Industrial I/O Modules

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6.1. I/O Modules

Overview

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.

1. 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
- FRnet communication modules

2. 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

3. Comparison Table of I-8KW Series and I-87KW Series

Item	I-8KW Series	I-8KRW Series	I-87KW Series
Communication Interface	Parallel bus	Parallel bus	Serial bus
Protocol	-	-	DCON
DI with latched function	-	-	Y
DI with counter input	-	-	Y (100 Hz)
Power on value	-	Y	Y
Safe value	-	Y	Y
Programmable slew-rate for AO module	-	-	Y

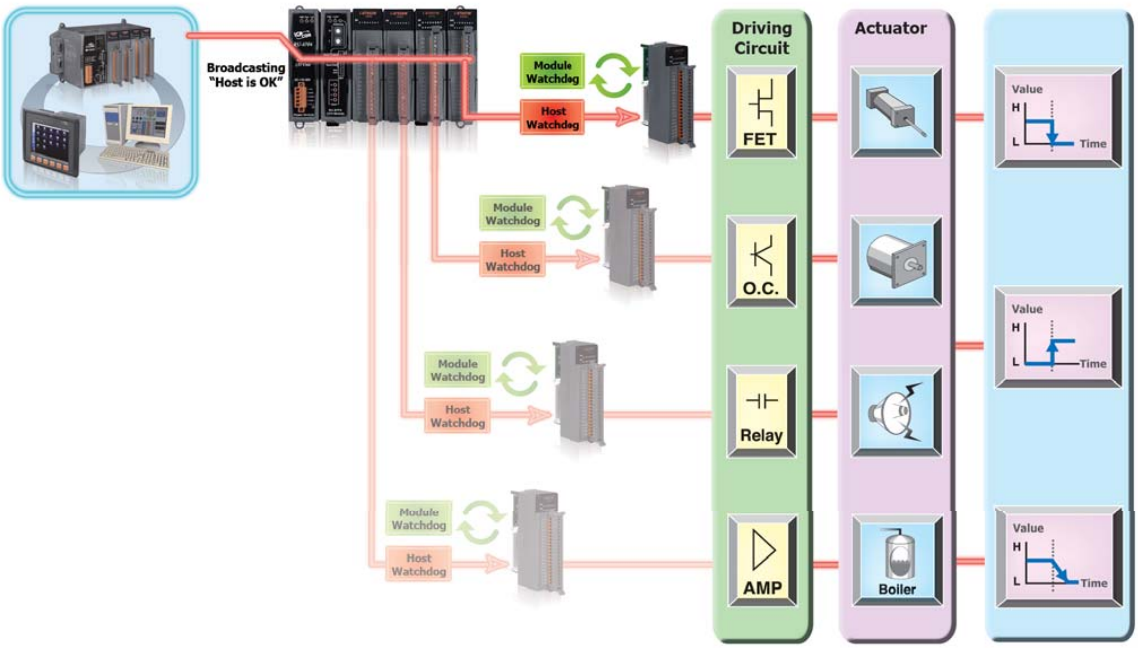
4. Supporting list of MCU (Main Control Unit) and I/O expansion unit:

Item	I-8K Series		I-87K Series	
	High Profile	Low Profile	High Profile	Low Profile
XPAC	Y	-	Y	-
WinPAC	Y	-	Y	-
LinPAC	Y	-	Y	-
iPAC	Y	-	Y	-
ViewPAC	Y	-	Y	-
RU-87P1/2/4/8	-	-	Y	-
USB-87P1/2/4/8	-	-	Y	-
ET-87P4/8	-	-	Y	-
I-8KE4/8	Y	Y	Y	Y
I-8KE4/8-MTCP	Y	Y	Y	Y
I-87K4/5/8/9	-	-	Y	Y

5. Hot features

Dual Watchdog Operation

The I-87K I/O modules include an internal Dual Watchdog. It is the combination of module watchdog and host watchdog. The module watchdog is a hardware watchdog designed to reset the micro-controller of the module when the module fails. This mechanism can keep the module work continuously without disruption. The host watchdog is a software watchdog that monitors the operating status of the host controller, such as PAC, PC… etc. When the host fails, the outputs of the module will be set to the safe values to prevent any erroneous operations. With Dual Watchdog, the control system is more reliable and stable.



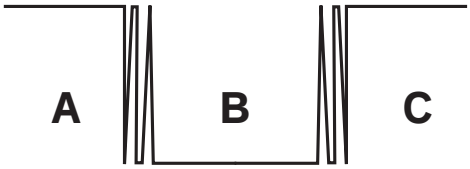
Power On Value and Safe Value of Digital / Analog Output

Besides setting by the set digital/analog output commands, the digital/analog outputs can be set under two other conditions. When the host watchdog is enabled and a host watchdog timeout occurs, the "safe value" is loaded into the digital/analog output ports. The set digital/analog output commands have no effect on the digital/analog output ports until the host watchdog timeout status is cleared. The host watchdog timeout status is saved in the EEPROM. The status is not changed even after power-on reset. It can be cleared only by the reset host watchdog timeout status command ~AA1. See Section A.2 for host watchdog details.

When the module is powered on and the host watchdog timeout status is cleared, the "power-on value" is loaded into the digital/analog output ports. If the host watchdog timeout status is not cleared on power-on, then the safe value is loaded into the digital/analog output ports. Both the safe value and power-on value are set by the ~AA5V command.

Latched Digital Input

The I-87K DIO modules provide commands to read the latched high digital input and latched low digital input status. Following is an example to show the usefulness of the latched digital input. When we want to read the key stroke of a key switch connected to the digital input channel of a module, the input signal of the key stroke is a pulse signal as shown in the following figure.



If we just use the read digital input status command to read the signal and we cannot send the command during the B period due to some reasons, then we will lose the key stroke information. However, with the read latched digital input command, we can still get the key stroke information even we are not able to send command in B period.

6.2. Analog Modules

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Analog I/O Modules (Parallel Bus) — Table 6-2-1

Models	I-8014W	I-8017HW	I-8017DW	I-8017HCW	I-8024W	I-8024DW
Pictures	NEW		NEW	NEW		NEW
Analog Input						
Channel	8/16	8/16			-	-
Wiring	Differential/ Single-ended	Differential/ Single-ended				
Range	±10 V_{DC}, ±5 V_{DC}, ±2.5 V_{DC}, ±1.25 V_{DC} -20 ~ +20 mA (Requires Optional External 125 Ω Resistor)	±10 V_{DC}, ±5 V_{DC}, ±2.5 V_{DC}, ±-1.25 V_{DC} ±20 mA (Requires Optional External 125 Ω Resistor)	±10 V_{DC}, ±5 V_{DC}, ±2.5 V_{DC}, ±-1.25 V_{DC} ±20 mA (Jumper Select)		-	-
Resolution	16-bit	14-bit			-	-
Accuracy	0.05% of FSR	±0.1% of FSR			-	-
Sampling Rate	Single Channel Polling Mode: 250 k S/s	Single Channel Polling Mode: 100 k S/s Single Channel Interrupt Mode: 50 k S/s 8 channel Scan Mode : 16 k S/s			-	-
Input Impedance	20 k, 200 k, 20 M (Jumper Select)	20 k, 200 k, 20 M (Jumper Select)			-	-
Over Voltage Protection	-45 ~ +60 V_{DC}	±35 V_{DC}			-	-
Analog Output						
Channel	-	-			4	
Range	-	-			±10 V_{DC}, 0 ~ +20 mA	
Resolution	-	-			14-bit	
Accuracy	-	-			±0.1% of FSR for voltage output ; ±0.2% of FSR for current output	
Throughput	-	-				
Output Capacity	-	-			20 mA @ 10 V_{DC}	
Power on Value	-	-			-	
Safe Value	-	-			-	
System						
Watchdog	-	-			-	
Isolation	2500 V_{rms}	2500 V_{rms}			3000 V_{DC}	
Power Consumption	2.5 W	2 W			2 W	
Connector	Terminal Block	Terminal Block	D-Sub 37	Terminal Block	Terminal Block	D-Sub 37
Optional Accessories	-	-	DN-37-381-A	-	-	DN-37-381-A

I/O module with DN-37-381-A

• Selection Guide

Analog Input Modules (Serial Bus)				Table 6-2-2
Models	I-87005W	I-87013W	I-87015W	I-87015PW
Pictures	NEW			
Sensor Type	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	Pt100, Pt1000, Cu50, Ni120	Pt100, Pt1000, Ni120, Cu50, Cu100, Cu1000	
Channel	8	4	7	
Wiring	2 Wires	2/3/4 Wires	2/3 Wire	
Resolution	16-bit	16-bit	16-bit	
Accuracy	±0.1% of FSR	±0.1% of FSR	±0.05% of FSR	
Sampling Rate	8 Hz (Total)	10 Hz (Total)	12 Hz (Total)	
Individual Channel Configurable	Yes	Yes	Yes	
3-wire RTD lead resistance elimination	-	Yes	-	Yes
Resistance Measurement	200 kΩ	3.2 kΩ	3.2 kΩ	
Open Wire Detection	Yes	Yes	Yes	
Over Voltage Protection	±120 V_{DC} /110 V_{AC}	±20 V_{DC}	±20 V_{DC}	±110 V_{DC}
4KV ESD Protection	Yes	Yes	Yes	
System				
Dual Watchdog	Yes	Yes	Yes	
Isolation	3000 V_{DC}	3000 V_{DC}	3000 V_{DC}	
Power Consumption	1 W	0.8 W	1 W	
Connector	Terminal Block	Terminal Block	Terminal Block	
Optional Accessories	-	-	-	-

■ **3-wire RTD lead resistance elimination**
With the feature, the line resistance of the RTD cable is eliminated regardless the length of the RTD cable for 3-wire RTD measurement.

