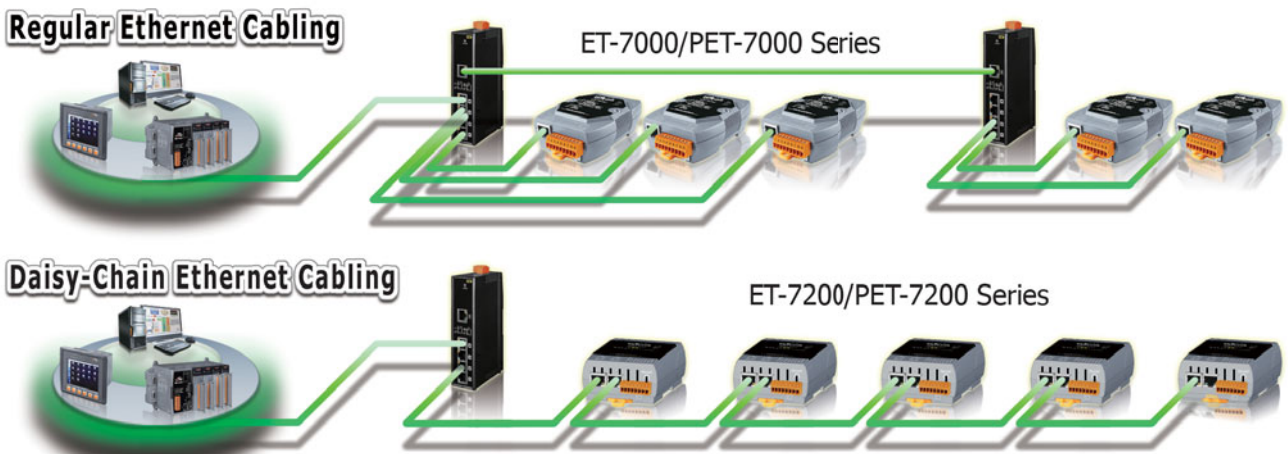
3. LAN Bypass

LAN Bypass feature guarantees the Ethernet communication. It will automatically active to continue the network traffic when the ET-7200/PET-7200 loses its power.

4. Communication Security

Account and password are needed when logging into the web server. An IP address filter is also included, which can be used to allow or deny connections with specific IP addresses.

5. Support for both Modbus TCP and Modbus UDP Protocols

The Modbus TCP, Modbus UDP slave function on the Ethernet port can be used to provide data to remote SCADA software.

6. Built-in I/O

Various I/O components are mixed with multiple channels in a single I/O module, which provides the most cost effective I/O usage and enhances performance of the I/O operations.

7. Dual Watchdog

The Dual Watchdog is consists of a Module Watchdog and a Communication Watchdog. The action of AO,DO are also associated to the Dual Watchdog.

Module Watchdog is a built-in hardware circuit to monitor the operation of the module and will reset the CPU if a failure occurs in the hardware or the software. Then the Power-on Value of AO,DO will be loaded.

Communication Watchdog is a software function to monitor the communication between the host and the I/O module. The timeout of the communication Watchdog is programmable, when the I/O doesn't receive commands from the host for a while, the watchdog forces the AO,DO to pre-programmed Safe Value to prevent unpredictable damage of the connected devices.

8. Highly Reliable Under Harsh Environment

● Wide Operating Temperature Range: -25 ~ +75°C
● Storage Temperature: -30 ~ +80°C
● Humidity 10 ~ 90% RH (Non-condensing)

10. Power-on Value and Safe Value

Besides setting by the set AO,DO commands, the AO,DO can be set under two other conditions.
Power-on Value: The Power-on Value is loaded into the AO,DO under 3 conditions: Power-on, reset by Module Watchdog, reset by reset command.
Safe Value: When the Communication Watchdog is enabled and a Communication Watchdog timeout occurs, the "safe value" is loaded into the AO,DO.

9. I/O Pair Connection

This function is used to create a AI/DI to AO/DO pair through the Ethernet. Once the configuration is completed, the I/O module can poll the status of remote AI/DI devices and then use the Modbus TCP protocol to continuously write to a local AO/DO channels in the background.

11. LED indicators for DIO status

The LED indicators for DIO status are for ET-7200/PET-7200 series.

12. Reset button

The reset button is for ET-7200/PET-7200 series. It is used to clear all data and restore all settings to the factory default values. It is very useful especially when you forget the ID, password to log in to the web server, or IP address to access the Ethernet I/O module.

13. Two pair of power input pins

For ET-7000/PET-7000 series, there are only two pins for power input. To ease the wiring, the pins are increased to four pins as two pairs for ET-7200/PET-7200 series.

14. Web HMI

The Web HMI function allows the users to create dynamic and attractive web pages to monitor and control the I/O points. Users can upload specific I/O layout pictures (bmp, jpg, gif format) and define a description for each I/O point. No HTML or Java skills are needed to create the web pages.
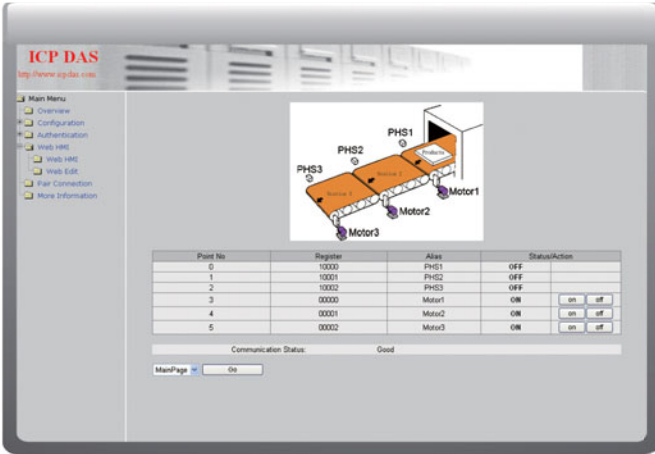
15. Built-in Web Server

Each I/O module has a Built-in web server that allows the users to easily configure, monitor and control the module from a remote location using a regular web browser.

Appearance:

ET-7000/PET-7000 Series

I/O Connector

PoE Indicator

Run Indicator
Ethernet Indicators

Ethernet

ET-7200/PET-7200 Series

I/O Connector

PoE Indicator

Run Indicator
Ethernet Indicators
DIO Indicators

Ethernet Switch

Reset Button
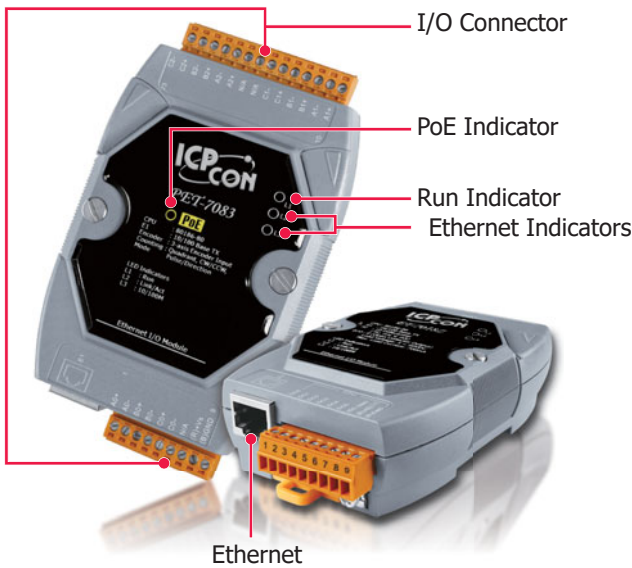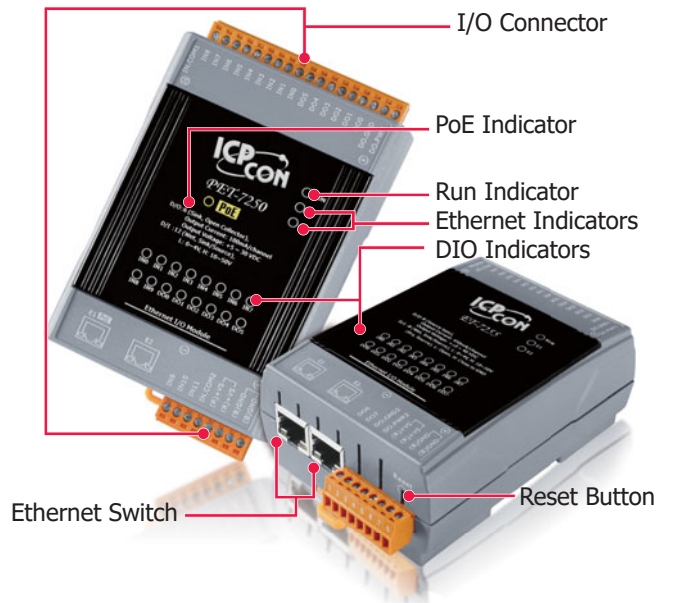
Dimensions (Units: mm):

ET-7000/PET-7000 Series
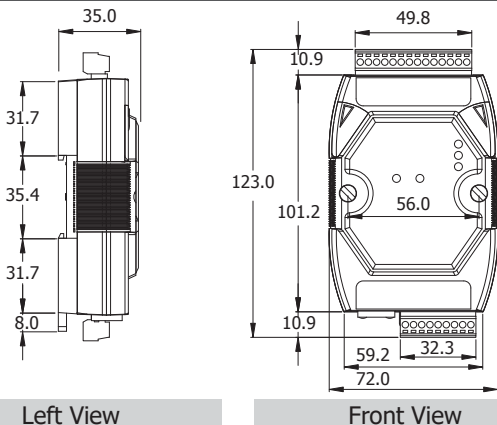
35.0
31.7
35.4
31.7
8.0

Left View

49.8
10.9
123.0
101.2
56.0
10.9
59.2 32.3
72.0

Front View

ET-7200/PET-7200 Series

42
32.8
35.6
32.8
6.8

Left View

76
120 101.1

Front View
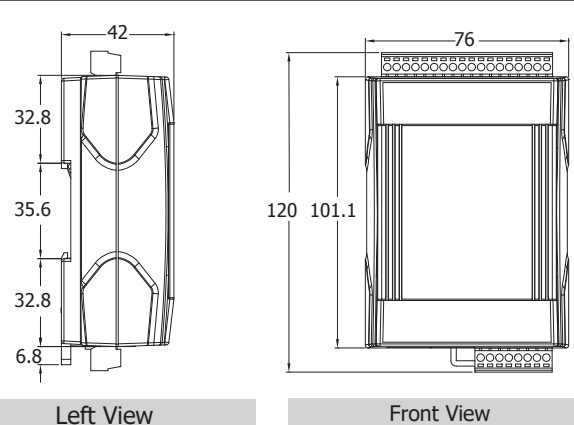
Software Support:

Our free charge software utility and development kit include

1. OPC Server

NAPOPC_ST DA Server is a **free** OPC DA Server ("**OPC**" stands for "OLE for Process Control" and "**DA**" stands for "Data Access") for ICP DAS products. Based on Microsoft's OLE COM (component object model) and DCOM (distributed component object model) technologies, NAPOPC_ST DA Server defines a standard set of objects, interfaces and methods for use in process control and manufacturing automation applications to facilitate the interoperability.

