

## Remote I/O R7 Series

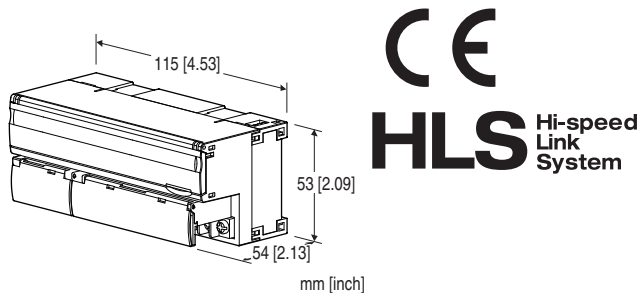
### HI-SPEED LINK SYSTEM I/O MODULE

(strain gauge input, 2 points, isolated, with monitor output)

#### Functions & Features

- 2 points strain gauge input for HLS
- Individual channels, zero adjustment, span adjustment, and scaling can be set with the configurator software (model: R7CON)

HLS is the abbreviation for “Hi-speed Link System” of Step Technica Co., Ltd.



## MODEL: R7HL-LC2-R[1]

### ORDERING INFORMATION

- Code number: R7HL-LC2-R[1]
- Specify a code from below for [1].
- (e.g. R7HL-LC2-R/H/R20/F2K/Q)
- Specify the specification for option code /Q
- (e.g. /C01/SET)

### I/O TYPE

LC2: Strain gauge input, 2 points (with monitor output)

### POWER INPUT

#### DC Power

R: 24 V DC

(Operational voltage range 24 V  $\pm$ 10 %, ripple 10 %p-p max.)

### [1] OPTIONS (multiple selections)

#### Communication Mode

blank: Full-duplex

/H: Half-duplex

#### Input Range

(be sure to specify)

/R20: -2 - +2 mV/V

/R10: -1 - +1 mV/V

/R05: -0.5 - +0.5 mV/V

#### CR Filter

(be sure to specify)

/F2K: 2 kHz/2 Hz

/F1: 1 Hz/2 Hz

#### Other Options

blank: none

/Q: Option other than the above (specify the specification)

### SPECIFICATIONS OF OPTION: Q (multiple selections)

#### COATING (For the detail, refer to our web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

#### EX-FACTORY SETTING

/SET: Preset according to the Ordering Information Sheet  
(No. ESU-7812-AX)

### RELATED PRODUCTS

- PC Configurator cable (model: MCN-CON or COP-US)
  - PC configurator software (model: R7CON)
- Downloadable at our web site.

### GENERAL SPECIFICATIONS

**Connection:** M3 separable screw terminal (torque 0.5 N·m)

**Solderless terminal:** Refer to the drawing at the end of the section.

#### Communication cable

**Recommended manufacture:** J.S.T. Mfg. Co., Ltd.

**Applicable wire size:** 0.2 to 0.5 mm<sup>2</sup> (AWG 26 to 22)

#### Others

**Recommended manufacture:** J.S.T. Mfg. Co., Ltd.,  
NICHIFU Co., Ltd.

**Applicable wire size:** 0.25 to 1.65 mm<sup>2</sup> (AWG 22 to 16)

**Screw terminal:** Nickel-plated steel

**Housing material:** Flame-resistant resin (gray)

**Isolation:** Input 0 or output 0 to input 1 or output 1 to HLS to power to FG

**Zero adjustments:** Configurable via R7CON

**Span adjustments:** Configurable via R7CON

**Load coefficient:** Configurable via R7CON

**Averaging:** 2 (\*), 4, 8, 16, 32, 64, 128, 256, 512, 1024

Selectable with the front DIP SW

(\*) Factory default setting

**Excitation Voltage:** 5 V (\*), 2.5 V

Selectable with the front DIP SW

(\*) Factory default setting

**Lowpass filter:** 2 kHz (1 Hz for option /F1)(\*), 2 Hz

Selectable with the front DIP SW

(\*) Factory default setting

**Monitor output:** Configurable via R7CON

**Status indicator LEDs:** PWR, RUN

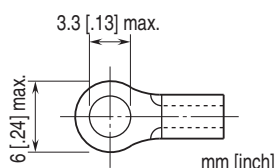
(Refer to the instruction manual)

**Input status indicator LED:** 0 to F

(Refer to the instruction manual)

**Configurator connection:** 2.5 dia. miniature jack

## ■Recommended solderless terminal



## HLS COMMUNICATION

### Communication mode:

Communication mode option code blank: Full-duplex

Communication mode option code /H: half-duplex

### Network cable

#### • Shield cable

Full-duplex communication:

ZHY262PS and ZHT262PS

(Shinko Seisen Industry Co., Ltd.)

