



2-channel Isolated Strain Gauge Input Module

#### **■** Introduction

Around our surroundings, there are numerous examples of converting force into a measurable electrical output; In most cases, we need a strain gauge or a load cell. But the question is that how do we deal with these electrical outputs.

I-87016W is definitely your NO.1 choice! It not only processes the data from load cells or strain gauges, but also features linear mapping that generates intuitive and synchronic results for you; by user-defined corespondent table, I-87016W converts the data into weight directly!

# Applications

- Industrial Automation
- Industrial Machinery
- Building Automation
- Semiconductor Fabrication
- Control Systems

#### **■ System Specifications**

Communication			
Interface		RS-485	
Format		N, 8, 1	
Baud Rate		1200 to 115200 bps	
Protocol		DCON	
Dual Watchdog	)	Yes, Module (1.6 Seconds), Communication (Programmable)	
Safe Value (When Host Fail or Communication Fail)		Yes	
Power-on Pres	et Value	Yes	
LED Indicato	rs/Display		
System LED Indictors		Yes, 1 as Power/Communication Indicator	
I/O LED Indicators		4 as Digital Input/Digital Output status Indicators	
Isolation			
Intra-module Isolation, Field-to-Logic		3000 VDC	
EMS Protection			
ESD (IEC 6100	10 4 2)	±4 kV Contact for each Terminal	
E3D (IEC 0100	10-4-2)	±8 kV Air for Random Point	
Power	Power		
Power	Typical	1.1 W	
Consumption	Maximum	2.5 W	
Mechanical			
Dimensions (L $\times$ W $\times$ H)		115 mm $\times$ 30 mm $\times$ 102 mm	
Environment			
Operating Temperature		-25 to +75°C	
Storage Temperature		-40 to +85°C	
Humidity		10 to 95% RH, Non-condensing	

# **■** Features

- Strain Gauge Measurement
- High Resolution: 16-bit
- Excitation Voltage Output: 0 ~ 10 V
- Individual Channel Configuration
- 2-channel Digital Inputs
- 2-channel Digital Outputs
- 3000 V<sub>DC</sub> Intra-module Isolation
- RoHS Compliant
- Wide Operating Temperature Range: -25 to +75°C