Using NAPOPC_ST DA Server, system integrates data with SCADA/HMI/Database software on the same computer and others. SCADA/HMI/Database sends a request and NAPOPC DA Server fulfills the request by gathering the data of ICP DAS modules (**License Free**) and third-party devices (**License Charge**) to SCADA/HMI/Database.

For different OS of PAC products, ICP DAS provides several professional DA Servers:

Version	NAPOPC_ST	NAPOPC_XPE	NAPOPC_CE5	NAPOPC_CE6
Platform	Desktop Windows	Windows XP Embedded	Windows CE5	Windows CE6
Price	Free/ $	Free	Free	Free

For more Information please visit **http://opc.icpdas.com**

2. EZ Data Logger

EZ Data Logger is the software that ICP DAS provides for users to easily build a small SCADA system on Windows 2000/XP/Vista. It comes with two versions, "Lite" & "Professional". The Lite version is not only full-functioned but free to all ICP DAS users!

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.

3. Modbus Software Development Toolkits

Plenty of library functions and demo programs are provided to let user develop programs easily under Windows, Linux and MiniOS7 operating systems.

OS	Development Language	SDK
MiniOS7	TC, BC	MBT7_xxx.lib, MBT8_xxx.lib and Demos
WinCE 5.0/6.0	VS .NET 2005/2008	nModbusCE.dll and Demos
WES 2009, Windows XP/Vista/7	VS .NET 2005/2008	nModbus.dll and Demos
	LabVIEW	Demos
Linux	C	Libraries and Demos

Selection Guide:

ET - **7** **X** - **XX**

PET: PoE Version
ET: Regular Ethernet Version

0: 1-port Ethernet
2: 2-port Ethernet Switch

Model Number

✔ Analog Input Model

Model Name		AI			DO		
		Channel	Range	Sensor Type	Channel	Type	Sink/Source
ET-7005 PET-7005	-	8	-	Thermistor	4	Open Collector	Sink
ET-7015 PET-7015	ET-7215 PET-7215	7	-	RTD: Pt100, Pt1000, Ni120, Cu100, Cu1000	-	-	-
ET-7017 PET-7017	ET-7217 PET-7217	8	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	-	4	Open Collector	Sink
ET-7017-10 PET-7017-10	ET-7217-10 PET-7217-10	10/20			-	-	-
-	ET-7217-A5 PET-7217-A5	8	±50 V, ±150 V	-	4	Open Collector	Sink
-	ET-7217RMS PET-7217RMS	8	0 ~ +150 mVrms 0 ~ +500 mVrms, 0 ~ +1 Vrms, 0 ~ +5 Vrms 0 ~ +10 Vrms,				
ET-7018Z/S PET-7018Z/S	ET-7218Z/S PET-7218Z/S	10	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	Thermocouple: J, K, T, E, R, S, B, N, C, L, M, and L$_{DIN43710}$	6/3 (Note 2)	Open Collector	Sink
ET-7019Z PET-7019Z	ET-7219Z PET-7219Z	10	±15 mV, ±50 mV, ±100 mV, ±150 mV, ±500 mV, ±1 V,±5 V, ±10 V ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA		6/3 (Note 2)		

Note 1: We recommend to choose ET-7018Z/PET-7018Z and ET-7019Z/PET-7019Z for extremely accurate thermocouple measurement.
Note 2: 6 DO channels for ET-7018Z, PET-7018Z, ET-7019Z and PET-7019Z.
3 DO channels for ET-7218Z, PET-7218Z, ET-7219Z and PET-7219Z.

Front   Rear

ET-7018Z/S =
DB-1820 Connects to the ET-7018Z

PET-7018Z/S =
DB-1820 Connects to the PET-7018Z

ET-7218Z/S =
DB-1820 Connects to the ET-7218Z

PET-7218Z/S =
DB-1820 Connects to the PET-7218Z

15 cm

ET-7018Z/S3 =
DN-1823 connects to the
ET-7018Z/S3

PET-7018Z/S3 =
DN-1823 connects to the
PET-7018Z/S3

1.8 m

ET-7018Z/S2 =
DN-1822 connects to the ET-7018Z/S2

PET-7018Z/S2 =
DN-1822 connects to the PET-7018Z/S2

ET-7218Z/S2 =
DN-1822 connects to the ET-7218Z/S2

PET-7218Z/S2 =
DN-1822 connects to the PET-7218Z/S2

ET-7218Z/S3 =
DN-1823 connects to the
ET-7218Z/S3

PET-7218Z/S3 =
DN-1823 connects to the
PET-7218Z/S3

15 cm

✅ Multi-function I/O

Model Name		AI			AO		DI/Counter		DO	
		Channel	Range	Sensor Type	Channel	Range	Channel	Contact	Channel	Type
ET-7002 PET-7002	ET-7202 PET-7202	3	±150 mV, ±500 mV, ±1V, ±5 V, ±10 V, +0 ~ +20 mA, ±20 mA, 4 ~ 20mA	-	-	-	6	Wet (Sink, Source)	3	Power Relay (Form A)
-	ET-7204 PET-7204	4	±500 mV, ±1V, ±5 V, ±10 V, +0 ~ +20 mA, ±20 mA, 4 ~ 20mA	-	4	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	4	Dry (Source), Wet (Sink, Source)	-	-
ET-7016 PET-7016	-	2	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, 0 ~ 20 mA, ±20 mA, 4 ~ 20mA	Strain Gauge, Load Cell, Full-Bridge, Half-Bridge, Quarter-Bridge	1 (Note)	0 ~ 10 V	2	Wet (Sink, Source)	2	Open Collector (Sink)
ET-7024 PET-7024	ET-7224 PET-7224	-	-	-	4	0 ~ 5 V, ±5 V, 0 ~ 10 V, ±10 V, 0 ~ 20 mA, 4 ~ 20 mA	5	Dry (Source), Wet (Sink, Source)	5	Open Collector (Sink)
ET-7026 PET-7026	ET-7226 PET-7226	6	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, 0 ~ 20 mA, ±20 mA, 4 ~ 20 mA	-	2		2		2	
ET-7028 PET-7028	ET-7228 PET-7228	-	-	-	8		-	-	-	-
Note: The AO is configured as a voltage excitation source for the strain gauge.										

✅ Digital I/O

Model Name		DI/Counter			DO				
		Channel	Contact	Sink/Source	Channel	Type	Sink/Source	Load Current @ 25°C	
ET-7042 PET-7042 ET-7042UT	ET-7242 PET-7242 ET-7242UT	-	-	-	16	Open Collector	Sink	100 mA/ channel	650 mA/ channel
ET-7044 PET-7044	ET-7244 PET-7244	8	Wet	Sink/Source	8	Open Collector	Sink	300 mA /channel	650 mA/ channel
-	ET-7245 PET-7245	-	-	-	16	Open Source	Source	600 mA/channel	
ET-7050 PET-7050	-	12	Wet (Note)	Sink/Source	6	Open Collector	Sink	100 mA/channel	
-	ET-7250A PET-7250A		Dry, Wet					500 mA/channel	
ET-7051 PET-7051	ET-7251 PET-7251	16	Wet	Sink/Source	-	-	-	-	
ET-7052 PET-7052	ET-7252 PET-7252	8	Wet	Sink/Source	8	Open Collector	Source	650 mA/channel	
ET-7053 PET-7053	ET-7253 PET-7253	16	Dry	Source	-	-	-	-	
-	ET-7255 PET-7255	8	Dry, Wet	Sink/Source	8	Open Collector	Source	650 mA/channel	

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☑ AC/DC Digital Input

Model Name		AC Digital Input					
		Channels	Contact	Sink/Source	ON Voltage Level	OFF Voltage Level	Isolation Voltage
-	ET-7258 PET-7258	8	Wet	Sink/Source	80 ~ 250 VAC ±90 ~ ±250 VDC	30 VAC (max.) ±30 VDC (max.)	Ethernet: 1500 VDC I/O: 2500 VDC
-	ET-7259 PET-7259				10 ~ 80 VAC ±15 ~ ±80 VDC	3 VAC (max.) ±3 VDC (max.)	

Model Name		AC Digital Input						Operating Temp.
		Channels	Contact	Sink/Source	ON Voltage Level	OFF Voltage Level	Isolation Voltage	
-	ET-7258M-16 PET-7258M-16	16	Wet	Sink/Source	80 ~ 250 VAC ±100 ~ ±250 VDC	30 VAC (max.) ±30 VDC (max.)	Ethernet: 1500 VDC I/O: 2500 VDC	-25 ~ +75°C
-	ET-7258M-16-UTA PET-7258M-16-UTA							-40 ~ +75°C
-	ET-7259M-16 PET-7259M-16				15 ~ 90 VAC ±20 ~ ±90 VDC	3 VAC (max.) ±3 VDC (max.)		-25 ~ +75°C
-	ET-7259M-16-UTA PET-7259M-16-UTA							-40 ~ +75°C

ET-7000/PET-7000 Series　　**ET-7200/PET-7200 Series**　　**ET-7258M-16/PET-7258M-16 ET-7258M-16-UTA/PET-7258M-16-UTA**

Note: The part number with -UTA means the PCB is conformal coated to work under extreme temperature conditions.