Half-duplex communication:

ZHY221PS (Shinko Seisen Industry Co., Ltd.)

#### • Dual-shield cable:

ZHY262PBA (Shinko Seisen Industry Co., Ltd.)

### Transmission distance / Transfer rate:

100 meters (328 ft)/12 Mbps (default),

200 meters (656 ft)/6 Mbps

(Selectable with DIP switch)

**Station address:** Rotary switch

(Refer to the instruction manual)

**Data allocation:** 2

**Terminating resistor:** Built-in (Selected with the DIP SW;  
factory setting: disabled)

## INPUT SPECIFICATIONS

### ■Strain Gauge Input:

#### • Strain Gauge

**Input range:**

Option code /R20

-2 - +2 mV/V (at 5 V excitation)

-4 - +4 mV/V (at 2.5 V excitation)

Option code /R10

-1 - +1 mV/V (at 5 V excitation)

-2 - +2 mV/V (at 2.5 V excitation)

Option code /R05

-0.5 - +0.5 mV/V (at 5 V excitation)

-1 - +1 mV/V (at 2.5 V excitation)

**Max. Input range:**

Option code /R20

-3 - +3 mV/V (at 5 V excitation)

-6 - +6 mV/V (at 2.5 V excitation)

Option code /R10

-1.5 - +1.5 mV/V (at 5 V excitation)

-3 - +3 mV/V (at 2.5 V excitation)

Option code /R05

-0.75 - +0.75 mV/V (at 5 V excitation)

-1.5 - +1.5 mV/V (at 2.5 V excitation)

**Zero adjustment:**

Option code /R20

-1 - +1 mV/V (at 5 V excitation)

-2 - +2 mV/V (at 2.5 V excitation)

Option code /R10

-0.5 - +0.5 mV/V (at 5 V excitation)

-1 - +1 mV/V (at 2.5 V excitation)

Option code /R05

-0.25 - +0.25 mV/V (at 5 V excitation)

-0.5 - +0.5 mV/V (at 2.5 V excitation)

**Lowpass filter:**

Approx. 2 kHz or approx. 2 Hz (option code /F2K)

Approx. 1 Hz or approx. 2 Hz (option code /F1)

**Conversion rate:** min. 2000 samples/sec.

• **Excitation:** 5 V  $\pm 10\%$  or 2.5 V  $\pm 10\%$

(Input range doubled in the case of 2.5 V excitation)

**Maximum current:** max. 60 mA (at 5 V excitation)

max. 100 mA (at 2.5 V excitation)

## OUTPUT SPECIFICATIONS

**Output range:** -10 - +10 V DC (of -10000 - +10000 (%  $\times$  100))

**Load resistance:**  $\geq 100\text{ k}\Omega$

**Operational range:** -115 - +115 %

## INSTALLATION

### Current consumption

• **DC:** Approx. 150 mA

**Operating temperature:** -10 to +55°C (14 to 131°F)

**Storage temperature:** -20 to +65°C (-4 to +149°F)

**Operating humidity:** 30 to 90 %RH (non-condensing)

**Atmosphere:** No corrosive gas or heavy dust

**Mounting:** DIN rail (35 mm rail)

**Weight:** 220 g (0.49 lb)

## PERFORMANCE

### Accuracy:

Option code except /R05

$\pm 0.04\%$  (Averaging 128 samples or more)

$\pm 0.05\%$  (Averaging 64 samples)

$\pm 0.10\%$  (Averaging 8, 16, 32 samples)

$\pm 0.15\%$  (Averaging 4 samples)

$\pm 0.20\%$  (Averaging 2 samples)

Option code /R05

$\pm 0.05\%$  (Averaging 512 samples or more)

±0.10 % (Averaging 64, 128, 256 samples)

±0.20 % (Averaging 16, 32 samples)

±0.30 % (Averaging 2, 4, 8 samples)