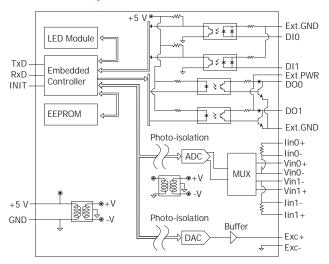


## **■ I/O Specifications**

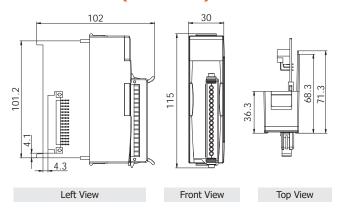
Channels	Analog Input			
Range	Channels		2	
Resolution 16-bit Individual Channel Configuration Yes  Accuracy \$\frac{\text{±0.05% of FSR (Voltage), ±0.1% of FSR (Current)}}{\text{Excitation}}\$  Accuracy \$\frac{\text{±0.05% of FSR (Voltage), ±0.1% of FSR (Current)}}{\text{Load Current}}\$  Sampling Rate 10 Hz (Total) 15.7 Hz (10 Hz mode)  Common Mode Rejection 150 dB min.  Normal Mode Rejection 100 dB Input Impedance > 400 kΩ (Voltage), 125 Ω (Current)  Overvoltage Protection 30 VDC  Long-distance Strain Gauge Measurement Individual Channel Configurable Yes  Excitation Voltage Output  Channels 1 1  Range 0 0 ~ +10 VDC  Resolution 16-bit  Max. Output Load current 80 mA  Accuracy ±0.05% of FSR  Output Capacity 10 VDC @ 80 mA  Drift ±50 ppm/°C  Digital Input  Channels 2 2  Contact Wet  Sink/Source (NPN/PNP) Sink  ON Voltage Level +3.5 VDC ~ 50 VDC  OFF Voltage Level +1 VDC Max.  Input Impedance 10 kΩ, 0.66 W  Channels 2 2  Max. Input Frequency 50 Hz  Min. Pulse Width 10 ms  Channels 10 VBC ~ 50 VDC  Digital Output  Channels 2 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Axoured Nature Frequency 50 Incompleted Sink/Source (NPN/PNP) Sink  Digital Output  Channels 2 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Axoured Nature Frequency 50 Incompleted Sink/Source (NPN/PNP) Sink  Domanulation Yes  Digital Output  Channels 2 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Axoured Current 700 mA/channel  External Power Reversed Protection and Short Circuit Protection	Range		mV, $\pm 1$ VDC, $\pm 2.5$ VDC -20 mA $\sim +20$ mA (No External	
Individual Channel Configuration       Yes         Accuracy       ±0.05% of FSR (Voltage), ±0.1% of FSR (Current)         Sampling Rate       10 Hz (Total)         -3dB Bandwidth       15.7 Hz (10 Hz mode)         Common Mode Rejection       150 dB min.         Normal Mode Rejection       100 dB         Input Impedance       > 400 kΩ (Voltage), 125 Ω (Current)         Overvoltage Protection       30 VDC         Long-distance Strain Gauge Measurement       Yes         Individual Channel Configurable       Yes         Excitation Voltage Output       Yes         Channels       1         Range       0 ~ +10 VDC         Resolution       16-bit         Max. Output Load current       80 mA         Accuracy       ±0.05% of FSR         Output Capacity       10 VDC @ 80 mA         Drift       ±50 ppm/°C         Digital Input       Thus the strain of the	Strain Gaug	де Туре		
# ±0.05% of FSR (Voltage), ±0.1% of FSR (Current)  Sampling Rate	Resolution		16-bit	
Sampling Rate 10 Hz (Total) -3dB Bandwidth 15.7 Hz (10 Hz mode)  Common Mode Rejection 150 dB min.  Normal Mode Rejection 100 dB  Input Impedance > 400 kΩ (Voltage), 125 Ω (Current)  Overvoltage Protection 30 VDC  Long-distance Strain Gauge Measurement Individual Channel Configurable Yes  Excitation Voltage Output  Channels 1 Range 0 ~ +10 VDC  Resolution 16-bit  Max. Output Load current 80 mA  Accuracy ±0.05% of FSR  Output Capacity 10 VDc @ 80 mA  Drift ±50 ppm/°C  Digital Input  Channels 2 Contact Wet Sink/Source (NPN/PNP) Sink  ON Voltage Level +1. VDc Max.  Input Impedance 10 kΩ, 0.66 W  Channels 2  Wax. Input Frequency 50 Hz Min. Pulse Width 10 ms  Channels 0 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  One Collector  Sink/Source (NPN/PNP) Sink  Channels 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Open Collector  Sink/Source (NPN/PNP) Sink  Channels 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Open Collector  Sink/Source (NPN/PNP) Sink  Channels 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Counter 700 mA/channel  External Power Reversed Protection and Short Circuit Protection	Individual (	Channel Configuration	Yes	
-3dB Bandwidth 15.7 Hz (10 Hz mode)  Common Mode Rejection 100 dB  Input Impedance > 400 kΩ (Voltage), 125 Ω (Current)  Overvoltage Protection 30 VDC  Long-distance Strain Gauge Measurement Individual Channel Configurable Yes  Excitation Voltage Output  Channels 1	Accuracy			
Common Mode Rejection       150 dB min.         Normal Mode Rejection       100 dB         Input Impedance       > 400 kΩ (Voltage), 125 Ω (Current)         Overvoltage Protection       30 VDC         Long-distance Strain Gauge Measurement       Yes         Individual Channel Configurable       Yes         Excitation Voltage Output       1         Channels       1         Range       0 ~ +10 VDC         Resolution       16-bit         Max. Output Load current       80 mA         Accuracy       ±0.05% of FSR         Output Capacity       10 VDC @ 80 mA         Drift       ±50 ppm/°C         Digital Input       2         Channels       2         Contact       Wet         Sink/Source (NPN/PNP)       Sink         ON Voltage Level       +3.5 VDC ~ 50 VDC         OFF Voltage Level       +1 VDC Max.         Input Impedance       10 kΩ, 0.66 W         Event Counter       2         Max. Input Frequency Min. Pulse Width       10 ms         Channels       2         Max. Input Frequency Min. Pulse Width       10 ms         Channels       2         Type       Open Collector	Sampling R	late	10 Hz (Total)	