☑ Relay Output & Digital Input

Model Name		DI/Counter			Relay Output			
		Channel	Contact	Sink/Source	Channel	Relay	Type	Max. Load Current @ 25°C
ET-7060 PET-7060	ET-7260 PET-7260	6	Wet	Sink/Source	6	Power Relay	Form A (SPST N.O.)	5.0 A/channel
	ET-7260A PET-7260A		Dry, Wet					
-	ET-7261 PET-7261	-	-	-	11	Power Relay	Form A (SPST N.O.)	5.0 A/channel
ET-7065 PET-7065	-	6	Wet	Sink, Source	6	PhotoMOS Relay	Form A	1.0 A/channel
ET-7066 PET-7066	-	-	-	-	8	PhotoMOS Relay	Form A	1.0 A/channel
ET-7067 PET-7067	ET-7267 PET-7267	-	-	-	8	Power Relay	Form A (SPST N.O.)	5.0 A/channel

✔ Encoder/Counter Input

Model Name		Encoder/Frequency/Counter Input						DO	
		Channel	Encoder	Counter	Frequency	Count Value Retention	Maximum counting rate	Channel	Type
ET-7083 PET-7083	-	3	CW/CCW, Dir/Pulse, AB Phase	-	-	Yes	1 MHz	-	-
-	ET-7284 PET-7284	4/8		Up or Up/Down	Yes		200 kHz	4	Open Collector

2.3 Slim-Type Modbus TCP I/O Modules
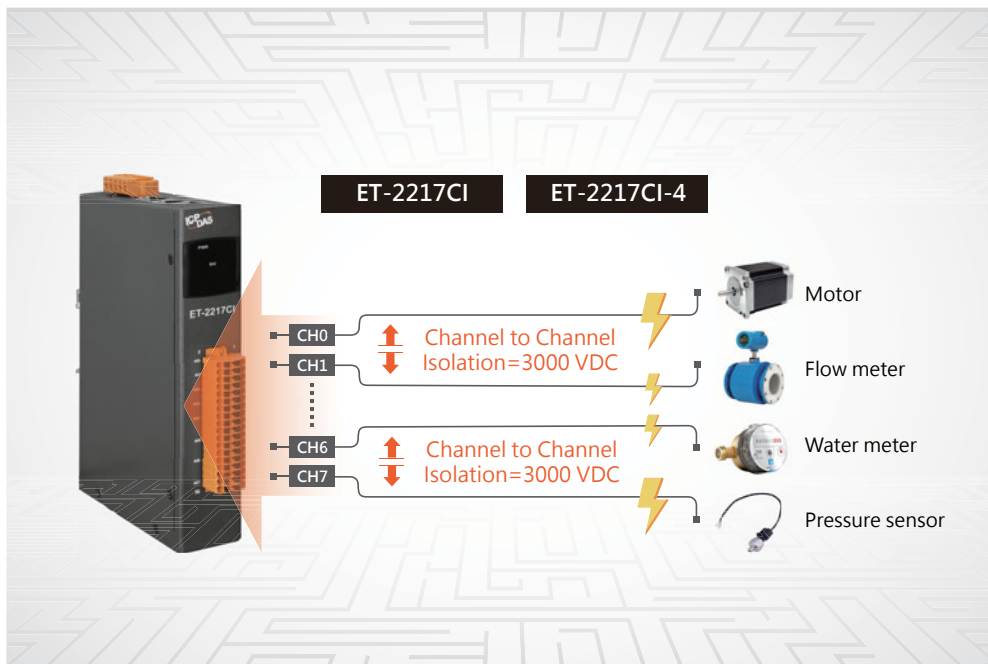
Introduction:

The ET-2200 module has built-in **2-port Ethernet Switch with LAN-bypass function**, which allows daisy-chain Ethernet cabling easily and reduces the total cost since less external Ethernet Switches installed. The ET-2200 module also provides **web configuration, higher speed of 32-bit DI counters, frequency measurement, PWM digital output functions**.

Push mode is a new way to transfer local DI status, immediately and automatically, to remote device or computer once the DI status changes. Without busy polling, push mode effectively reduces the network loading and improves the performance of the whole system. The ET-2200 module supports both **polling and push mode** to transfer the I/O data over the network. No programming is required in the ET-2200 module, and the push mode can be easily enabled through the web configuration interface.

Selection Guide:

Model Name		AI					Protocol		
Non-PoE	PoE	Channels	Sampling Rate	Voltage and Current Input		Channel to Channel Isolation	MQTT	SNMP V2c	
ET-2217	**PET-2217**	8/16	20/200Hz	±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, ±20 mA, 0 ~ +20 mA, +4 ~ +20 mA		-		Yes	
ET-2217CI-4	-	4	10/200Hz, for each channel	±1 V, ±2.5 V, ±5 V, ±10 V,±20 mA,		Yes	Yes	-	
ET-2217CI	-	8							

ET-2217CI   ET-2217CI-4

CH0
CH1
Channel to Channel Isolation=3000 VDC
CH6
CH7
Channel to Channel Isolation=3000 VDC

Motor
Flow meter
Water meter
Pressure sensor

Model Name		AO					Protocol	
Non-PoE	PoE	Channels	Resolution	Voltage Output	Current Output	Channel to Channel Isolation	MQTT	SNMP V2c
ET-2224	PET-2224	4	12-bit	0 ~ +5 V, 0 ~ +10 V, ±5 V, ±10 V	0 ~ +20 mA, +4 ~ +20 mA	-	Yes	Yes
ET-2228	PET-2228	8	12-bit	0 ~ +5 V, 0 ~ +10 V, ±5 V, ±10 V	0 ~ +20 mA, +4 ~ +20 mA	-	Yes	Yes
ET-2224CI	-	4	16-bit	0 ~ +5 V, 0 ~ +10 V	0 ~ +20 mA, +4 ~ +20 mA	Yes	Yes	-
ET-2228CI	-	8	16-bit	0 ~ +5 V, 0 ~ +10 V	0 ~ +20 mA, +4 ~ +20 mA	Yes	Yes	-

ET-2224CI   ET-2228CI

Channel to Channel Isolation=3000 VDC
Channel to Channel Isolation=3000 VDC

Motor
Motor
Valve
Valve
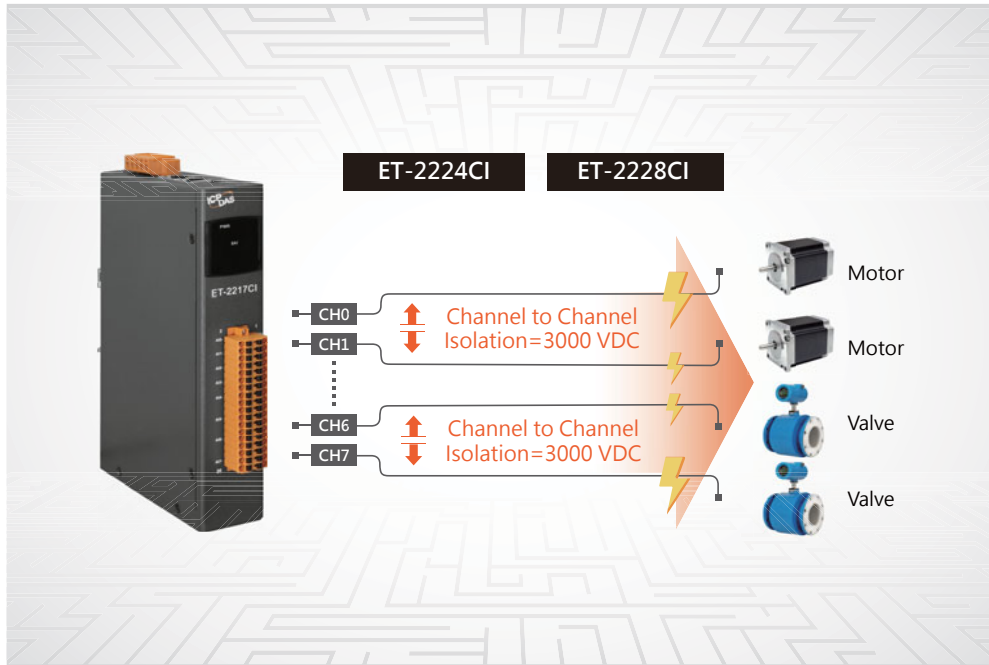
Model Name		UDIO	DI			DO			
Non-PoE	PoE	Channels	Channels	Contact	Sink/Source	Channels	Type	Sink/Source	Max. Load @ 25°C
ET-2242	PET-2242	-	-	-	-	16	Open Collector	Sink	650 mA/Channel
ET-2242-32	PET-2242-32	-	-	-	-	32	Open Collector	Sink	600 mA/Channel
ET-2242U	-	-	-	-	-	16	Push-Pull	Sink/Source	500 mA/Channel
ET-2251	PET-2251	-	16	Wet/Dry	Sink/Source	-	-	-	-
ET-2251-32	PET-2251-32	-	32	Wet/Dry	Sink/Source	-	-	-	-
ET-2254	PET-2254	16	(Note1)	Dry	Source	(Note1)	Open Collector	Sink	100 mA/Channel
ET-2254P	PET-2254P	16	(Note1)	Dry	Source	(Note1)	Open Collector	Sink	350 mA/Channel
ET-2255	PET-2255	-	8	Wet/Dry	Sink/Source	8	Open Collector	Sink	650 mA/Channel
ET-2255-32	PET-2255-32	-	16	Wet/Dry	Sink/Source	16	Open Collector	Sink	500 mA/Channel
ET-2255U	PET-2255U	-	8	Wet/Dry	Sink/Source	8	Push-Pull	Sink/Source	500 mA/Channel

Note1: The number of DI/DO channels is depending on wiring and the software configuration.
Note2: All DI/DO modules support both MQTT and SNMP V2c protocols.

Model Name		DI			Relay Output			
Non-PoE	PoE	Channels	Contact	Sink/Source	Channels	Relay	Type	Contact Rating
ET-2260	PET-2260	6	Wet/Dry	Sink/Source	6	Power Relay	Form A (SPST N.O.)	5 A @ 250 VAC/24 VDC (Resistive Load)
ET-2261	PET-2261	-	-	-	10	Power Relay	Form A (SPST N.O.)	5 A @ 250 VAC/24 VDC (Resistive Load)
ET-2261-16	PET-2261-16	-	-	-	16	Power Relay	Form A (SPST N.O.)	5 A @ 250 VAC/24 VDC (Resistive Load)
ET-2268	-	-	-	-	8	Signal Relay	4 Form A, 4 Form C	2 A @ 30 VDC 0.25 A @ 250 VDC

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2.4 MQTT I/O Module

MQ-7200M is an I/O module designed for Internet of Things. It support MQTT V3.1 client. Through the MQTT broker (can be installed on private cloud or public cloud), it can flexibly exchange data between I/O modules and other MQTT clients.

Compared to request/response type of Ethernet I/O modules, MQTT I/O modules bring two obvious benefits:

1. Reduce the Ethernet communication packets

The behavior of most request/response type of Ethernet I/O modules is: the master polls every modules periodically no matter the data is changed or not. MQTT I/O modules can be confi gured to publish data to the broker periodically or an event happens. Thus the Ethernet communication packets can be obviously reduced.