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Analog Input Modules (Serial Bus) — **Table 6-2-3**

Models	I-87017W	I-87017DW	I-87017RW	I-87017W-A5	I-87017RCW	I-87017RCDW	I-87017RCDW-AI
Pictures		NEW				Available soon	Available soon
Channel	8	8/16	8	8	8	16	16
Wiring	Differential	Differential/ Single-ended	Differential	Differential	Differential	Differential	Differential
Range	±10 VDC, ±5 VDC, ±1 VDC, ±500 mV, ±150 mV, ±20 mA (Requires Optional External 125 Ω Resistor)			±50 VDC, ±150 VDC	0 ~ +20 mA, +4 ~ +20 mA, ±20 mA (No External Restistor Reguired)	0 ~ +20 mA, +4 ~ +20 mA, ±20 mA (No External Restistor Reguired)	0 ~ +100 mA
Resolution	Normal Mode: 16-bit Fast Mode: 12-bit			Normal Mode: 16-bit Fast Mode: 12-bit	Normal Mode: 16-bit Fast Mode: 12-bit		
Accuracy	Normal Mode :±0.1% of FSR Fast Mode :±0.5% of FSR			Normal Mode: ±0.1% of FSR Fast Mode: ±0.25% of FSR	Normal Mode: ±.1% of FSR Fast Mode: ±0.5% of FSR		
Sampling Rate	Normal Mode: 10 Hz (Total) Fast Mode: 60 Hz (Total)			Normal Mode: 10 Hz (Total) Fast Mode: 50 Hz (Total)	Normal Mode: 10 Hz (Total) Fast Mode: 60 Hz (Total)		
Input Impedance	20 MΩ	20 MΩ	> 2 MΩ	290 KΩ	125 Ω		
Common Voltage Protection	-	-	-	-	200 VDC		
Individual Channel Configurable	-	Yes	-	-	-	Yes	Yes
Open Daughter Board Detection	-	Yes	-	-	-	Yes	Yes
Over Voltage Protection	±35 VDC	±35 VDC	240 Vrms	±200 VDC	-		
4KV ESD Protection	Yes	Yes	Yes	Yes	Yes		
System							
Dual Watchdog	Yes			Yes	Yes		
Isolation	3000 VDC			3000 VDC	3000 VDC		
Power Consumption	1.3 W			1.3 W	1.3 W		
Connector	Terminal Block	D-Sub 37	Terminal Block	Terminal Block	Terminal Block	D-Sub 37	D-Sub 37
Optional Accessories	-	DN-37-381-A	-	-	-	DN-37-381-A	DN-37-381-A

I/O module with DN-37-381-A

Introduction

A thermocouple is a temperature sensor which consists of two wires of different conductors.
Based on the Seebeck effect in thermoelectricity, the temperature difference results voltage difference on the two wires.
Thermocouples are widely used in scientific and industrial applications because they're generally accurate and can operate over wide range of temperature.

Thermocouple Type

Type	Range (°C)
J	-210 ~ +760
K	-270 ~ +1372
T	-270 ~ +400
E	-270 ~ +1000
R	0 ~ +1768
S	0 ~ +1768
B	0 ~ +1820
N	-270 ~ 1300
C	0 ~ 2320
L	-200 ~ +800
M	-200 ~ +100
L (DIN43710)	-200 ~ +900

Analog Input Modules (Serial Bus) — **Table 6-2-4**

Models	I-87018W	I-87018PW	I-87018RW	I-87018ZW	I-87019RW
Pictures		NEW			
Sensor Type	±15 mV, ±50 mV, ±100 mV ±500 mV, ±1 VDC, ±2.5 VDC			±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 VDC, ±2.5 VDC	±15 mV, ±50 mV, ±100 mV, ±150 mV ±500 mV, ±1 VDC, ±2.5 VDC,±5VDC, ±10 VDC
	±20 mA (Requires Optional External 125 Ω Resistor)			±0 mA, 0 ~ 20 mA, 4 ~ 20 mA (Requires Optional External 125 Ω Resistor)	±20 mA (Jumper Selectable)
	Thermocouple (J, K, T, E. R. S, B, N, C, L, M, LDIN43710)			Thermocouple (J, K, T, E, R, S, B, N, C, L, M, LDIN43710)	Thermocouple (J, K, T, E. R. S, B, N, C, L, M, LDIN43710)
Channel	8			10	8
Wiring	Differential			Differential	Differential
Temperature outputs consistency	-	Yes	-	Yes	-
Stable tempereture output in the field	-	Yes	-	Yes	-
Resolution	16-bit			16-bit	16-bit
Accuracy	±0.1% of FSR			±0.1% of FSR	±0.1% of FSR
Sampling Rate	10 Hz (Total)			10 Hz (Total)	8 Hz (Total)
Input Impedance	>400 kΩ			>400 kΩ	Voltage Input: >2 MΩ, Current Input: 125 Ω
Individual Channel Configurable	-	Yes	-	Yes	Yes
Open Wire Detection	-	Yes	Yes	Yes	Yes
Over Voltage Protection	±35 VDC	240 Vrms	240 Vrms	240 Vrms	240 Vrms
4KV ESD Protection	Yes	Yes	Yes	Yes	Yes
System					
Dual Watchdog	Yes			Yes	Yes
Isolation	3000 VDC			3000 VDC	3000 VDC
Power Consumption	0.8 W			0.8 W	1.1 W
Connector	Terminal Block			DB25	Terminal Block
Optional Accessories	-	CN-1824	-	DB-1820/DN-1822	-

Special daughter board for thermocouple inputs features two benefits
- Temperature outputs consistency
- Stable tempereture output in the field

I-87018PW-G/S CR=
I-87018PW connects CN-1824 directly

I-87018ZW-G/S CR=
I-87018ZW connects DB-1820 directly

I-87018ZW-G/S2 CR=
I-87018ZW connects DN-1822 with CD-2518D kit

• Selection Guide

Analog Output Modules (Serial Bus) — **Table 6-2-5**

Models	I-87024W	I-87024DW	I-87024CW	I-87028CW
Pictures		NEW	Available soon	NEW
Channel	4		4	8
Wiring	Bipolar/Unipolar		Unipolar	
Range	0 ~ +5 V_{DC}, ±5 V_{DC}, 0 ~ +10 V_{DC}, ±10 V_{DC}, 0 ~ +20 mA, +4 ~ +20 mA		0 ~ +20 mA, +4 ~ +20 mA	
Resolution	14-bit		12-bit	
Accuracy	±0.1% of FSR		±0.1% of FSR	
DA Output Response Time	10 ms per channel		10 ms per channel	
Output Capacity	Voltage: 10 V_{DC} @ 20 mA Current: External +24 V_{DC} @ 1050 Ω		External +24 V_{DC} @ 1050 Ω	
Channel to channel isolation	-		Yes, 1 kV	
Open Wire Detection	-	Yes	Yes	
Short Circuit Protection	Yes		Yes	
4KV ESD Protection	Yes		Yes	
Dual Watch dos	Yes		Yes	
Power on Value	Yes		Yes	
Safe Value	Yes		Yes	
System				
Dual Watchdog	Yes		Yes	
Isolation	3000 V_{DC}		1000 V_{DC}	
Power Consumption	2.8 W		0.9 W	1.4 W
Connector	Terminal Block	D-Sub 37	Terminal Block	
Optional Accessories	-	DN-37-381-A	-	

