



## I-7016(D)

## M-7016(D)

2-channel Strain Gauge Input Module

### Features

- 2-channel Strain Gauge Measurement
- High Resolution: 16-bit
- Excitation Voltage Output: 0 ~ +10 V
- 50 Hz Event Counter (Digital Input)
- High/Low Alarm (Digital Output)
- Linear Mapping Function
- 3000 Vdc Intra-module Isolation
- Dual Watchdog
- Wide Operating Temperature Range: -25 to +75°C



### Introduction

In the industrial environment, there are numerous examples where force needs to be converted into a measurable electrical output. In most cases, a strain gauge or a load cell can be used. But the question is, how do we then deal with these electrical output measurements? In this situation, the I-7016 is definitely the No. 1 choice. Not only can the module process data from a load cell or a strain gauge, it also features linear mapping that can be used to directly convert the resulting data into weight via a user-defined correspondent table. The I-7016 supports full-bridge strain gauges and provides 2 Analog Input channels, 1 excitation voltage output channel, 1 Digital Input channels and 4 Digital Output channels. The module provides a programmable input range ( $\pm 15$  mV,  $\pm 50$  mV,  $\pm 100$  mV,  $\pm 500$  mV,  $\pm 1$  V, and  $\pm 2.5$  V) and each Analog Input channel can be individually configured. Excitation voltage output can be in the range of 0 ~ +10 V, with a 40 mA driving efficiency. Digital Output channels can also be set as high or low alarm outputs. The M-7016 supports both the Modbus RTU and DCON protocols, which can be configured via software, and all hardware specifications are the same as the I-7016.

### System Specifications

| Model                                  | I-7016                                                                             | I-7016D | M-7016           | M-7016D |
|----------------------------------------|------------------------------------------------------------------------------------|---------|------------------|---------|
| Communication                          |                                                                                    |         |                  |         |
| Interface                              | RS-485                                                                             |         |                  |         |
| Bias Resistor                          | No (Usually supplied by the RS-485 Master. Alternatively, add a tM-SG4 or SG-785.) |         |                  |         |
| Format                                 | (N, 8, 1) (N, 8, 2) (E, 8, 1) (O, 8, 1)                                            |         |                  |         |
| Baud Rate                              | 1200 to 115200 bps                                                                 |         |                  |         |
| Protocol                               | DCON                                                                               |         | Modbus RTU, DCON |         |
| Dual Watchdog                          | Yes, Module (1.6 Seconds), Communication (Programmable)                            |         |                  |         |
| LED Indicators/Display                 |                                                                                    |         |                  |         |
| System LED Indicator                   | Yes, 1 as Power/Communication Indicator                                            |         |                  |         |
| I/O LED Indicators                     | -                                                                                  |         |                  |         |
| 7-segment LED Display                  | -                                                                                  | Yes     | -                | Yes     |
| Isolation                              |                                                                                    |         |                  |         |
| Intra-module Isolation, Field-to-Logic | 1500 Vdc                                                                           |         |                  |         |
| EMS Protection                         |                                                                                    |         |                  |         |
| ESD (IEC 61000-4-2)                    | -                                                                                  |         |                  |         |
| EFT (IEC 61000-4-4)                    | -                                                                                  |         |                  |         |
| Surge (IEC 61000-4-5)                  | -                                                                                  |         |                  |         |
| Power                                  |                                                                                    |         |                  |         |
| Reverse Polarity Protection            | Yes                                                                                |         |                  |         |
| Input Range                            | +10 ~ +30 Vdc                                                                      |         |                  |         |
| Consumption                            | 2.4 W                                                                              | 3.0 W   | 2.4 W            | 3.0 W   |
| Mechanical                             |                                                                                    |         |                  |         |
| Dimensions (L x W x H)                 | 123 mm x 72 mm x 35 mm                                                             |         |                  |         |
| Installation                           | DIN-Rail or Wall Mounting                                                          |         |                  |         |
| Environment                            |                                                                                    |         |                  |         |
| Operating Temperature                  | -25 to +75°C                                                                       |         |                  |         |
| Storage Temperature                    | -40 to +85°C                                                                       |         |                  |         |
| Humidity                               | 10 to 95% RH, Non-condensing                                                       |         |                  |         |