Normal Mode Rejection  Input Impedance  > 400 kΩ (Voltage), 125 Ω (Current)  30 VDC  Long-distance Strain Gauge Measurement Individual Channel Configurable  Excitation Voltage Output  Channels  I 0 ~ +10 VDC  Resolution  Max. Output Load current  80 mA  Accuracy  ±0.05% of FSR  Output Capacity  10 VDC @ 80 mA  Drift  ±50 ppm/°C  Digital Input  Channels  2  Contact  Sink/Source (NPN/PNP)  ON Voltage Level  Input Impedance  10 kΩ, 0.66 W  Channels  Channels  2  Max. Input Frequency  Min. Pulse Width  10 ms  Channels  Channels  2  Type  Open Collector  Sink/Source (NPN/PNP)  Sink  Channels  2  Type  Open Collector  Sink/Source (NPN/PNP)  Sink  Channels  2  Type  Open Collector  Sink/Source (NPN/PNP)  Sink  Channel  Channels  2  Type  Open Collector  Sink/Source (NPN/PNP)  Sink  Channel  Channel  Type  Open Collector  Sink/Source (NPN/PNP)  Sink  Channel  Channel  Channel  Type  Open Collector  Sink/Source (NPN/PNP)  Sink  Channel  Chan	-3dB Bandy	width	15.7 Hz (10 Hz mode)	
Input Impedance   > 400 kΩ (Voltage), 125 Ω (Current)	Common M	lode Rejection	150 dB min.	
Overvoltage Protection       30 VDC         Long-distance Strain Gauge Measurement       Yes         Individual Channel Configurable       Yes         Excitation Voltage Output       1         Channels       1         Range       0 ~ +10 VDC         Resolution       16-bit         Max. Output Load current       80 mA         Accuracy       ±0.05% of FSR         Output Capacity       10 VDC @ 80 mA         Drift       ±50 ppm/°C         Digital Input         Channels       2         Contact       Wet         Sink/Source (NPN/PNP)       Sink         ON Voltage Level       +3.5 VDC ~ 50 VDC         OFF Voltage Level       +1 VDC Max.         Input Impedance       10 kΩ, 0.66 W         Event Counter       Channels       2         Max. Input Frequency       50 Hz         Min. Pulse Width       10 ms         Channels       2         Type       Open Collector         Sink/Source (NPN/PNP)       Sink         Load Voltage       +3.5 VDC ~ 50 VDC         Max. Load Current       700 mA/channel         External Power Reversed Protection and Short Circuit Protection       Yes <td>Normal Mo</td> <td>de Rejection</td> <td>100 dB</td>	Normal Mo	de Rejection	100 dB	
Long-distance Strain Gauge Yes   Measurement Yes   Individual Channel Configurable Yes   Excitation Voltage Output 1   Channels 1   Range 0 ~ +10 VDC   Resolution 16-bit   Max. Output Load current 80 mA   Accuracy ±0.05% of FSR   Output Capacity 10 VDC @ 80 mA   Drift ±50 ppm/°C   Digital Input Vet   Channels 2   Contact Wet   Sink/Source (NPN/PNP) Sink   ON Voltage Level +3.5 VDC ~ 50 VDC   OFF Voltage Level +1 VDC Max.   Input Impedance 10 kΩ, 0.66 W   Event Counter Channels   Event Counter 2   Max. Input Frequency 50 Hz   Min. Pulse Width 10 ms   Channel-to-Channel Isolation Yes   Digital Output   Channels 2   Type Open Collector   Sink/Source (NPN/PNP) Sink   Load Voltage +3.5 VDC ~ 50 VDC   Max. Load Current 700 mA/channel   External Power Reversed Protection and Short Circuit Protection Yes	Input Impe	edance	> 400 kΩ (Voltage), 125 Ω (Current)	
Measurement   Individual Channel Configurable Yes   Excitation Voltage Output 1   Channels 1   Range 0 ~ +10 VDC   Resolution 16-bit   Max. Output Load current 80 mA   Accuracy ±0.05% of FSR   Output Capacity 10 VDC @ 80 mA   Drift ±50 ppm/°C   Digital Input   Channels 2   Contact Wet   Sink/Source (NPN/PNP) Sink   ON Voltage Level +3.5 VDC ~ 50 VDC   OFF Voltage Level +1 VDC Max.   Input Impedance 10 kΩ, 0.66 W   Event Counter Max. Input Frequency 50 Hz   Min. Pulse Width 10 ms   Channel-to-Channel Isolation Yes   Digital Output   Channels 2   Type Open Collector   Sink/Source (NPN/PNP) Sink   Load Voltage +3.5 VDC ~ 50 VDC   Max. Load Current 700 mA/channel   External Power Reversed Protection and Short Circuit Protection Yes	Overvoltag	e Protection	30 VDC	
Channels	_	_	Yes	
Channels	Individual (	Channel Configurable	Yes	
Range				
Resolution	Channels		1	
Max. Output Load current         80 mA           Accuracy         ±0.05% of FSR           Output Capacity         10 VDC @ 80 mA           Drift         ±50 ppm/°C           Digital Input           Channels         2           Contact         Wet           Sink/Source (NPN/PNP)         Sink           ON Voltage Level         +3.5 VDC ~ 50 VDC           OFF Voltage Level         +1 VDC Max.           Input Impedance         10 kΩ, 0.66 W           Event Counter         2           Max. Input Frequency         50 Hz           Min. Pulse Width         10 ms           Channel-to-Channel Isolation         Yes           Digital Output         2           Channels         2           Type         Open Collector           Sink/Source (NPN/PNP)         Sink           Load Voltage         +3.5 VDC ~ 50 VDC           Max. Load Current         700 mA/channel           External Power Reversed Protection and Short Circuit Protection         Yes	Range		0 ~ +10 VDC	
Accuracy	Resolution		16-bit	
Dutput Capacity	Max. Outpu	ut Load current	80 mA	
Drift	Accuracy		±0.05% of FSR	