I/O module with DN-37-381-A

6.3. Digital Modules

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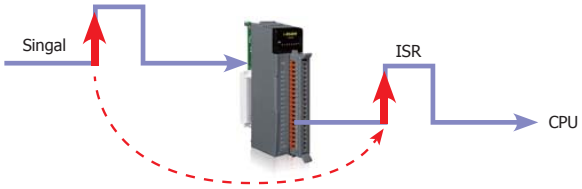
Digital Input Modules (Parallel Bus) — Table 6-3-1

Models		I-8040W	I-8040PW	I-8046W	I-8048W	I-8051W	I-8052W	I-8053W	I-8053PW	I-8058W
Pictures					Note1				NEW	
Channel		32		16	8	16	8	16		8
Contact		Wet		Dry	Dry + Wet	Dry	Wet	Wet		Wet
Sink /Source (NPN /PNP)		Sink, Source		Source	Sink, Source	Source	Sink, Source	Sink, Source		Sink, Source
on	Voltage Level	10 ~ 30 V_{DC}	19 ~ 30 V_{DC}	Close to GND.	Isolated: 4 ~ 30 V Non-Isolated TTL: 0.8 V max.	Close to GND.	10 ~ 30 V_{DC}	10 ~ 30 V_{DC}	19 ~ 30 V_{DC}	80 ~ 250 V_{AC}
off	Voltage Level	4 V_{DC} max.	11 V_{DC} max.	Open	Isolated: 1 V_{DC} max. Non-Isolated TTL: 2 ~ 5 V_{DC}	Open	4 V_{DC} max.	4 V_{DC} max.	11 V_{DC} max.	30 V_{AC} max.
Low Pass Filter		-	Yes	-	-	-	-	-	Yes	-
Effective Distance for Dry Contact		-	-	500 m	100 m	100 m	-	-	-	-
System										
Watchdog		-		-	-	-	-	-		-
Isolation		3750 Vrms		3750 Vrms	1500 Vrms	-	5000 Vrms	3750 Vrms		5000 Vrms
Power Consumption		0.65 W	1 W	1.3 W	1.75 W	1.1 W	0.3 W	0.4 W	0.45 W	0.6 W
Connector		D-Sub 37		Terminal Block	Terminal Block	Terminal Block	Terminal Block	Terminal Block		Terminal Block
Optional Accessories		DN-37-381-A		-	-	-	-	-	-	-

I/O module with DN-37-381-A

Note1. I-8048W supports hardware interrupt capturing. Each channel can be configured to capture either of rising edge or falling edge singal.

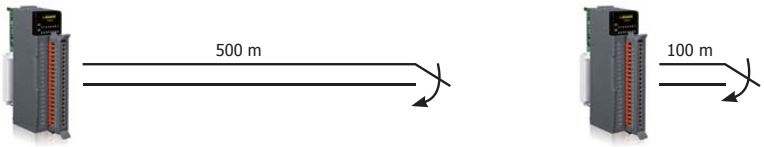
Hardware Interrupt



Response Time < 0.1 ms

■ **Effective distance for dry contact of DI / DIO module**

In general, the effective distance for dry contact of DI module is 100m. With the enhanced circuit design, the distance can be extended up to 500m.



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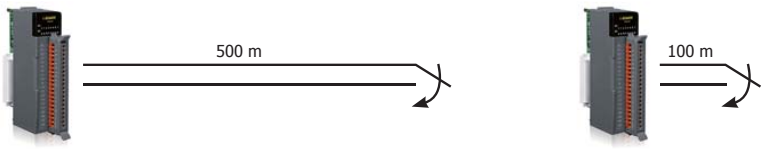
Digital Input Modules (Serial Bus) — **Table 6-3-2**

Models	I-87040W	I-87040PW	I-87040DW-A5	I-87046W	I-87051W	I-87052W	I-87053W	I-87053PW	I-87053W-A5	I-87058W	I-87059W
Pictures		NEW						NEW			
Channel	32			16	16	8	16			8	8
Type	Wet			Dry+Wet	Dry+Wet	Wet	Dry+Wet			Differential	Differential
Sink /Source (NPN /PNP)	Sink, Source			Source	Source	Sink, Source	Sink, Source			-	-
on Voltage Level	3.5 ~ 30 VDC	19 ~ 30 VDC	3.5 ~ 30 VDC	Dry Contact: Close to GND. Wet contact: 1 VDC max.	Dry Contact: Close to GND. Wet contact: 1 VDC max.	3.5 ~ 30 VDC	Dry Contact: Close to GND. Wet contact: 3.5 ~ 30 VDC	Dry Contact: Close to GND. Wet contact: 19 ~ 30 VDC	Dry Contact: Close to GND. Wet contact: 68 ~ 150 VDC	80 ~ 250 VAC	10 ~ 80 VAC
off Voltage Level	1 VDC max.	11 VDC max.	1 VDC max.	Dry Contact: Open Wet contact: 3.5 ~ 30 VDC	Dry Contact: Open Wet contact: 3.5 ~ 30 VDC	1 VDC max.	Dry Contact: Open Wet contact: 1 VDC max.	Dry Contact: Open Wet contact: 11 VDC max.	Dry Contact: Open Wet contact: 48 VDC max.	30 VAC max.	3 VAC max.
Counter (100 Hz, 16-bit)	Yes			Yes	Yes	Yes	Yes			Yes	Yes
Effective Distance for Dry Contact	-			500 m	100 m	-	500 m			-	-
4KV ESD Protection	Yes			Yes	Yes	Yes	Yes			Yes	Yes
Low Pass Filter	Yes			Yes	Yes	Yes	Yes			Yes	Yes
System											
Dual Watchdog	Yes			Yes	Yes	Yes	Yes			Yes	Yes
Isolation	3750 Vrms			-	-	5000 Vrms	3750 Vrms			5000 Vrms	3750 Vrms
Power Consumption	1.6 W			1 W	0.5 W	0.3 W	0.8 W	0.8 W	0.9 W	0.3 W	0.3 W
Connector	D-Sub 37			Terminal Block	Terminal Block	Terminal Block	Terminal Block			Terminal Block	Terminal Block
Optional Accessories	DN-37-381-A			-	-	-	-	-	-	-	-

I/O module with DN-37-381-A

■ **Effective distance for dry contact of DI/DIO module**

In general, the effective distance for dry contact of DI module is 100m. With the enhanced circuit design, the distance can be extended up to 500m.



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Digital Output Modules (Parallel Bus) — Table 6-3-3

Models	I-8037W	I-8041W	I-8041RW	I-8041AW	I-8056W	I-8057W	I-8057RW	I-8057PW	I-8060W	I-8064W	I-8068W	I-8069W	I-8069RW
Pictures			NEW				Available soon	NEW					Available soon
Channel	16	32			16				6	8	8	8	
Type	Open Collector	Open Collector			Open Collector				Power Relay			PhotoMOS Relay	
Sink /Source (NPN /PNP)	Source	Sink	Sink	Source	Sink				Form C	Form A	Form A x 4 Form C x 4	Form A	
Load Voltage	5~30 V_{DC}	5~30 V_{DC}			5~30 V_{DC}		5~50 V_{DC}						
Max. Load Current	100 mA/ channel	100 mA/channel			100 mA/channel		700 mA/channel		0.5 A @125 V_{AC} 0.25 A @250 V_{AC} 2A @30 V_{DC}	5 A @250 V_{AC} 5 A @30 V_{DC}	Form A : 5 A @250 V_{AC} 5 A @28 V_{DC} Form C : 5 A (NO) /3A (NC) @30 V_{DC} 5 A (NO) /3A (NC) @ 277 V_{AC}	60 V_{DC} /1.0 A	
Power on Value	-	-	Yes	-	-		Yes	-	-	-	-	-	Yes
Safe Value	-	-	Yes	-	-		Yes	-	-	-	-	-	Yes
System													
Watchdog	-	-	Yes	-	-								
Isolation	3750 V_{rms}	3750 V_{rms}			-	3750 V_{rms}	3750 V_{rms}		1500 V_{rms}	2000 V_{rms}	1500 V_{rms}	1500 V_{rms}	
Power Consumption	0.9 W	1.5 W			0.9 W	0.9 W	1.5 W		1 W	1.1 W	2.5 W	0.6 W	
Connector	Terminal Block	D-Sub 37			Terminal Block								
Optional Accessories	-	DN-8K32R, DN-37-381-A		DN-37-381-A	-	-	-		-	-	-	-	