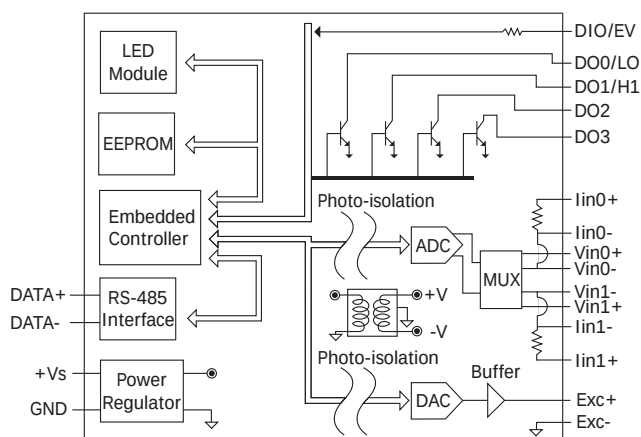
### Applications

- Building Automation
- Machine Automation
- Remote Diagnosis
- Factory Automation
- Remote Maintenance
- Testing Equipment

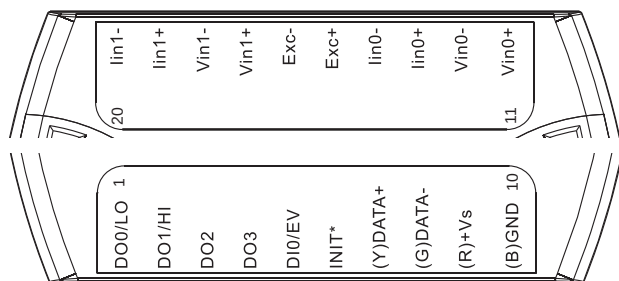
### I/O Specifications

| Model                            | I-7016                                                      | I-7016D | M-7016 | M-7016D |
|----------------------------------|-------------------------------------------------------------|---------|--------|---------|
| Strain Gauge Input               |                                                             |         |        |         |
| Channels                         | 2                                                           |         |        |         |
| Wiring                           | 4-wire                                                      |         |        |         |
| Sensor Types                     | Full-Bridge                                                 |         |        |         |
| Resolution                       | 16-bit                                                      |         |        |         |
| Accuracy                         | ±0.05% of FSR                                               |         |        |         |
| Sampling Rate                    | 10 Hz for 1-channel mode or 2 Hz (total) for 2-channel mode |         |        |         |
| Input Impedance                  | 20 MΩ                                                       |         |        |         |
| Individual Channel Configuration | -                                                           |         |        |         |
| Overvoltage Protection           | ±5 VDC                                                      |         |        |         |
| Open Wire Detection              | -                                                           |         |        |         |
| Long Distance Measurement        | -                                                           |         |        |         |
| Excitation Voltage Output        |                                                             |         |        |         |
| Channels                         | 1                                                           |         |        |         |
| Range                            | 0 ~ +10 V                                                   |         |        |         |
| Max. Load Current                | 40 mA                                                       |         |        |         |
| Resolution                       | 16-bit                                                      |         |        |         |
| Accuracy                         | ±0.05%                                                      |         |        |         |
| Power-on Value                   | Yes                                                         |         |        |         |
| Digital Input                    |                                                             |         |        |         |
| Channels                         | 1                                                           |         |        |         |
| Contact                          | Dry                                                         |         |        |         |
| Sink/Source (NPN/PNP)            | Source                                                      |         |        |         |
| ON Voltage Level                 | Close to GND                                                |         |        |         |
| OFF Voltage Level                | Open                                                        |         |        |         |
| Counter (50 Hz, 16-bit)          | Yes                                                         |         |        |         |
| Input Impedance                  | 3 kΩ                                                        |         |        |         |
| Overvoltage Protection           | ±30 Vdc                                                     |         |        |         |
| Digital Output                   |                                                             |         |        |         |
| Channels                         | 4                                                           |         |        |         |
| Type                             | Open Collector                                              |         |        |         |
| Sink/Source (NPN/PNP)            | Sink                                                        |         |        |         |
| Load Voltage                     | +3.5 ~ +50 Vdc                                              |         |        |         |
| Max. Load Current                | 30 mA/Channel                                               |         |        |         |
| Power-on Value                   | Yes                                                         |         |        |         |
| Safe Value                       | Yes                                                         |         |        |         |