Digital Input           Channels         2           Contact         Wet           Sink/Source (NPN/PNP)         Sink           ON Voltage Level         +3.5 VDC ~ 50 VDC           OFF Voltage Level         +1 VDC Max.           Input Impedance         10 kΩ, 0.66 W           Event Counter         Max. Input Frequency           Min. Pulse Width         10 ms           Channel-to-Channel Isolation         Yes           Digital Output         2           Type         Open Collector           Sink/Source (NPN/PNP)         Sink           Load Voltage         +3.5 VDC ~ 50 VDC           Max. Load Current         700 mA/channel           External Power Reversed Protection and Short Circuit Protection         Yes	Output Cap	pacity	10 VDC @ 80 mA	
Channels   2	Drift		±50 ppm/°C	
$ \begin{array}{c cccc} Contact & Wet \\ \hline Sink/Source (NPN/PNP) & Sink \\ \hline ON Voltage Level & +3.5 VDC \sim 50 VDC \\ \hline OFF Voltage Level & +1 VDC Max. \\ \hline Input Impedance & 10 k\Omega, 0.66 W  \hline Event \\ Counter & Max. Input Frequency & 50 Hz \\ \hline Min. Pulse Width & 10 ms \\ \hline Channel-to-Channel Isolation & Yes \\ \hline \hline \textit{Digital Output} \\ \hline Channels & 2 \\ \hline Type & Open Collector \\ \hline Sink/Source (NPN/PNP) & Sink \\ \hline Load Voltage & +3.5 VDC \sim 50 VDC \\ \hline Max. Load Current & 700 mA/channel \\ \hline External Power Reversed Protection and Short Circuit Protection \\ \hline \end{array} $	Digital In	put		
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Channels		2	
ON Voltage Level $+3.5 \text{ VDC} \sim 50 \text{ VDC}$ OFF Voltage Level $+1 \text{ VDC Max}$ .  Input Impedance $10 \text{ k}\Omega$ , $0.66 \text{ W}$ Event Counter $M$ Max. Input Frequency $M$ Min. Pulse Width $M$ Channel-to-Channel Isolation $M$ Channels $M$ Channels $M$ Type $M$ Open Collector $M$ Sink/Source (NPN/PNP) $M$ Load Voltage $M$ As $M$ External Power Reversed Protection and Short Circuit Protection	Contact		Wet	
ON Voltage Level $+3.5 \text{ VDC} \sim 50 \text{ VDC}$ OFF Voltage Level $+1 \text{ VDC Max}$ .  Input Impedance $10 \text{ k}\Omega$ , $0.66 \text{ W}$ Event Counter $M$ Max. Input Frequency $M$ Min. Pulse Width $M$ Channel-to-Channel Isolation $M$ Channels $M$ Channels $M$ Type $M$ Open Collector $M$ Sink/Source (NPN/PNP) $M$ Load Voltage $M$ As $M$ External Power Reversed Protection and Short Circuit Protection	Sink/Source	e (NPN/PNP)	Sink	
Input Impedance 10 kΩ, 0.66 W  Event Counter  Max. Input Frequency 50 Hz  Min. Pulse Width 10 ms  Channel-to-Channel Isolation Yes  Digital Output  Channels 2  Type 0pen Collector  Sink/Source (NPN/PNP) Sink  Load Voltage +3.5 Vpc ~ 50 Vpc  Max. Load Current 700 mA/channel  External Power Reversed Protection and Short Circuit Protection			+3.5 VDC ~ 50 VDC	
Input Impedance 10 kΩ, 0.66 W  Event Counter  Max. Input Frequency 50 Hz  Min. Pulse Width 10 ms  Channel-to-Channel Isolation Yes  Digital Output  Channels 2  Type 0pen Collector  Sink/Source (NPN/PNP) Sink  Load Voltage +3.5 Vpc ~ 50 Vpc  Max. Load Current 700 mA/channel  External Power Reversed Protection and Short Circuit Protection	OFF Voltag	e Level	+1 VDC Max.	
Channels   2     Max. Input Frequency   50 Hz     Min. Pulse Width   10 ms			10 kΩ, 0.66 W	
Event Counter  Max. Input Frequency 50 Hz  Min. Pulse Width 10 ms  Channel-to-Channel Isolation Yes  Digital Output  Channels 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Load Voltage +3.5 Vpc ~ 50 Vpc  Max. Load Current 700 mA/channel  External Power Reversed Protection and Short Circuit Protection			,	
Min. Pulse Width 10 ms  Channel-to-Channel Isolation Yes  Digital Output  Channels 2  Type Open Collector  Sink/Source (NPN/PNP) Sink  Load Voltage +3.5 VDC ~ 50 VDC  Max. Load Current 700 mA/channel  External Power Reversed Protection and Short Circuit Protection		Max. Input Frequency	50 Hz	
Channel-to-Channel Isolation Yes  Digital Output  Channels 2 Type Open Collector Sink/Source (NPN/PNP) Sink  Load Voltage +3.5 VDC ~ 50 VDC  Max. Load Current 700 mA/channel External Power Reversed Protection and Short Circuit Protection	Counter			
Digital Output  Channels  2 Type Open Collector Sink/Source (NPN/PNP) Sink Load Voltage +3.5 VDC ~ 50 VDC Max. Load Current External Power Reversed Protection and Short Circuit Protection	Channel-to	-Channel Isolation		
Channels 2 Type Open Collector Sink/Source (NPN/PNP) Sink Load Voltage +3.5 VDC ~ 50 VDC Max. Load Current 700 mA/channel External Power Reversed Protection and Short Circuit Protection				
Type Open Collector Sink/Source (NPN/PNP) Sink Load Voltage +3.5 VDC ~ 50 VDC Max. Load Current 700 mA/channel External Power Reversed Protection and Short Circuit Protection			2	
Sink/Source (NPN/PNP)  Load Voltage  +3.5 VDC ~ 50 VDC  Max. Load Current  External Power Reversed Protection and Short Circuit Protection  Yes			Open Collector	
Load Voltage +3.5 VDC ~ 50 VDC  Max. Load Current 700 mA/channel  External Power Reversed Protection and Short Circuit Protection	Sink/Source (NPN/PNP)		'	
Max. Load Current 700 mA/channel External Power Reversed Protection 700 mA/channel Yes			+3.5 VDC ~ 50 VDC	
External Power Reversed Protection and Short Circuit Protection  Yes	-		700 mA/channel	
	External Power Reversed Protection			
			Yes	