2. Simplify the network configuration

MQTT I/O modules can be confi gured as dynamic IP address. Only the MQTT broker needs a domain name or a static IP address. Thus the networking confi guration for each MQTT I/O module can be the same. Thus the configuring work becomes simplified.
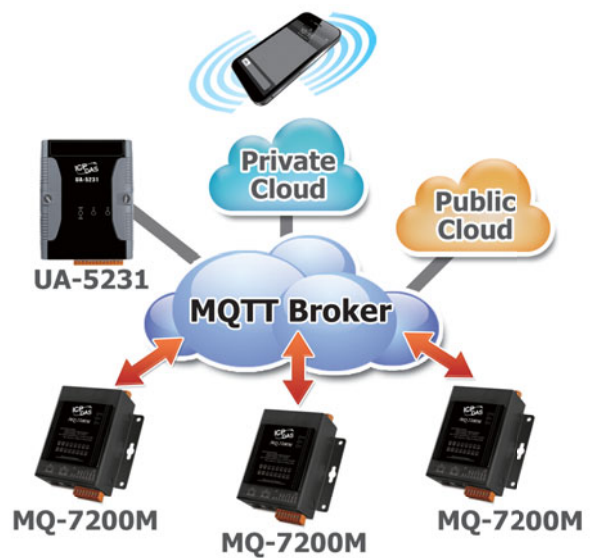
Features:

- Support MQTT V3.1 Client
- 2-port Ethernet Switch for Daisy-chain Topology
- Build-in LED indicators for I/O
- Built-in Web Server for Configuration
- LAN Bypass to Prevent Communication Lost While Power Lost

Appearance:

I/O Connector
Run Indicator
Ethernet Indicators
DIO Indicators
Ethernet Switch
Reset Button
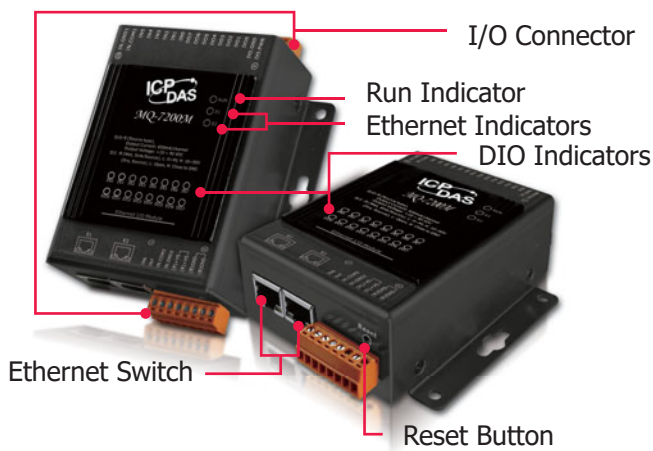
Applications:

Selection Guide:

Module Name	DI			DO			
	Channels	Type	Sink/Source	Channels	Type	Sink/Source	Load Current @ 25 °C
MQ-7244M	8	Wet	Sink/Source	8	Open Collector	Sink	650 mA/Channel
MQ-7252M		Wet				Source	
MQ-7255M		Dry, Wet				Source	
MQ-7251M	16	Wet	Sink/Source	-	-	-	-
MQ-7253M		Dry	Source				
MQ-7260AM	6	Dry, Wet	Sink/Source	6	Power Relay	Form A	5A

2.5 Tiny-Size Modbus TCP I/O Modules

Introduction:

The functionality of the tET/tPET series modules is almost the same as the PET-7000. The major difference is that the PET-7000 module supports user-defined web HMI interface and more connections, while the tET/tPET series supports fixed web interface for configuration, higher speed of 32-bit DI counters, frequency measurement, PWM digital output and low power consumption. Especially the tET/tPET series features tiny form factor and low channel count that are suitable in distributed I/O points applications, such as room control and monitor.

Push mode is a new way to transfer local DI status, immediately and automatically, to remote device or computer once the DI status changes. Without busy polling, push mode effectively reduces the network loading and improves the performance of the whole system. tET/tPET series supports both Pull and Push mode to transfer the I/O data over the network. No programming is required in the tET/tPET series, and the push mode can be easily enabled through the web configuration interface. The solution makes the user set up system easily and quickly, and the system work more efficient.

Application:

- Remote Maintenance
- Testing Equipment
- Building Automation
- Factory Automation
- Machine Automation
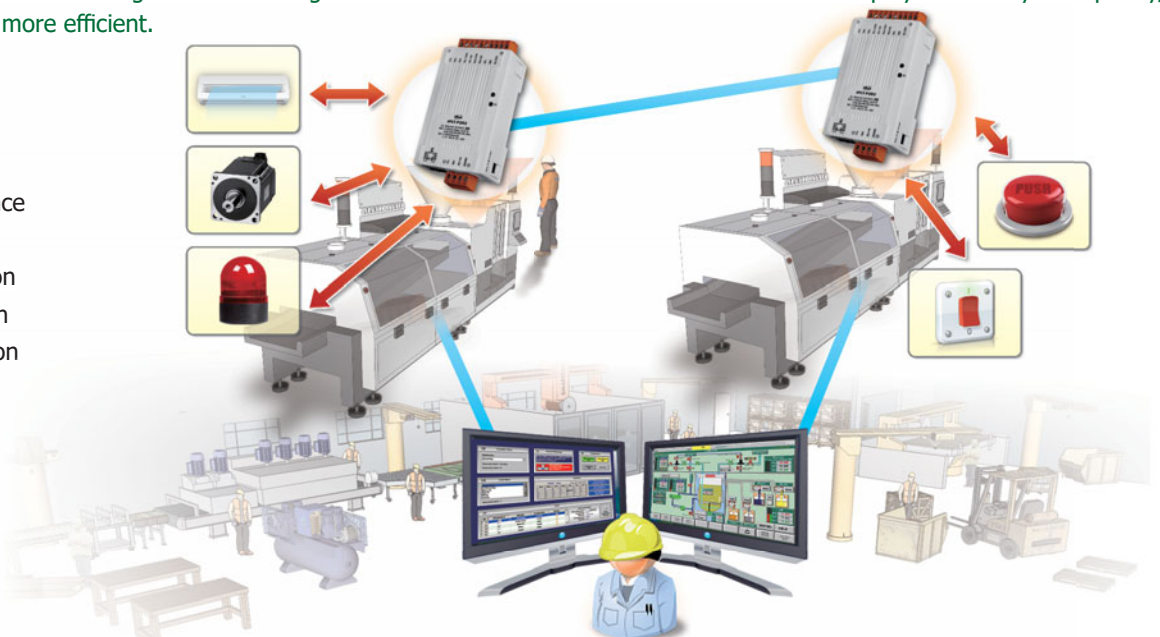
Features:

❶ I/O Pair-Connection

The tET/tPET series Ethernet I/O modules support various I/O types, like photo-isolated digital input, power relay, PhotoMOS relay, and open collector output. The module can be used to create DI to DO (or AI to AO) pair-connection through the Ethernet. Once the configuration is completed, the module can automatically read inputs and write to outputs via the Modbus TCP protocol.

Pull Mode:
Remote inputs to **Local** outputs

Push Mode:
Local inputs to **Remote** outputs

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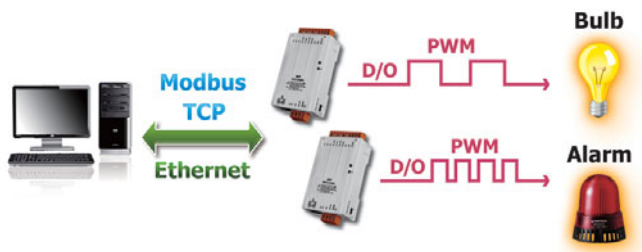Industrial Computer Products and Data Acquisition Systems
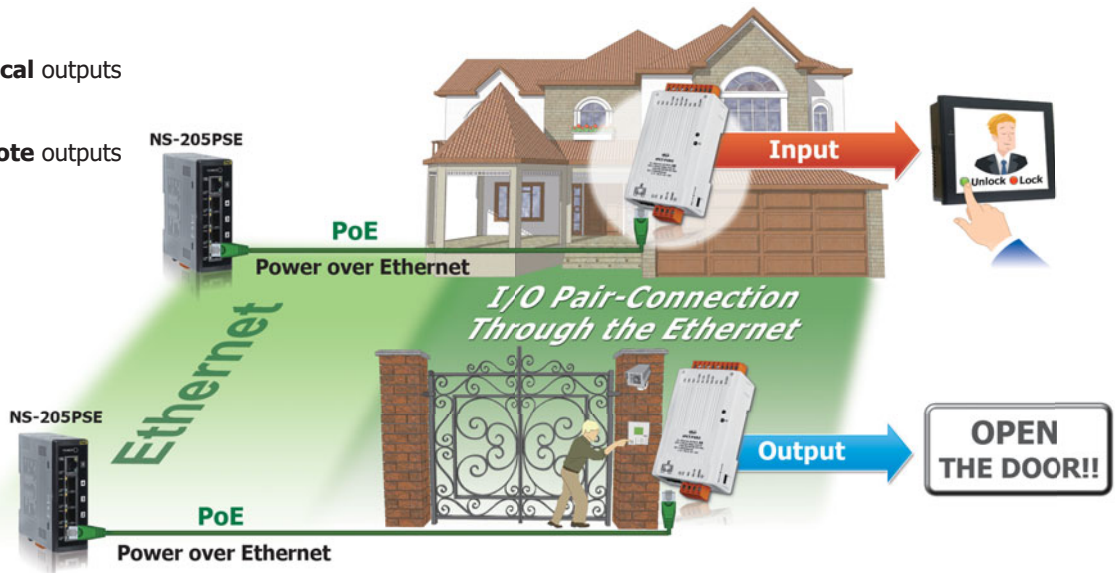
❷ 32-bit High Speed Digital Counter

Polling the remote DI status back and then counting the ON/OFF changes in host computer may get quantity errors caused by communication delay. The tET/tPET series module has Built-in 32-bit counter function; it counts the DI ON/OFF changes in site to prevent counting errors caused by the communication latency. The 32-bit counter of the tET/tPET modules can count up to 4,294,967,295 and accept a frequency up to 3,500 Hz (without low pass filter), so it is suitable for more applications such as production counting, button or switch ON/OFF counting, event counting.
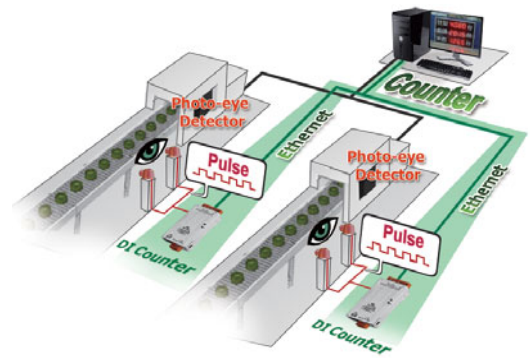
❸ Frequency Measurement

The tET/tPET module also supports frequency measurement function; it counts the DI ON/OFF changes in a certain time period and then calculates the frequency automatically. Rather than polling remote DI status back and then computing the frequency in the host PC, our module can directly count out the frequency in site. This reduces the frequency errors caused by communication latency between two ends, and also reduces the network loadings. In order to apply for more applications, this module provides 3 scan modes (0.1s, 1s and single-pulse) and 4 moving average levels for user to select the best way in their applications. This feature can be used for rotation and speed measurements… etc.