I/O module with DN-8K32R

I/O module with DN-37-381-A

• Selection Guide

Digital Output Modules (Serial Bus) — **Table 6-3-4**

Models	I-87041W	I-87057W	I-87057PW	I-87061W	I-87064W	I-87065W	I-87066W	I-87068W	I-87069W
Pictures			NEW	NEW					
Channel	32	16		16	8	8	8	8	8
Type	Open Collector	Open Collector		Power Relay		AC SSR	DC SSR	Power Relays	PhotoMOS Relay
Sink /Source (NPN /PNP)	Sink	Sink		Form A		Form A	Form A	Form A × 4 Form C × 4	Form A
Load Voltage	5 ~ 30 V_{DC}	5 ~ 30 V_{DC}	5 ~ 50 V_{DC}	Relay Contact: 0 ~ 250 V_{AC} 0 ~ 30 V_{DC}		24 ~ 265 V_{rms}	3 ~ 30 V_{DC}	Form A: 0 ~ 250 V_{AC} 0 ~ 28 V_{DC} Form C: 0 ~ 277 V_{AC} 0 ~ 30 V_{DC}	350 V max. at DC/AC
Max. Load Current	100 mA/ channel	100 mA/ channel	700 mA/ channel	5.0 A_{rms}		1.0 A_{rms}	1.0 A_{rms}	Form A: 8 A Form C: 3 A (NC) 5 A (NO)	0.13 A
Short Circuit Protection	-	-	Yes	-		-	-	-	-
4KV ESD Protection	Yes	Yes		Yes		Yes	Yes	Yes	Yes
Power on Value	Yes	Yes		Yes		Yes	Yes	Yes	Yes
Safe Value	Yes	Yes		Yes		Yes	Yes	Yes	Yes
System									
Dual Watchdog	Yes	Yes		Yes		Yes	Yes	Yes	Yes
Isolation	3750 V_{rms}	3750 V_{rms}		3000 V_{rms}	2000 V_{rms}	2500 V_{rms}	2500 V_{rms}	4000 V_{rms}	5000 V_{rms}
Power Consumption	0.7 W	1 W		1.7 W	1.5 W	0.6 W	0.6 W	2.5 W	0.5 W
Connector	D-Sub 37	Terminal Block		Terminal Block		Terminal Block	Terminal Block	Terminal Block	Terminal Block
Optional Accessories	DN-8K32R, DN-37-381-A	-		-	-	-	-	-	-

I/O module with DN-8K32R

I/O module with DN-37-381-A

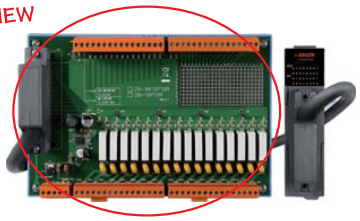
• Selection Guide

Digital Input & Output Modules (Parallel Bus) — **Table 6-3-5**

Models	I-8042W	I-8050W	I-8054W	I-8054RW	I-8055W	I-8063W
Pictures		Note1		Available soon		
Digital Input						
Channel	16	16	8		8	4
Type	Wet	Wet	Wet		Dry	Wet
Sink /Source (NPN /PNP)	Sink, Source	Sink	Sink, Source		Source	Sink, Source
on — Voltage Level	10 ~ 30 V_{DC}	10 ~ 30 V_{DC}	10 ~ 50 V_{DC}		Close to GND.	10 ~ 30 V_{DC}
off — Voltage Level	4 V_{DC} max.	4 V_{DC} max.	4 V_{DC} max.		Open	4 V_{DC} max.
Low Pass Filter	-	-	-	Yes	-	-
Effective Distance for Dry Contact	-	-	-	-	100 m	-
Digital Output						
Channel	16	16	8		8	4
Type	Open Collector	Open Collector	Open Collector		Open Collector	Power Relay
Sink /Source (NPN /PNP)	Sink	Sink	Sink		Sink	Form C
Load Voltage	5 ~ 30 V_{DC}	5 ~ 30 V_{DC}	5 ~ 50 V_{DC}		5 ~ 30 V_{DC}	5 A (NO)/3 A (NC) @ 30 V_{DC} 5 A (NO)/3 A (NC) @ 277 V_{AC} 5 A (NO)/3 A (NC) at 65°C
Max. Load Current	100 mA/channel	100 mA/channel	700 mA/channel		100 mA/channel	
Power on Value	-	-	-	Yes	-	-
Safe Value	-		-	Yes	-	-
System						
Watchdog	-	-	-		-	-
Isolation	3750 V_{rms}	3750 V_{rms}	3750 V_{rms}		-	3750 V_{rms}
Power Consumption	1.5 W	1 W	0.55 W		1 W	2 W
Connector	D-Sub 37	Terminal Block	Terminal Block		Terminal Block	Terminal Block
Optional Accessories	DN-37-381-A, DN-8K16P16R	-	-		-	-

I/O module with DN-37-381-A

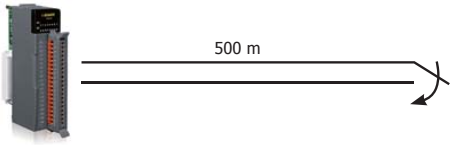
NEW

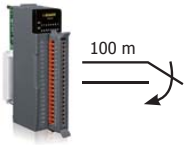


I/O module with DN-8K16P16R

■ **Effective distance for dry contact of DI/DIO module**

In general, the effective distance for dry contact of DI module is 100m. With the enhanced circuit design, the distance can be extended up to 500m.





Note1. I-8050W is 16-ch universal digital I/O module. Each channel can be independently configured to be an input or an output channel by software setting.

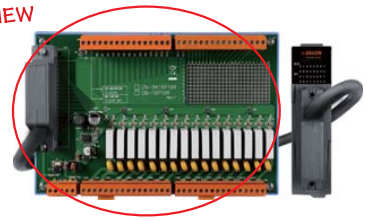
• Selection Guide

Digital Input & Output Modules (Serial Bus) — **Table 6-3-6**

Models	I-87042W	I-87054W	I-87055W	I-87063W
Pictures	NEW			
Digital Input				
Channel	16	8	8	4
Contact	Wet	Wet	Dry+Wet	Wet
Sink /Source (NPN /PNP)	Sink, Source	Sink, Source	Sink	Sink, Source
on Voltage Level	+3.5 ~ +30 V_{DC}	+3.5 ~ +50 V_{DC}	Dry Contact: Close to GND. Wet contact: 1 V_{DC} max.	+3.5 ~ +30 V_{DC}
off Voltage Level	1 V_{DC} max.	1 V_{DC} max.	Dry Contact: Open Wet contact: +3.5 ~ +30 V_{DC}	1 V_{DC} max.
Counter (100 Hz, 16-bit)	Yes	Yes	Yes	Yes
Low Pass Filter	Yes	Yes	Yes	Yes
Effective Distance for Dry Contact	-	-	100 m	-
Digital Output				
Channel	16	8	8	4
Type	Open Collector	Open Collector	Open Collector	Power Relay
Sink /Source (NPN /PNP)	Sink	Sink	Sink	Form C
Load Voltage	+5 ~ +30 V_{DC}	+5 ~ +50 V_{DC}	+5 ~ +30 V_{DC}	+5 ~ +24 V_{DC} 0 ~ +250 V_{AC}
Max. Load Current	100 mA/channel	700 mA/channel	100 mA/channel	5 A (NO)/3 A (NC) @ 30 V_{DC} 5 A (NO)/3 A (NC) @ 277 V_{AC}
Short Circuit Protection	-	Yes	-	-
4KV ESD Protection	Yes	Yes	Yes	Yes
Power on Value	Yes	Yes	Yes	Yes
Safe Value	Yes	Yes	Yes	Yes
System				
Dual Watchdog	Yes	Yes	Yes	Yes
Isolation	3750 V_{rms}	3750 V_{rms}	-	4000 V_{rms}
Power Consumption	1.5 W	0.7 W	0.6 W	1.5 W
Connector	D-Sub 37	Terminal Block	Terminal Block	Terminal Block
Optional Accessories	DN-37-381-A, DN-8K16P16R	-	-	-

I/O module with DN-37-381-A

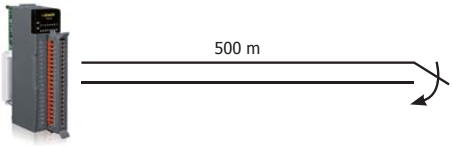
NEW

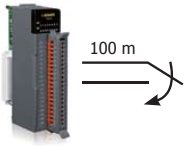


I/O module with DN-8K16P16R

■ **Effective distance for dry contact of DI/DIO module**

In general, the effective distance for dry contact of DI module is 100m. With the enhanced circuit design, the distance can be extended up to 500m.