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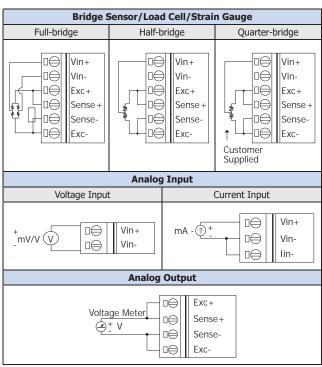
#### **■ Internal I/O Structure**



# **■** Dimensions (Units: mm)



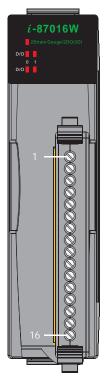
Wire Connections



Digital Input/ Counter	Readback as 1	Readback as 0
	+10 ~ +50 VDC	OPEN or < +4 VDC
Sink	→ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	□ Dix + □ □ Ext.GND

Output Type	ON State Readback as 1	OFF State Readback as 0	
Drive Relay	□ Ext.PWR DOX Ext.GND	Ext.PWR DOx Ext.GND	
Resistance Load	+	± Ext.PWR DOX Ext.GND	

# **Pin Assignments**



Ter	minal No.	Pin Assignment
Гп	01	Vin0+
	02	Vin0-
Ţp(	03	lin0-
	04	Vin1+
G P	05	Vin1-
5-0	06	lin1-
C = (	07	Exc+
	08	Sense+
[ n	09	Sense-
	10	Exc-
	11	Ext.PWR
	12	DO0/LO
	13	DO1/HI
	14	DI0/EV
	15	DI1/EV
	16	Ext.GND

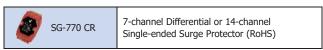
## **Excitation Voltage**

Strain Gauge	Quarter-bridge	Half-bridge	Full-bridge
120 R	9.0 V	9.0 V	4.5 V
350 R	10 V	10 V	10 V

#### Ordering Information

I-87016W-G CR	2-channel Isolated Strain Gauge Input Module (Gray Cover) (RoHS)
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#### Accessories



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