❹ PWM (Pulse Width Modulation) Digital Output

The DOs on the tET/tPET series provide PWM (pulse width modulation) function that can be used in applications such as alarm light, flash light controls. Once the configuration is finished, the module will automatically and continuously switch the DO output ON and OFF. This removes the busy control by remote host and also reduces the network loadings. Users can set different frequency and duty cycle for the PWM function in each digital output channel. In addition, the DO channels can work independently or simultaneously. This function reduces the complexity of the control system and enhances the timing accuracy of pulse output.
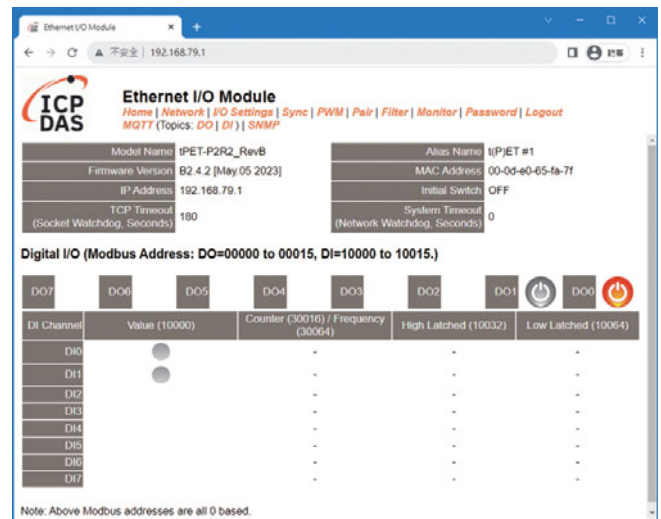
❺ Easy Network Configuration

DHCP minimizes configuration errors caused by manual IP address configuration, such as address conflicts caused by the assignment of an IP address to more than one computer or device at the same time. The tET/tPET series module supports the DHCP client function, which allows the tET/tPET to easily obtain the necessary TCP/IP configuration information from a DHCP server. The module also contains a UDP responder that transmits its IP address information to a UDP search from the eSearch utility program, making local management more efficient.

The series of Ethernet I/O modules features a powerful 32-bit MCU to enable efficient handling of network traffic. It also has a Built-in web server that provides an intuitive web management interface to allow users to modify the settings of the module including DHCP/Static IP, gateway and mask.

❻ Dual Watchdog with Power-on and Safe Value

The module provides dual watchdog: module watchdog (hardware function) and host watchdog (software function). The module watchdog automatically resets the module if the built-in firmware is operating abnormally, while the host watchdog sets the digital output with predefined safe-value when there is no communication between the module and the host (PC or PLC) for a period of time (watchdog timeout). The dual watchdog is an important feature that ensures the module operates continuously, even in harsh environments.
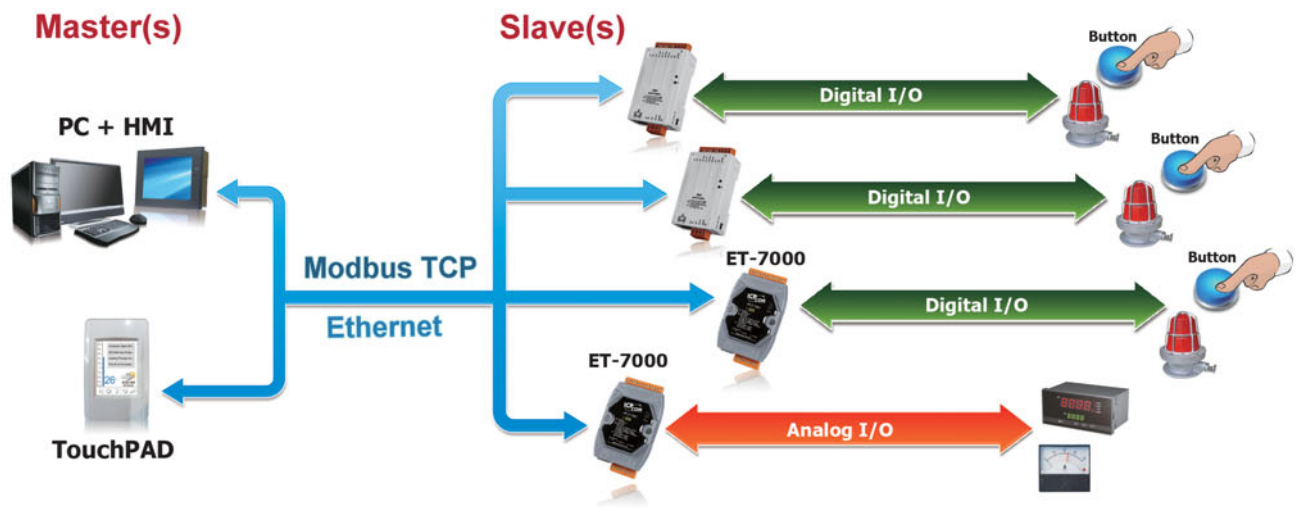
❼ PoE (Power over Ethernet)
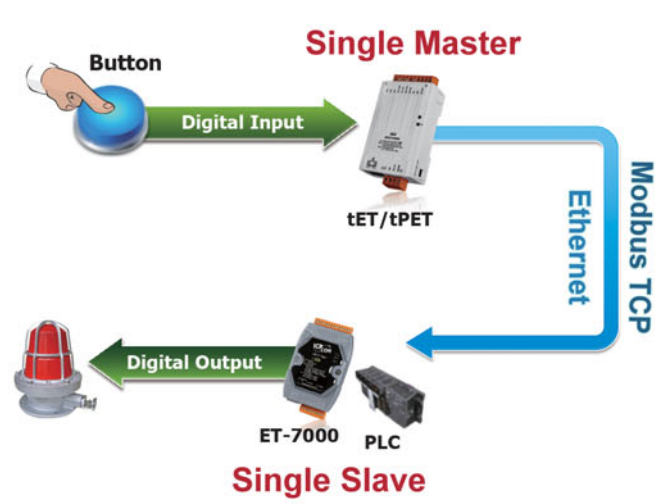
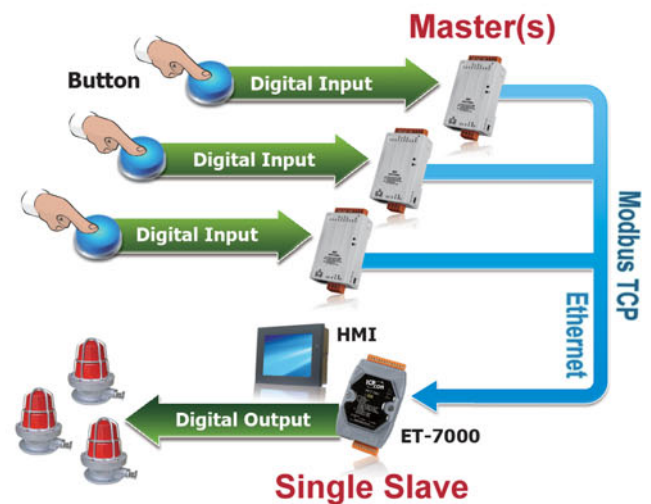The module also accept power input from a DC adapter.

❽ Low Power Consumption

① Polling: Masters poll tET/tPET DIO modules

Master(s)

PC + HMI

Slave(s)

Button

Digital I/O

Button

Digital I/O

ET-7000

Button

Modbus TCP

Ethernet

Digital I/O

ET-7000

TouchPAD

Analog I/O

② Push Mode: tET/tPET module pushes DI to remote DO

Button

Single Master

Digital Input

tET/tPET

Modbus TCP

Ethernet

Digital Output

ET-7000   PLC

Single Slave

③ Push Mode: tET/tPET modules push DI to remote DO

Master(s)

Button   Digital Input

Button   Digital Input

Button   Digital Input

Modbus TCP

Ethernet

HMI

Digital Output

ET-7000

Single Slave

④ Pull Mode: tET/tPET DIO pair-connection

Button

Single Master

Digital I/O

Modbus TCP

Ethernet

Button

Digital I/O

Single Slave
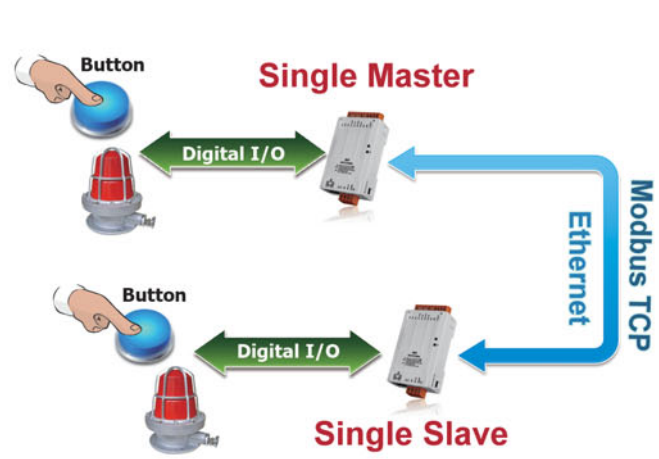
⑤ Pull Mode: tET/tPET modules pull remote DI to Local DO

Master(s)

Button   Digital I/O

Button   Digital I/O

Button   Digital I/O

Modbus TCP

Ethernet

PC + HMI   ET-7000

Single Slave
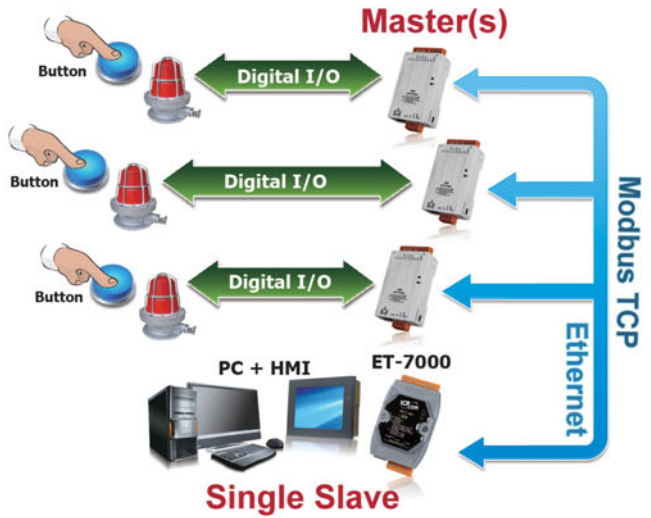
System Specifications:

Model Name	tET Series	tPET Series
Software		
Built-in Web Server	Yes	
I/O Pair Connection ✉	Support Pull and Push modes	
CPU Module		
CPU	32-bit MCU	
Watchdog Timer	Module, Communication (Programmable)	
EMS Protection		
EFT (IEC 61000-4-4)	±4 kV for Power Line	
ESD (IEC 61000-4-2)	±4 kV Contact for Each Terminal	
	±8 kV Air for Random Point	
LED Indicators		
Status	Run, Ethernet	Run, Ethernet, PoE
Ethernet		
Ports	1 x RJ-45, 10/100 Base-Tx	
PoE	-	Yes
Security	Password and IP Filter	
Protocol	Modbus TCP/UDP, MQTT, or SNMP V2c Protocols	
Power		
Reverse Polarity Protection	Yes	
Powered from PoE	-	IEEE 802.3af, Class 1
Powered from Terminal Block	+12 to +48 VDC	
Mechanical		
Dimensions (mm)	52 x 96 x 27 (W x L x H)	
Installation	DIN-Rail mounting	
Environment		
Operating Temperature	-25 ~ +75 °C	
Storage Temperature	-30 ~ +80 °C	
Humidity	10 to 90% RH, Non-condensing	

Selection Guide:

Analog Input/Analog Output								
Model Name		AI				AO		
PoE	**Non-PoE**	Channels	Fast Sampling Rate	Resolution	Voltage & Current Input	Channels	Resolution	Voltage & Current Output
tPET-AD2	**tET-AD2**	2	200 Hz	16-bit	0 ~ 500 mV, 0 ~ 1 V, 0 ~ 2.5 V, 0 ~ 5 V, 0 ~ 10 V, 0 ~ 20 mA, 4 ~ 20 mA	-	-	-
tPET-DA2	**tET-DA2**	-	-	-	-	2	12-bit	0 ~ 10 V, 0 ~ 20 mA, 4 ~ 20 mA

Digital Input/Digital Output								
Model Name		DI			DO			
PoE	**Non-PoE**	Channels	Contact	Sink/Source	Channels	Type	Sink/Source (NPN/PNP)	Max. Load @ 25°C
tPET-P6	**tET-P6**	6	Wet	Sink/Source	-	-	-	-
tPET-PD6	**tET-PD6**	6	Dry	Source	-	-	-	-
tPET-C4	**tET-C4**	-	-	-	4	Open Collector	Sink (NPN)	100 mA/channel
tPET-A4	**tET-A4**	-	-	-	4	Open Emitter	Source (PNP)	650 mA/channel
tPET-P2C2	**tET-P2C2**	2	Wet	Sink/Source	2	Open Collector	Sink (NPN)	100 mA/channel
tPET-P2A2	**tET-P2A2**	2	Wet	Sink/Source	2	Open Emitter	Source (PNP)	650 mA/channel

Relay Output/Digital Input							
Model Name		DI			Relay Output		
PoE	**Non-PoE**	Channels	Contact	Sink/Source	Channels	Relay	Type	Load Current
tPET-P2POR2	**tET-P2POR2**	2	Wet	Sink/Source	2	PhotoMOS Relay	Form A	1.0 A/channel
tPET-PD2POR2	**tET-PD2POR2**	2	Dry	Source	2	PhotoMOS Relay	Form A	1.0 A/channel
tPET-P2R2	**tET-P2R2**	2	Wet	Sink/Source	2	Power Relay	Form A (SPST N.O.)	5.0 A/channel
tPET-PD2R1	**tET-PD2R1**	2	Dry	Source	1	Power Relay	Form A (SPST N.O.)	5.0 A/channel

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# 2.6 Ethernet I/O Expansion Unit

Ethernet I/O Expansion Unit

iP-8000-MTCP series is an Ethernet I/O expansion unit with Modbus protocol. It supports most of high profile I-8K and I-87K series I/O modules. SCADA and HMI software can easily access variant I/O signals via the unit.
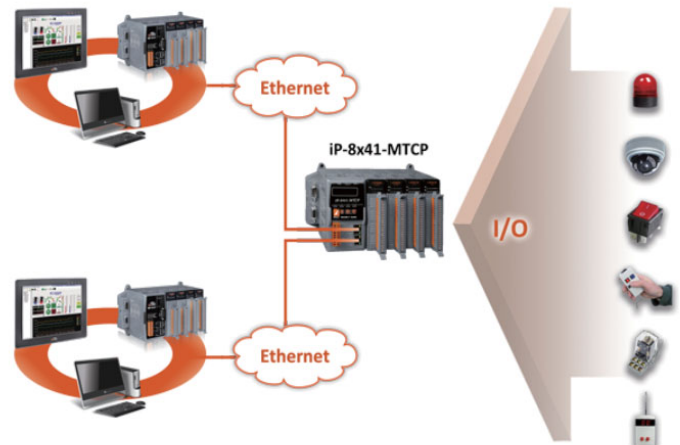
Model (Modbus/TCP)	Ethernet	IP Address	I/O Slot	I-8K series	I-87K series	I/O Hot Swap	COM Port
iP-8441-MTCP	2(10/100 M)	2	4	Yes	Yes	-	4
iP-8841-MTCP			8				

Intelligent Ethernet I/O Expansion Unit

ET-87Pn-MTCP series is a Modbus TCP 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 for daisy-chain topology. The daisy-chain feature allows ET-87Pn to connect in series to each other or other Ethernet devices. Users can easily simplify the cabling and save installation space with the feature.
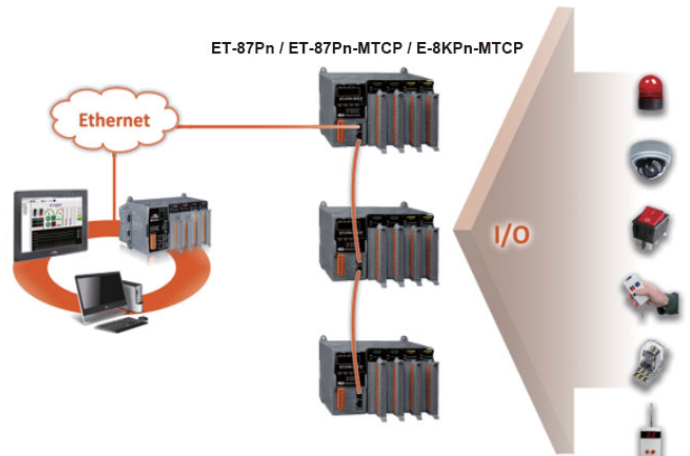
Model (Modbus/TCP)	Ethernet	IP Address	I/O Slot	I-8K series	I-87K series	I/O Hot Swap	COM Port
ET-8KP4-MTCP	2(10/100 M)	1	4	Yes	Yes	-	1
ET-8KP8-MTCP			8				
ET-87P4-MTCP	2(10/100 M)	1	4	-	Yes	Yes	1
ET-87P8-MTCP			8				

Model (DCON)	Auto Configuration	Hot Swap	Ethernet Port	Max. Baud Rate	I/O Slot
ET-87P4	Yes	Yes	2, 10/100Base-TX (Note)	115200 bps	4
ET-87P8					8

Note: The two ethernet ports, LAN1 and LAN2, are connected with a bridge and they operate much like a network switch. They have a common IP address and a subnet mask.

2.7 OPC UA I/O Module

OPC UA I/O module is a series of Ethernet I/O modules with built-in OPC UA Server and MQTT Client services. It provides a web interface for configuring the module, controlling the output channels, monitoring the connection and I/O status. In industrial communication, UA I/O provides OPC UA Server and MQTT Client protocols (can execute both communications at the same time). Users can choose the networking mode according to their cases. And to transmit the values of the built-in I/O channels to the Cloud IT system or field control system for reading and writing. Support Scaling to convert the analog signal into a more readable value.
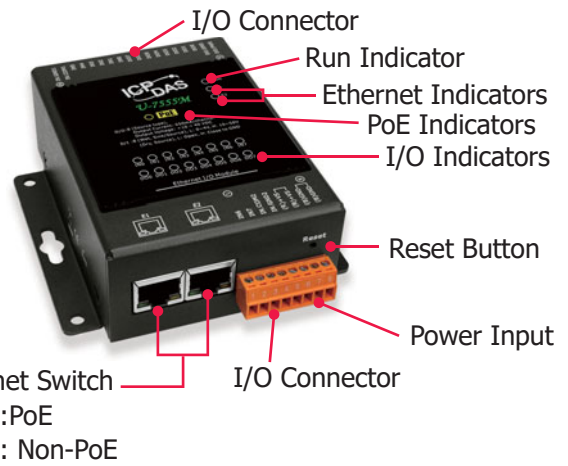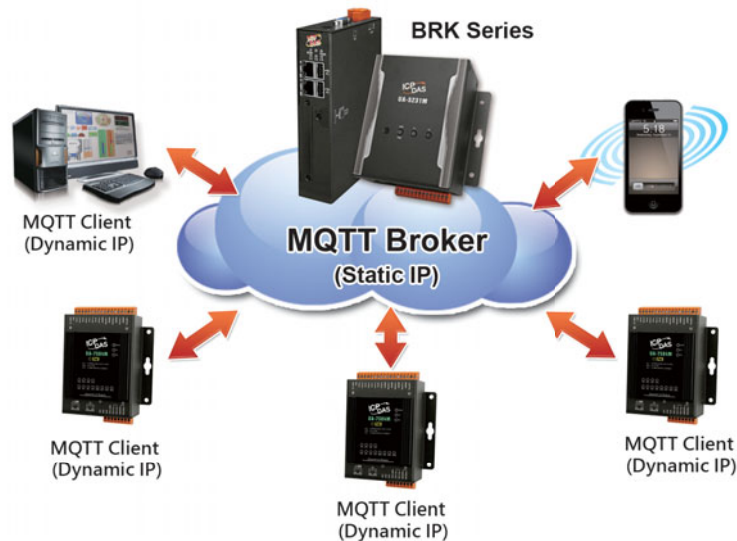

Ethernet Switch
E1:PoE
E2: Non-PoE

UA I/O Series provides a Web-based User Interface (Web UI) to configure the module, control the output channels, monitor the connection, and I/O status via a normal web browser. It is easy, fast, and no extra APP needed.