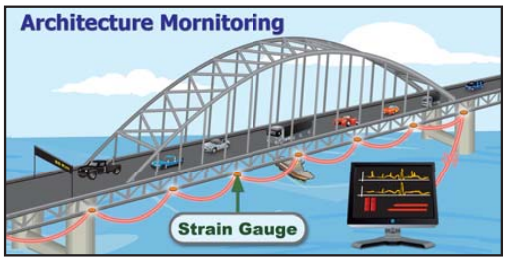
6.4. Multi Function/Strain Gauge Modules

• Selection Guide

Strain Gauge Introduction

A strain gauge is a resistive sensor. The measurement of strain is usually made using a Wheatstone bridge circuit with excitation voltage. The variation in strain can be calculated based on the measured voltage. The resistance of the gauge varies when the gauge is compressed or stretched. With the characteristic, it can be applied to measure stress or the growth of the crack or movement in buildings, foundations, and other structures to ensure the safety.

Applications

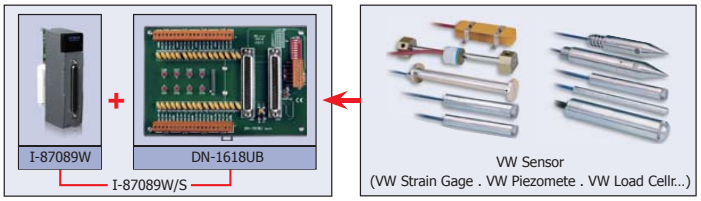


Multi-function Module (Parallel/Serial Bus)			
Models	I-87016W	I-87026PW	I-8026PW
Pictures	NEW	Available soon	Available soon
Analog Input			
Channel	2	6	6
Range	±15 mV, ±50 mV, ±100 mV, ±500 mV, ±1 VDC, ±2.5 VDC, ±20 mA	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±20 mA	±10 VDC, ±5 VDC, ±20 mA (Jumper Select)
Strain Gauge Type	Full-Bridge, Half-Bridge, Quarter-Bridge	-	-
Resolution	16-bit	16-bit	12-bit
Accuracy	±0.05% of FSR (Voltage), ±0.1% of FSR (Current)	±0.1% of FSR	±0.2% of FSR
Sampling Rate	10 Hz	10 Hz	35 kHz
Input Impedance	> 400 kΩ (Voltage), 125 Ω (Current)	2 MΩ (Voltage), 125 Ω (Current)	2M Ω
Over Voltage Protection	30 VDC	240 Vrms	-
Long Distance Strain Gauge Measurement	Yes	-	-
Individual Channel Configurable	Yes	Yes	Yes
Analog Output			
Channel	1	2	2
Range	0 ~ +10 VDC	±10 V, ±5 V, 0 ~ 10 V, 0 ~ 5 V, 0 ~ 20 mA, 4 ~ 20 mA	±10 VDC
Resolution	16-bit	12-bit	12-bit
Accuracy	±0.05% of FSR	±0.1% of FSR	±0.2% of FSR
Output Capacity	10 V @ 80 mA	10 V @ 20 mA	10 V @ 20 mA
Digital Input			
Channel	2	2	3
Contact	Wet	Wet	Wet
Sink /Source (NPN /PNP)	Sink	Sink	Sink, Source
on Voltage Level	3.5 ~ 50 VDC	3.5 ~ 50 VDC	10 ~ 30 VDC
off Voltage Level	1 VDC max.	1 VDC max.	4 VDC max.
Low Pass Filter	Yes	Yes	-
Digital Output			
Channel	2	2	3
Type	Open Collector	Open Collector	Open Collector
Sink /Source (NPN /PNP)	Sink	Sink	Sink
Load Voltage	5 ~ 50 VDC	5 ~ 50 VDC	5 ~ 30 VDC
Max. Load Current	700 mA/channel	700 mA/channel	100 mA/channel
System			
Dual Watchdog	Yes	Yes	-
Data Bus	Serial	Serial	Parallel
Isolation	3000 VDC	2500 VDC	2500 VDC
Power Consumption	2.5 W	2.5 W	3 W
Connector	Terminal Block	Terminal Block	Terminal Block
Optional Accessories	-	-	-

6.5. Vibrating Wire Input Modules

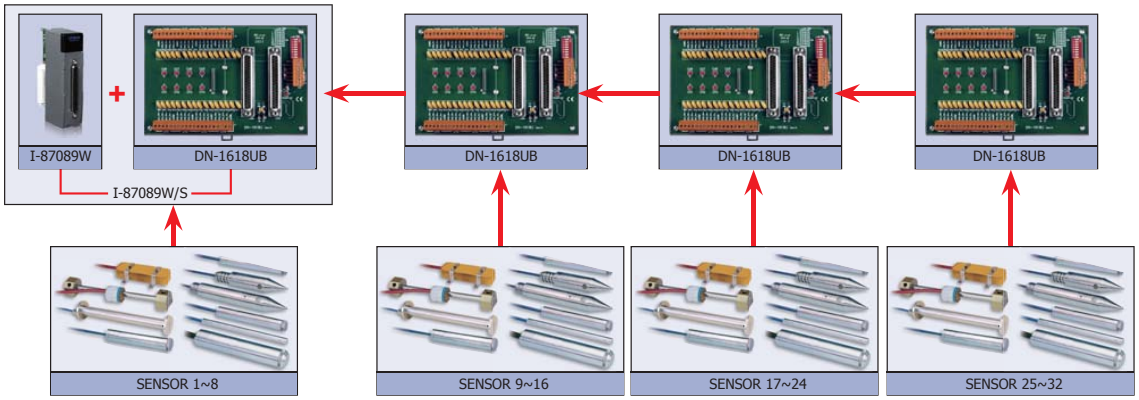
Introduction

The vibrating wire sensor has a wire which is initially plucked by a series of electrical magnetic forces from a coil. The conductive wire after plucking is vibrating in a magnetic field. The wire will disturb the field, and then the coil can pick up the induced voltage change. The signal is amplified and detected by a VW readout device, or called VW reader. After plucking, there is no other force acting on this wire. When the transient response dies out, the reader can read a stable resonant frequency. The resonant frequency is function of the tension of this wire.



Applications

The I-87089W/S can be extended to 32 channels by connecting 3 extra DN-1618UB.



VW Input Module	
Models	I-87089W/S
Pictures	NEW
Vibrating Wire Input	
Channel	8
Input Type	Vibrating Wire Sensor (2 VW wire + 2 Temperature wire +1 shield wire)
Measurement Range	Wire: 450 ~ 6000 Hz
Excitation mode	Enhanced square wave
Resolution	Wire: 0.01Hz / Temperature: 0.01 °C
Accuracy	Wire: ±0.01 % of FSR / Temperature: ±0.1 % of FSR
Channel to channel isolation	Yes, 1 kV
System	
Dual Watchdog	Yes
Isolation	3000 V_{DC}
Power Consumption	3.6 W
Connector	D-Sub 37
Optional Accessories	DN-1618UB

6.6. Counter/Frequency/PWM Modules

Selection Guide

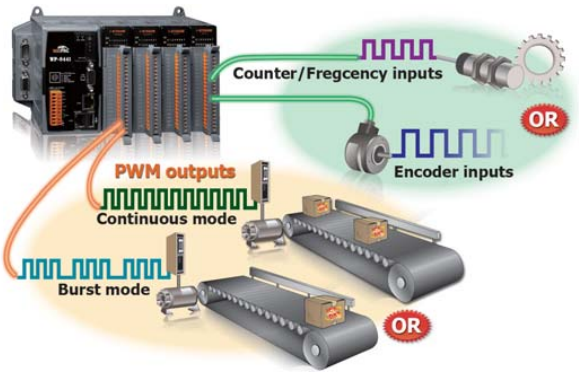
PWM Introduction

PWM (Pulse width modulation) is a powerful technique for controlling analog circuits. It uses digital outputs to generate a waveform with variant duty cycle and frequency to control analog circuits. I-8088W and I-87088W have 8 PWM output channels and 8 digital inputs. It can be used to develop powerful and cost effective analog control system.

PWM Features

- Automatic generation of PWM outputs by hardware, without software intervention.
- Software and hardware trigger mode for PWM output
- Individual and synchronous PWM output
- Burst mode PWM operation for standby
- DI channel can be configured as simple digital input channel or hardware trigger source of the PWM output.