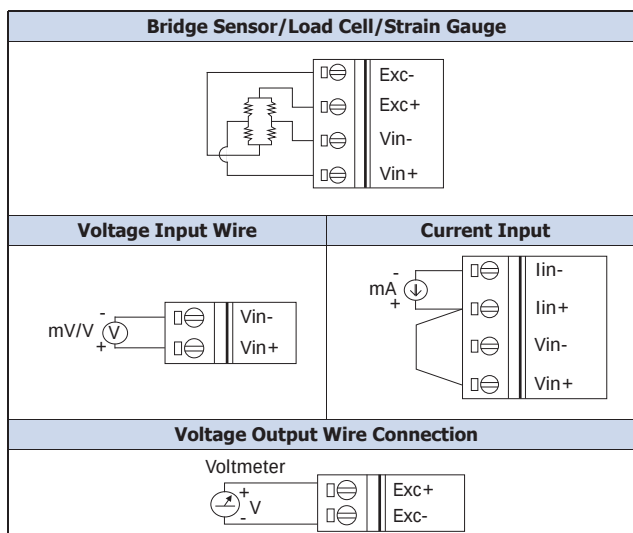
## Internal I/O Structure



## Pin Assignments



## Wire Connections



| Digital Input/Counter | Readback as 1          | Readback as 0           |
|-----------------------|------------------------|-------------------------|
|                       | Open                   | Closed to GND           |
| Dry Contact           |                        |                         |
| Output Type           | ON State Readback as 1 | OFF State Readback as 0 |
| Resistance Load       |                        |                         |
| Inductance Load       |                        |                         |

## Ordering Information

|                     |                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------|
| <b>I-7016 CR</b>    | 2-channel Strain Gauge Input Module using the DCON Protocol (Blue Cover) (RoHS)             |
| <b>I-7016D CR</b>   | I-7016 with 7-segment LED Display (Blue Cover) (RoHS)                                       |
| <b>I-7016D-G CR</b> | I-7016 with 7-segment LED Display (Gray Cover) (RoHS)                                       |
| <b>M-7016-G CR</b>  | 2-channel Strain Gauge Input Module using the DCON and Modbus Protocols (Gray Cover) (RoHS) |
| <b>M-7016D-G CR</b> | M-7016 with 7-segment LED Display (Gray Cover) (RoHS)                                       |

## Accessories

|  |                |                                                                                                        |
|--|----------------|--------------------------------------------------------------------------------------------------------|
|  | tM-7520U CR    | RS-232 to RS-485 Converter (RoHS)                                                                      |
|  | tM-7561 CR     | USB to RS-485 Converter (RoHS)                                                                         |
|  | tM-SG4 CR      | RS-485 Bias and Termination Resistor Module (RoHS)                                                     |
|  | I-7514U CR     | 4-channel RS-485 Hub (RoHS)                                                                            |
|  | SG-770 CR      | 7-channel Differential or 14-channel Single-ended Surge Protector                                      |
|  | SG-3000 Series | Signal Conditioning Modules for Thermocouple, RTD, DC Voltage, DC Current and Power Input Transformers |