OPC UA Architecture:

MQTT Architecture:

Features:

■ **Built-in OPC UA Server Service**

Compliance with IEC 62541 Standard. Provides functions of Active Transmission, Transmission Security Encryption (SSL/TLS), User Authentication (X.509 Certificates/Account password), Communication Error Detection and Recovery, etc. to connect SCADA or OPC UA Clients. Recommend to keep the maximum number of sessions within 3 connections.

■ **Built-in MQTT Client Service**

Build-in MQTT Client Service (Compliance with MQTT V.3.1.1 protocol). Provides functions of IoT Active M2M Transmission, QoS (Quality of Service), Retains Mechanism, Identity Authentication, Encryption, Last Will, etc.

■ **Support to Execute OPC UA and MQTT Communication Simultaneously**

■ **Built-in Web Server to Provide the Web User Interface**

UA I/O Series provides a Web-based User Interface (Web UI) to configure the module, control the output channels, monitor the connection, and I/O status via a normal web browser. It is easy, fast, and no extra APP needed.

■ **Built-in I/O Channels**

UA I/O series has built-in AI, AO, DI, or DO channels, which is convenient for users to choose different models according to different needs.

■ **2-port Ethernet Switch for Daisy-Chain Topology**

The cabling of Daisy-Chain Topology is much easier and total costs of cable and switch are significantly reduced.

■ **IEEE 802.3af-compliant Power over Ethernet (PoE)**

UA I/O follows IEEE 802.3af compliant Power over Ethernet (PoE) specification. It allows receiving power from PoE enabled network by Ethernet pairs. This feature provides greater flexibility and efficiency to simplify system design, save space, and reduce wirings and power sockets.

Advantages:
Comparison Table of ICP DS UA I/O Module & Traditional I/O Module

	ICP DAS UA I/O Module		Traditional I/O Module
Protocol	**OPC UA Server**	**MQTT Client**	**Modbus TCP Slave**
IP Setting	Static IP	Static or Dynmic (DHCP) IP	Static IP
Identity Authentication	Account ID/Password, Anonymous, Certificate Verification	Account ID/Password, Anonymous	None
Encryption	SSL/TLS	SSL/TLS	None
Data Transmission	Active (Actively sends Data to the Client)	Active (Actively publishes Data to Broker, and the Broker sends Data to other Clients)	Passive (Wait for Master to poll the Data: Query/Response)
Project Building	Via browse the Server Content	Via subscribe Topic from Broker	Manually assign an ID and define the Data address and type.

Selection Guide:

OPC UA I/O Modules U-7000 Series: Built-in with the OPC UA Server and MQTT Client services								
Model Name	**AI**		**AO**		**DI**		**DO**	
	Ch.	Type	Ch.	Type	Ch.	Type	Ch.	Type
U-7502M	3	±150 mV, ±500 mV, ±1 V, ±5V, ±10V, +0 mA ~ +20 mA, ±20 mA, 4 ~ 20 mA	-	-	6	Wet (Sink,Source)	3	Power Relay Form A (SPST N.O.)
U-7504M	4	±500mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4~20mA	4	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	4	Dry (Source), Wet (Sink)	-	-
U-7515M	7	Pt100, Pt1000, Ni120, Cu100, Cu1000	-	-	-	-	-	-
U-7517M	8	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	-	-	-	-	4	Isolated Open Collector (Sink)
U-7517M-10	10/20	±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA	-	-	-	-	-	-

| Model Name	AI		AO		DI		DO	
	Ch.	Type	Ch.	Type	Ch.	Type	Ch.	Type
U-7518ZM/S	10	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710	-	-	-	-	3	Isolated Open Collector (Sink)
U-7518ZM/S2								
U-7519ZM/S	10	±15mV, ±50mV, ±100mV, ±150mV, ±500mV, ±1V, ±2.5V, ±5V, ±10V, ±20mA, 0~20mA, 4~20mA Thermocouple: J, K, T, E, R, S, B, N, C, L, M, LDIN43710	-	-	-	-	3	Isolated Open Collector (Sink)
U-7519ZM/S2								
U-7524M	-	-	4	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	5	Dry (Source) Wet (Skin)	5	Isolated Open Collector (Sink)
U-7526M	6	±500 mV, ±1V, ±5V, ±10V, 0~20mA, ±20mA, 4~20mA	2	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	2	Dry (Source) Wet (Skin)	2	Isolated Open Collector (Sink)
U-7528M	-	-	8	0~5V, ±5V, 0~10V, ±10V, 0~20mA, 4~20mA	-	-	-	-
U-7542M	-	-	-	-	-	-	16	Isolated Open Collector (Sink)
U-7544M	-	-	-	-	8	Wet (Sink,Source)	8	Isolated Open Collector (Sink)
U-7545M	-	-	-	-	-	-	16	Isolated Open Collector (Source)
U-7550AM	-	-	-	-	12	Dry (Source) Wet (Sink)	6	Isolated Open Collector (Sink)
U-7551M	-	-	-	-	16	Wet (Sink,Source)	-	-
U-7552M	-	-	-	-	8	Wet (Sink,Source)	8	Isolated Open Collector (Source)
U-7553M	-	-	-	-	16	Dry (Source)	-	-
U-7555M	-	-	-	-	8	Dry (Source), Wet (Sink,Source)	-	Isolated Open Collector (Source)
U-7558M	-	-	-	-	8	Wet (Sink/Source)	-	-
U-7559M	-	-	-	-	8	Wet (Sink/Source)	-	-
U-7560M	-	-	-	-	6	Wet (Sink/Source)	6	Power Relay Form A (SPST N.O.)
U-7561M	-	-	-	-	-	-	11	Power Relay Form A (SPST N.O.)
U-7567M	-	-	-	-	-	-	8	Power Relay Form A (SPST N.O.)

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2.8 iDCS Redundant I/O

iDCS-8000
The iDCS-8000 system is a combination of power, communication within the backplane. For different combination, there will be different iDCS-8000 system. Here is the list of iDCS-8000 system.

Model	Redundancy	Auto Configuration	Hot Swap	Comm. Interface	I/O Slot
iDCS-8830 2x FPM-D2440+2x FCM-MTCP	Yes	Yes	Yes	Modbus/TCP	8
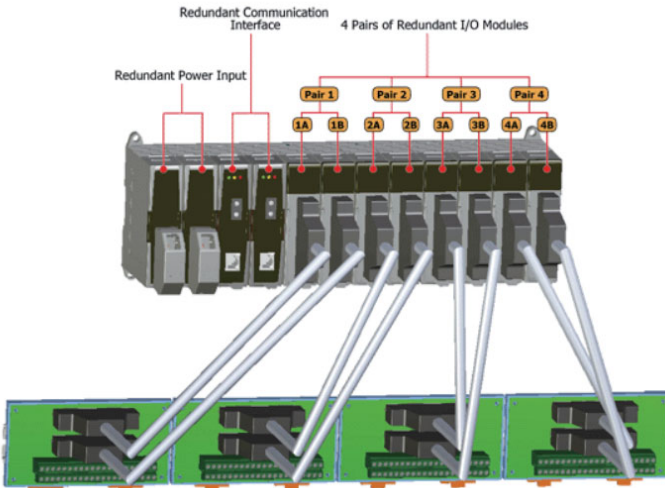
iDCS-Modules

Type		Model	Description
Communication Module		FCM-MTCP	Modbus/TCP with support redundant function.
Power Module		FPM-D2440	24 VDC input, 35W@5V, 120W@24V, with redundant function.
Digital	Input	F-8040	32-ch, dry contact, sink/source, Isolated, one COM for all DI, LED display.
	Output	F-8041	32-ch, sink, 0.1A/channel, Isolated, one COM for all DO, LED Display.
Analog	Input	F-8017C1	8-ch, 4~20mA, Isolated.
		F-8017C2	16-ch, 4~20mA, Isolated.
		F-8017CH	8-ch, 4~20mA with HART compliant, Isolated.
		F-8015	8-ch, RTD sensor Pt100, Pt1000, JPt100, Isolated.
		F-8019	8-ch, Single/Duplex, universal analog input and Thermocouple. (J, K, T, E, R, S, B, N, C, L, M), Isolated
	Output	F-8028CV	8-ch, 4~20mA, 0~20mA, 0~5V, 0~10V, +/-5V, +/-10V, Isolated.
		F-8028CH	8-ch, 4~20mA with HART compliant, Isolated.
Pulse	Input	F-8084	8-channel High Speed Pulse Input Module, Isolated.

Accelerometer Data Logger Reserved page

PAC & Local I/O Modules

3.1 PAC I/O Modules (I-8K and I-87K Series)

There are two types of I/O modules, parallel and serial. Both type of the modules can be plugged into the slots of PAC series. But only the serial module can be used in remote I/O units, such as RU-87Pn and ET-87Pn. Up to now, over 100 I/O, communication and motion control modules are available. For the new generation PACs, only the high profile I-8KW and I-87KW I/O modules can be used.

❶ **Parallel I/O Modules (I-8KW Series) Includes**

- High speed A/D: 100 k samples/second
- High speed D/A: 30 k (-10 ~ +10 V)
- High speed DI & DO: All Digital I/O modules provide visual indication of status via LED indicators
- High speed stepping/Servo motion control modules
- High speed encoder modules
- High performance Counter/Frequency modules
- High speed multi-channel RS-232/422/485 modules
- CAN bus communication modules

❷ **Serial I/O modules (I-87KW Series) Includes**

- RTD Input modules
- Thermocouple Input modules
- Strain Gauge Input modules
- VW Input modules
- High resolution multi-channel Analog Input modules
- Isolated multi-channel D/A modules
- Digital Input and Digital Output modules with Latch and counter function
- Counter/Frequency modules

URL Link

HOME > PRODUCTS > Remote I/O Module and Unit > PAC I/O Modules > I-8K/I-87K Series (High Profile)

| Introduction | Analog I/O | Digital I/O | Motion Control | Communication | Others | Software Support |

Parallel Bus (I-8K Series) VS Serial Bus (I-87K Series) I/O Modules

There are two types of I/O communication bus, parallel bus and serial bus. The parallel bus type I/O modules (high profile I-8K series) are high speed ones used only in the PACs including XPAC, WinPAC, iPAC, ViewPAC, etc. And the serial bus type I/O modules (high profile I-87K series) are low speed ones used in both PACs including XPAC, WinPAC, iPAC, ViewPAC, etc., and I/O expansion units including RU87Pn, ET-87Pn, USB-87Pn, etc.