Applications



Counter/Frequency/PWM Module (Parallel/Serial Bus)					
Models		I-87082W	I-8084W	I-87084W	I-8088W	I-87088W
Pictures				NEW	NEW	Available soon
Digital Input						
Channels		2	8		8	8
Type		Isolated or Non-isolated	Isolated or Non-isolated (Jumper Selectable)		Isolated	Isolated
on	Voltage Level	3.5 ~ 30 VDC (isolated) 2.4 ~ 5 VDC (Non-isolated)	4.5 ~ 30 VDC (isolated) 2 ~ 5 VDC (Non-isolated)		5 ~ 30 VDC	2.4 ~ 5 VDC
off	Voltage Level	1 VDC max. (isolated) 0~ 0.8 VDC (Non-isolated)	1 VDC max. (isolated) 0 ~ 0.8 VDC (Non-isolated)		0.8 VDC max.	0.8 VDC max.
Threshold Voltage		Programmable	Fixed		Fixed	Fixed
Counter		Up	Up/Down		-	Up
Max.Counts		32-bits (4,294,967,295)	32-bits (4,294,967,295)		-	32-bits (4,294,967,295)
Max. Counter Speed		100 kHz	250 kHz (isolated) 1 MHz (Non-isolated)		-	1 MHz
Digital Filter		2 ~ 65000 μs	1 ~ 32767 μs		-	-
Virtual Battery Backup for Counter Value		-	-	Yes	-	Yes
Max. Frequency		100 kHz	250 kHz		-	-
Frequency Accuracy		1Hz or 10Hz	±0.4% of Input Frequency		-	
Encoder		-	CW/CCW, Dir/Pulse, AB Phase		-	-
Digital Output						
Channels		2	-		8	
Type		Sink, Open Collector	-		Source, PWM	
Output Voltage		5 ~ 30 VDC	-		5 VDC	
Output Current		30 mA	-		1 mA	
Alarm Output		Yes	-		-	
PWM Frequency		-	-		1 ~ 500 kHz	
PWM Duty Cycle		-	-		0.1 ~ 99.9%	
PWM Mode		-	-		Burst, Continuous	
Burst Count		-	-		1 ~ 65535	
Trigger Start		-	-		Hardware, Software	
System						
Dual Watchdog		Yes	-	Yes	-	Yes
Data Bus		Seriial	Parallel	Seriial	Parallel	Seriial
Isolation		3750 Vrms	1000 Vrms	2000 VDC	3000 VDC	2500 Vrms
Power Consumption		0.5 W	0.6 W	0.6 W	1.8 W	1.8 W
Connector		Terminal Block	Terminal Block	Terminal Block	Terminal Block	Terminal Block
Optional Accessories		-	-	-	-	-

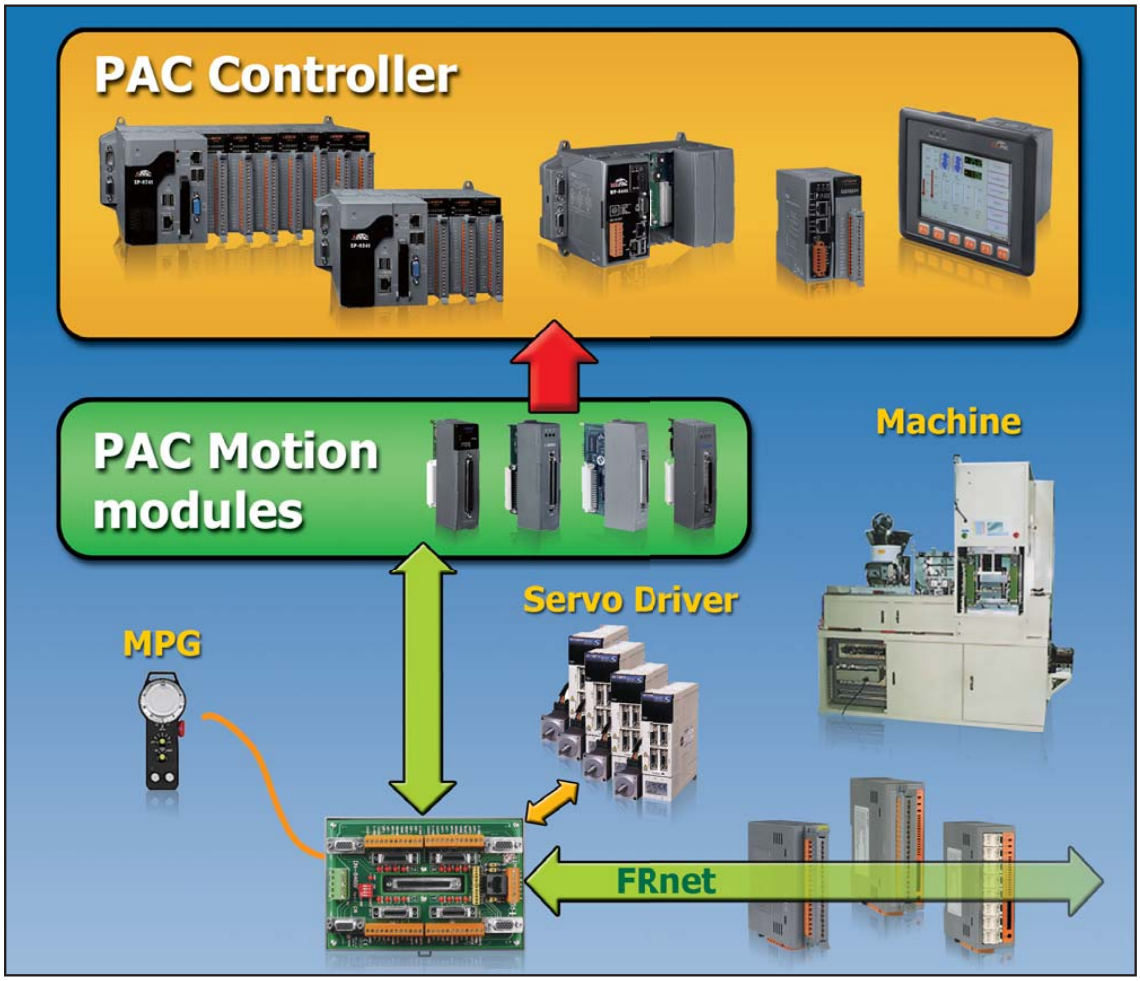
6.7. Motion Control Modules

Introduction

The i-8092/4/F/A/H is a 2/4-axis stepping/pulse-type servo motor control module that can be used on the ICPDAS PAC series controllers, and is suitable for general-purpose motion control application.This module contains a high-performance motion ASIC. Apart from a wide speed range, this intelligent motion controller also has a variety of motion control functions built in, such as 2/3(4 Axes only)- axis linear interpolation, 2-axis circular interpolation, T/S-curve acceleration/deceleration, various synchronous actions(4 Axes only), automatic homing(4 Axes only), and others. In addition, most of the motion control functions are performed with light load on the processor. While driving the motors, the motion status, and the other I/O status on the PAC modules, can still be monitored. As a result of the low CPU loading requirements, one or more motion modules may be used on a single PAC controller. ICPDAS has also provided a wide range of functions and examples to reduce the need for programming by users, making it a highly cost-effective solution for motion builders.

The i8092F/4F/4H modules have one port of FRnet. The FRnet port allows this module to expand its fast remote I/O easily. This two-wired FRnet can automatically scan its 128 DI and 128 DO with a period of 2.88 ms.

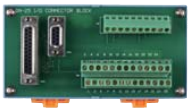
Applications



Selection Guide

Motion Control Modules (Parallel Bus)								
Model Name	I-8090W	I-8091W	I-8092F	I-8093W	I-8094	I-8094F	I-8094A	I-8094H
Pictures				NEW				
Encoder Input								
Axis	2	-	2	3	4			
Counter (bits)	16	-	32	32	32			
Speed (pps)	1 M	-	1 M	1 M	1 M			
Signal	CW/CCW, A/B, Pulse/Dir	-	CW/CCW, A/B	CW/CCW, A/B, Pulse/Dir	CW/CCW, A/B			
Command Pulse Output								
Axis	-	2	2	-	4			
Counter (bits)	-	32	32	-	32			
Speed (pps)	-	1 M	4 M	-	4 M			
Signal	-	CW/CCW, Pulse/Dir	CW/CCW, Pulse/Dir	-	CW/CCW, Pulse/Dir			
System								
Watchdog	-				-	-	-	-
Programmable CPU (MiniOS7 inside)	-				-	-	Yes	Yes
FRnet	-	-	Yes	-	-	Yes	-	Yes
Isolation	2500 Vrms				2500 Vrms			
Power Consumption	3.4 W	3.9 W	1.9 W	2 W	2 W	2.5 W	3 W	3.5 W
Optional Accessories	DN-25	DN-25	DN-8237	-	DN-8468	DN-8468	DN-8468	DN-8468

DN-25



DN-8237 Series List

DN-8468 Series List

DN-8468GB
DN-8468GB is for general purpose usage

DN-8468MB
DN-8468MB is for Mitsubishi servo J2 Amplifier

DN-8468PB
DN-8468PB is for Panasonic servo minas A Amplifier

DN-8468YB
DN-8468YB is for Yaskawa servo Amplifier

DN-8468DB
DN-8468DB is for Delta ASDA A servo Amplifier

DN-8468FB
DN-8468FB is for FUJI FALDIC-W servo Amplifier

6.8. Serial Communication Modules (Parallel Bus)

• Selection Guide

RS-232/422/485 Communication Module (Parallel Bus)					
Model Name	I-8112iW	I-8114W	I-8114iW	I-8142iW	I-8144iW
Pictures					
Communication					
Interface	RS-232	RS-232	RS-232	RS-422/485	RS-422/485
Port	2	4	4	2	4
Max. Speed (K bps)	115.2				
Controller Chip	16C950				
System					
Hot Swap	-	-		-	
Isolation	2500 V_{rms}	-	2500 V_{rms}	2500 V_{rms}	
Power Consumption	1.5 W	1.25 W	1.75 W	1.5 W	1.75 W
Connector	D-Sub 9 x 2	D-Sub 37		Terminal Block	
Optional Accessories	CA-0915	CA-9-3705	CA-9-3705	-	-

CA-0915

CA-9-3705

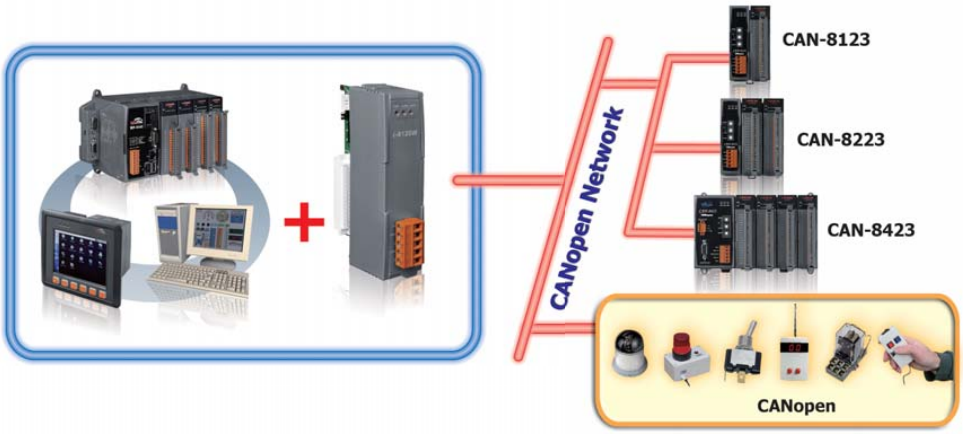
6.9. CAN/CANopen/DeviceNet Communication Modules (Parallel/Serial Bus)

Introduction

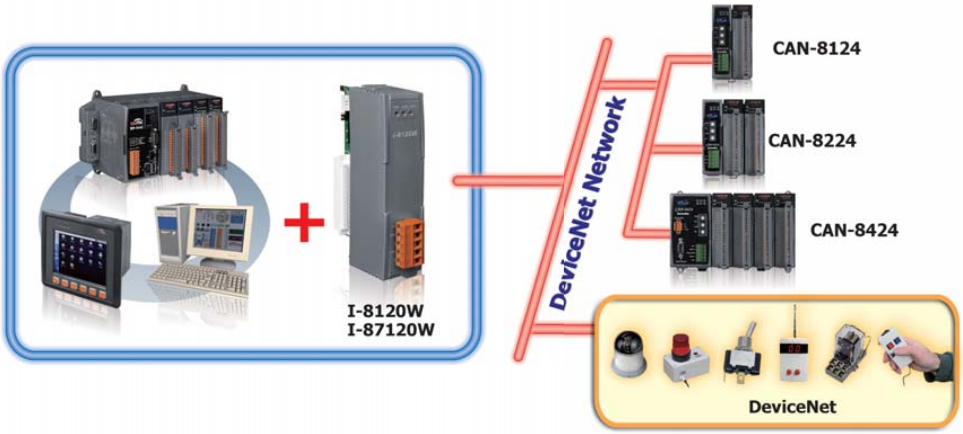
These CAN bus communication modules are the solutions to the various CAN application requirements in PAC family with rich CAN bus protocols. The I-8123W, I-87123W, I-8124W, and I-87124W separately support CANopen and DeviceNet master protocols. Users can apply them in PAC to connect to CANopen and DeviceNet devices to reach various CANopen/DeviceNet systems easily.
For the especial CAN bus applications, the I-8120W and I-87120W are designed for users to apply in PAC series. The default firmware of I-8120W and I-87120W provides the transmission and reception of CAN bus messages in PAC. In addition, users can design the specific firmware in these modules to reduce the loading of the PAC in C language.

CAN Bus Applications

CANopen Applications



DeviceNet Applications



Selection Guide

CAN / CANopen / DeviceNet Communication Module (Parallel / Serial Bus)						
Model Name	I-8120W	I-87120W	I-8123W	I-87123W	I-8124W	I-87124W
Pictures						
Communication						
Interface	ISO 11898-2 CAN					
Port	1					
Terminator	120 Ω Selected By Jumper					
Max. Speed (K bps)	1000		1000		500	
Controller Chip	SJA1000T					
Transceiver Chip	82C250					
Protocol	CAN 2.0 A/2.0 B		CANopen		DeviceNet	
System						
Hot Swap	-	Yes	-	Yes	-	Yes
Data Communication	Parallel Interface	Serial Interface	Parallel Interface	Serial Interface	Parallel Interface	Serial Interface
User-defined Firmware	Yes		No		No	
Isolation	2500 Vrms					
Power Consumption	2 W					
Connector	5-pin Terminal Block					
Optional Accessories	CA-0904 Cable					

CA-0904

6.10. FRnet Communication Modules (Parallel Bus)

Introduction

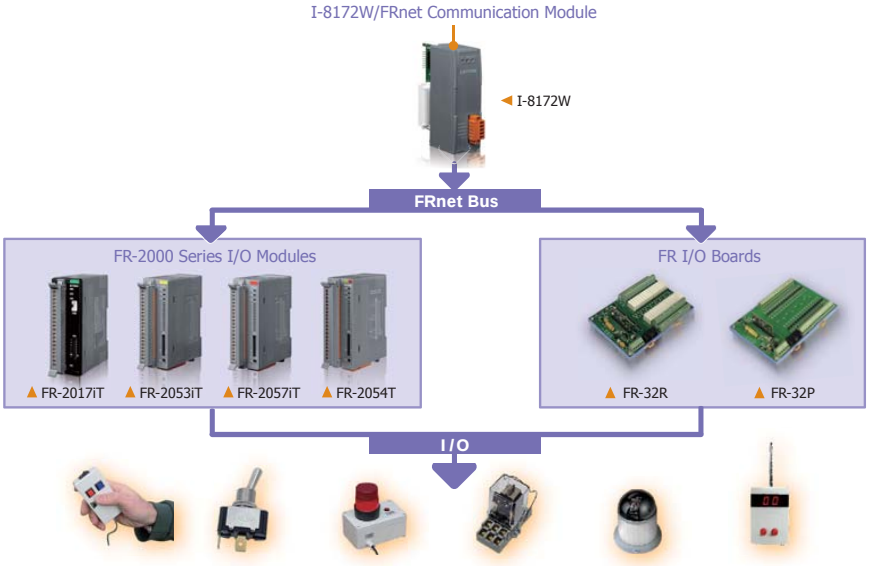
FRnet is an innovative industrial field bus. It uses twisted pair cable to be the transmission medium. Each FRnet port can link up to 128 DI and 128 DO channels. The whole I/O statuses are updated at a fixed cycle time (0.72 ms or 2.88 ms) no matter how many FRnet I/O modules are connected to the FRnet network. Further more, the update is done by hardware, there is no communication protocol is needed. Using FRnet, the user can easily and quickly implement high-speed distributed I/O control systems. Its key features are:

Features

- Easy connection: multi-drop networking with twisted pair cable
- Easy programming: memory mapping (no communication protocol needed)
- I/O expansion ability for each port: 8 SA nodes (for DI) and 8 RA nodes (for DO), each node addresses to 16 DI or DO channels
- Normally FRnet module provides two communication speeds. OEM customer can call manufacturer to design special FRnet module for long distance communication.