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USB I/O Products

4. USB I/O Products

ICP DAS USB series I/O modules are highly flexible solution to acquire or output data. User can build up own PC-based control, laboratory research, testing and so on by applying ICP DAS USB series I/O modules. The advantages of ICP DAS USB I/O modules are small size, portable, plug & play and various input type to help user build up own project easily and quickly in different field and application. These I/O modules can be applied in wide range application, ex: fan-less control or measurement, automatically testing systems...etc. ICP DAS provides two kinds of USB series I/O as below.

1. USB–2000 I/O :
It provides 10kS/s data acquisition functionality and powered by USB port. User can apply this to real-time demanded application, ex: vibration current measurement.

2. USB-87Pn I/O:
We also developed USB-87Pn, a series of USB remote I/O unit for compact and modular I/O expansion. It comprises a CPU, a power module and a backplane with a number of I/O slots for flexible I/O configuration.

The brief comparison is as the following table.

Model Name	USB-2000	USB-4000	USB-87Pn
Pictures			
Cable	USB type B connector	Micro USB	USB type B connector
Protocol	USB HID	Modbus RTU	DCON (ASCII Format)
Power Supply	USB port	USB port	+10 ~ +30 VDC via wiring
Sd	12 Mbit/s (USB 2.0 Full-Speed)	12 Mbit/s (USB 2.0 Full-Speed)	115200 bit/s (default)
Slot for I/O Unit	-	-	1/2/4/8
Size	33 mm × 78 mm × 107 mm 31 mm × 129 mm × 147 mm	113 mm × 169 mm × 29 mm 113 mm × 169 mm × 54 mm	64 mm × 120 mm × 110 mm (min) 312 mm × 132 mm × 111 mm (max)
SDK and Sample	VB, C++, C#.Net, VB.Net, Linux driver	N/A	Dll, Labview, InduSoft, Linux, OPC server

Features:

- **USB bus powered** - Plug and Play
- **Dual Watchdog** - Hardware and Communication WDT
- **Power On Value & Safe Value** - When output module power-on, reset, or communication timeout
- **Highly Reliable Under Harsh Environment** - From -25 to 75°C

Selection Guide:

☑ USB-87Pn

Model Name		Interface	Description
	USB-87P1 USB-87P2 USB-87P4 USB-87P8	USB 2.0	I/O Expansion Unit with 1/2/4/8 slots, support I-87K series I/O modules

Selection Guide:

✅ USB Analog I/O

Model Name	Interface	Analog Input					Analog Output		
		Channels	Resolution	Input Type	Isolation	Sampling Rate	Channels	Resolution	Output Type
USB-2019	USB 2.0	8	16-bit	15 mV, 50 mV, 100 mV, 150 mV, 500 mV, 1 V, 5 V, 10 V, 20 mA, 0 ~ 20 mA, 4 ~ 20 mA, J, K, T, E, R, S, B, N, C, L, M, ∟DIN43710	3000 V$_{DC}$	10 Hz	-	-	-

✅ USB Multifunction I/O

Model Name	Interface	Analog Input			Analog Output		Digital Input		Digital Output		
		Channels	Resolution	Sampling Rate	Channels	Resolution	Channels	Type	Channels	Type	Rating
USB-2026	USB 2.0	5	14/12	10/200 Hz	2	12	2	Dry, Source	2	OC, Sink	700 mA

✅ USB Digital I/O

Model Name	Interface	Digital Input		Digital Output		
		Channels	Type	Channels	Type	Rating
USB-2045	USB 2.0	-	Dry, Source	16	Open Collector, Sink	700 mA/Channel
USB-2045-32	USB 2.0	-	Dry, Source	32	Open Collector, Sink	500 mA/Channel
USB-2051	USB 2.0	16	Dry, Source / Wet, Sink/Source	-	-	-
USB-2051-32	USB 2.0	32	Dry, Source / Wet, Sink/Source	-	-	-
USB-2055	USB 2.0	8	Dry, Source / Wet, Sink/Source	8	Open Collector, Sink	700 mA/Channel
USB-2055-32	USB 2.0	16	Dry, Source / Wet, Sink/Source	16	Open Collector, Sink	600 mA/Channel
USB-2060	USB 2.0	6	Dry, Source / Wet, Sink/Source	6	Power Relay, Form A (SPST N.O)	5 A
USB-2064	USB 2.0	-	-	8	Form A (SPST N.O.)	5 A
USB-2064-16	USB 2.0	-	-	16	Form A (SPST N.O.)	3 A
USB-2068-18	USB 2.0	10	Dry, Source / Wet, Sink/Source	8	Signal Relay, Form C (DPDT)	2 A @ 30 V$_{DC}$ 0.24 A @ 220 V$_{AC}$

✅ USB Pulse I/O

Model Name	Interface	Pulse Input		
		Channels	Input Frequency	Isolation
USB-2084	USB 2.0	4 Up/Down (CW/CCW) 4 Dir/Pulse (Bi-direction) 4 A/B Phase (Quadrant Counting) 8 Up Counter, Frequency	TTL: 500 KHz maximum Isolated: 250 KHz maximum	2500 V$_{DC}$

☑ USB Analog I/O

Model Name	Interface	Analog Input			
		Channels	Resolution	Input Type	Isolation
USB-4018	USB 2.0	8	16-bit	Thermocouple : J, K, T, E, R, S, B, N, C, L, M, └DIN43710	3000 V$_{DC}$
USB-4018HS-16	USB 2.0	16			

Standard Thermocouple Connector

Support standard Thermocouple connector

▲ USB-4018HS

Support standard Thermocouple connector
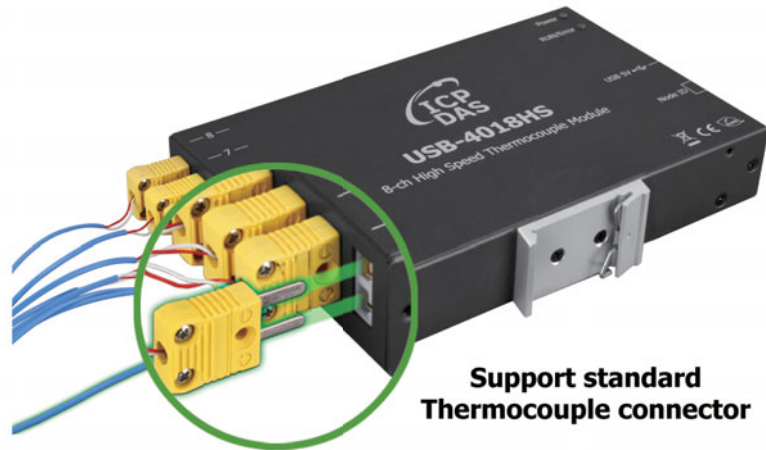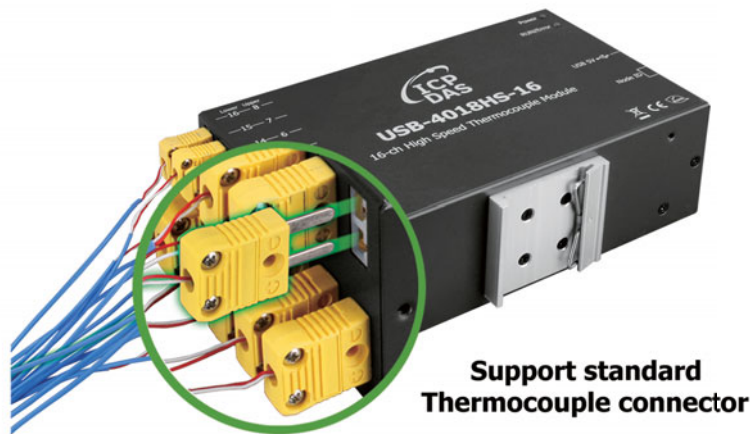
▲ USB-4018HS-16

PAC 9000 Series

- AXP/ALX-9000 Series
- XP-9000-WES7/ XP-9000-IoT/ LX-9000/LP-9000 Series
- e-9K Series Module
- I-9K Series Module
- 2000 Series PAC
- iBPC Series BoxPC
- Touch Monitor

IIoT Products

- IIoT Cloud Management Software (IoTstar)
- IIoT Edge Controller (WISE-5231 Series)
- IP Camer (iCAM Series)
- IIoT Communication Server (UA-5200 Series)
- MQTT I/O Module (MQ-7200 Series)
- Stack Light Monitoring Module (tSL Series)
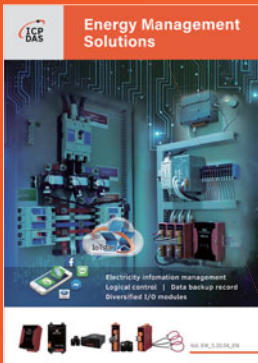
Energy Management Solutions

- InduSoft SCADA
- Power Meter Concentrator
- IIoT PMC with Display
- Three-phase Smart Power Meter
- Single-phase Smart Power Meter
- Multi-circuit Smart Power Meter
- True RMS Input Module
- Smart Power Meter with LED Display

Wireless Solution

- WLAN Products
- Radio Modems
- 3G/4G Products
- NB-IoT Solution
- GPS Products
- Bluetooth LE Converters
- ZigBee Products
- Infrared Wireless Modules
- Wireless Modbus Data Concentrators
- WLS (Wireless Locating System)

Intelligent IIoT Edge Controller & I/O Module

- WISE IIoT Edge Controller & I/O Module
- Cloud Management
- Applications
- Product Specifi cation
- Intelligent Surveillance Solution
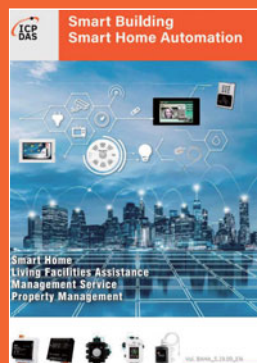
Smart Building, Smart Home Automation

- Video Intercom & Access Control
- Touch HMI - TouchPAD Series
- Smart Lighting Control
- Energy Saving - PM/PMC Series
- Environmental - DL/CL Series
- Motion Detector - PIR Series
- Wi-Fi Wireless - WF Series
- Infrared Wireless - IR Series
- ZigBee Wireless - ZT Series
- IIoT Server & Concentrator
- LED Display - iKAN Series
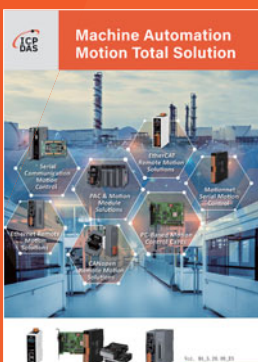
Machine Automation Motion Total Solutions

- PC-Based Remote Motion Solutions
- PC-Based Motion Control Cards
- PAC Solutions
- Accessories

Touch HMI Solutions - TouchPAD

- TPD/VPD Products Series
- Video Intercom & Access Control Series
- TPD/VPD Applications