Speed	Baudrate	Max. Distance	Fixed Cycle Time
High Speed	1 Mbps	100 m	0.72 ms
Low Speed (Default)	250 kbps	400 m	2.88 ms

Applications



2-PORT FRnet module (Parallel Bus)	
Model Name	I-8172W
Pictures	
Communication	
Interface	FRnet
Port	2
Transfer distance	Max. 400 m for speed 250Kbps (Default); Max. 100 m for speed 1 Mbps
Transfer speed	2.88 ms for speed 250Kbps (Default) / 0.72 ms for speed 1 Mbps
Protocol	None (memory mapping)
I/O Expansion for Each Port	8 SA nodes (for DI) and 8 RA nodes (for DO); each node for DI or DO channels
networking	multi-drop networking with twiced paired cable
System	
Hot Swap	-
Intra-module Isolation, Field to Logic	3000 VDC
Power Consumption	6 W
Optional Accessories	-

6.11. Ethernet Communication Modules (Parallel Bus)

Introduction

The I-8135W is a flexible and high performance five-port Ethernet switch module. It can be installed in PAC (XPAC, WinPAC, LinPAC, iPAC, ViewPAC, ...) and directly gets power from the backplane. An extra power adapter for an Ethernet switch is not needed any more.

I-8135W can work as either of the following modes:

Ethernet Switch:

I-8135W just gets power from backplane of the PAC. There is no extra software driver needed.

Ethernet Adapter:

I-8135W not only gets power from backplane of the PAC but also enables the Ethernet controller on the I-8135W to become an Ethernet adapter. This can let the PAC have one extra Ethernet port.
To be an Ethernet adapter, there must be a software driver installed in the OS.
Currently, only VP-23/25Wx (installed WinCE 5.0 and Android 1.6) can support the mode.

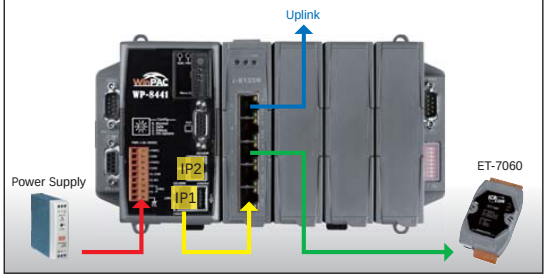
In your PAC solutions, if you want to expand Ethernet connection, I-8135W is good to replace regular Ethernet switchs to save installation space and power adapter.

Features

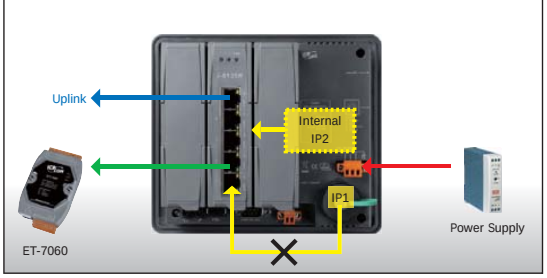
- 8-bit Ethernet Controller Inside
- 5-port RJ-45 Ethernet Switch
- Automatic MDI/MDI-X crossover for plug-and-play
- Each port supports both 10/100 Mbps speed auto negotiation
- Full duplex IEEE 802.3x and half duplex backpressure flow control
- 3.2 Gbps high performance memory bandwidth
- Frame buffer memory: 512 Kbit

Applications

I-8135W (Ethernet Switch Mode) with WinPAC



I-8135W (Ethernet Adapter Mode) with ViewPAC



Ethernet Communication Module	
Model Name	I-8135W
Pictures	NEW
Ethernet Adapter	10/100 Mbit Ethernet Controller connected to internal port of switch via MII interface
Ethernet Switch	5 External ports (to RJ-45)
Technology	
Standards	IEEE 802.3, 802.3u, 802.3x
Processing Type	Store & forward, wire speed switching
MAC Addresses	1024
Memory Bandwidth	3.2 Gbps
Frame Buffer Memory	512 Kbit
Flow Control	IEEE802.3x flow control, back pressure flow control
Operating Mode	
Ethernet Adapter	Directly supported by WinCE 5.0 and Android 1.5 (for VP-23/25W and VP-23/25A series)
Ethernet Switch	No external software required (for iP-8000, WP-8000, XP-8000, VP-23/25W and VP-23/25A series)
System	
Hot Swap	-
LED Indicators	1 LED as power indicator
	10 LEDs as speed and Link/Act indicators
Power Consumption	6 W

6.12. GPS/GSM/GPRS Modules

• Selection Guide

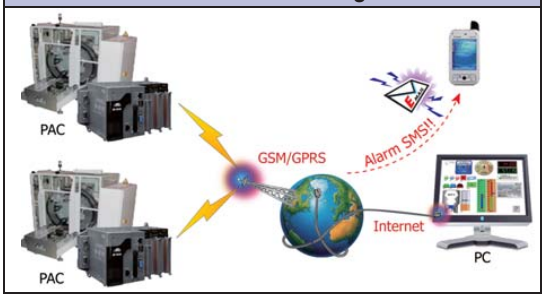
Introduction

The I-87211W/I-8212W/I-8213W modules are specially designed for GPS, GSM and GPRS applications in PAC series. They expand the capability of PAC series into Machine to Machine, Mobile, Man communication applications. Also, there are rich demos including IsaGraf, InduSoft and C language for users to integrate these modules into M2M applications. By applying these modules in PAC series, the remote control or monitoring can be implemented easily from any location.

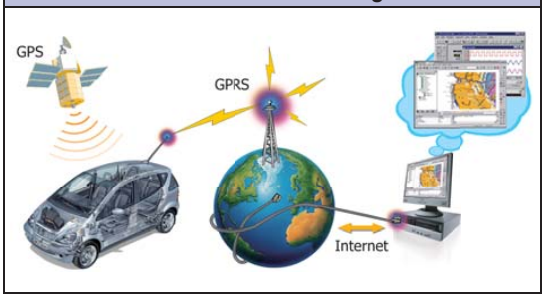
Applications

- Remote Machine management
- GPS Vehicle Tracking

Remote Machine Management



GPS Vehicle Tracking



Model Name		I-87211W	I-8212W	I-8213W
Pictures		5 m	NEW	NEW 5 m
Specifications				
Digital Output	Output Channel	2 (Sink)	-	-
	Output Type	Non-isolated Open Collector	-	-
	Output Current	100 mA	-	-
	Load Voltage	+5 ~ +30 VDC	-	-
GPS Receiver	Chip	MediaTek solution	-	MediaTek solution
	Frequency	L1 1575.42 MHz, C/A code	-	L1 1575.42 MHz, C/A code
	Support Channel	32	-	32
	Position Accuracy	Capable of SBAS (WAAS, EGNOS, MSAS)	-	Capable of SBAS (WAAS, EGNOS, MSAS)
	Max. Altitude	<18,000 m	-	<18,000 m
	Max. Velocity	<515 m/s	-	<515 m/s
	Acquisition Time	Cold Start (Open Sky)=42 s (typical)	-	Cold Start (Open Sky)=42 s (typical)
	Sensitivity	Tracking=Up to -158 dBm	-	Tracking=Up to -158 dBm
		Cold start=Up to -142 dBm	-	Cold start=Up to -142 dBm
	Protocol Support	NMEA 0183 version 3.01	-	NMEA 0183 version 3.01
GPS Output	1 PPS	Pulse per second output (Default 100 ms pulse/sec)	-	-
	RS-232 Interface	GPS information output	-	-
GSM/GPRS	Band	-	850/900/1800/1900 MHz	
	GPRS Multi-slot	-	Class 10/8	
	GPRS Mobile Station	-	Class B	
	GPRS Class 10	-	Max. 85.6 kbps	
	CSD	-	Up to 14.4 kbps	
	Compliant to GSM phase 2/2+	-	Class 4 (2W @ 850/900 MHz); Class 1(1W @ 1800/1900 MHz)	
	Colding Schemes	-	CS 1, CS 2, CS 3, CS 4	
	SMS	-	Text and PDU mode	
3G	Technology	-	GSM /GPRS /EDGE /UMITS /HSDPA /HSUPA will be avalible for I-8212W-3GWA and I-8213W-3GWA	