Monitor output accuracy: ±0.1 %

**Data range:** -10000 – +10000 of the input range (% × 100)

**Temperature coefficient:**

Strain gauge input: ±0.015 %/°C (±0.008 %/°F)

Monitor output: ±0.015 %/°C (±0.008 %/°F)

**Input delay time:**

Lowpass filter 2 kHz max. 20 msec. (0 - 90 %)

Lowpass filter 2 Hz max. 200 msec. (0 - 90 %)

Lowpass filter 1 Hz max. 400 msec. (0 - 90 %)

**Output delay time:** ≤ 250 msec. (0 – 90 %)

**Resolution:** 1/10000

**Insulation resistance:** ≥ 100 MΩ with 500 V DC

**Dielectric strength:** 1500 V AC @ 1 minute (input 0 or output 0 to Input 1 or output 1 to HLS to power input to FG)

## STANDARDS & APPROVALS

Refer to the manuals to comply with the standards.

**EU conformity:**

EMC Directive

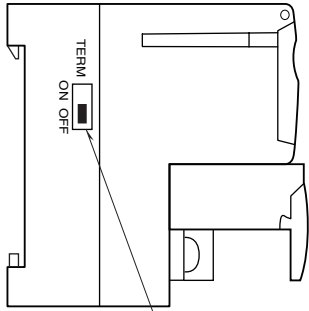
EMI EN 61000-6-4

EMS EN 61000-6-2

RoHS Directive

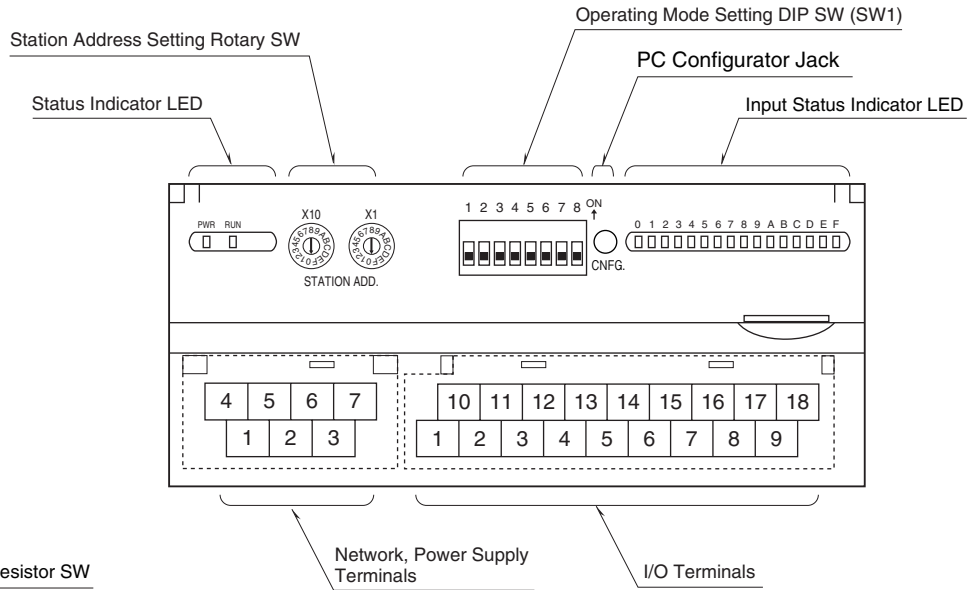
## EXTERNAL VIEW

### ■ SIDE VIEW



Terminating Resistor SW

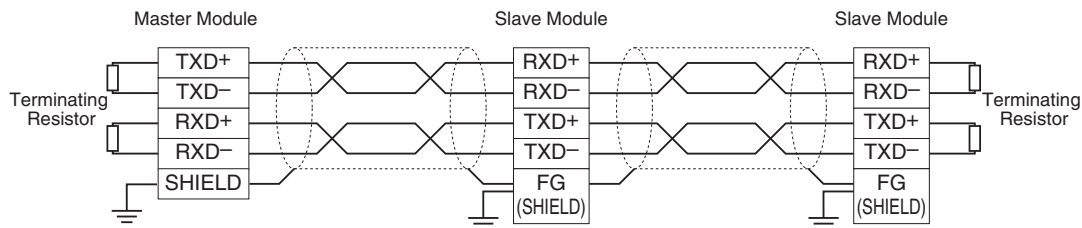
### ■ FRONT VIEW



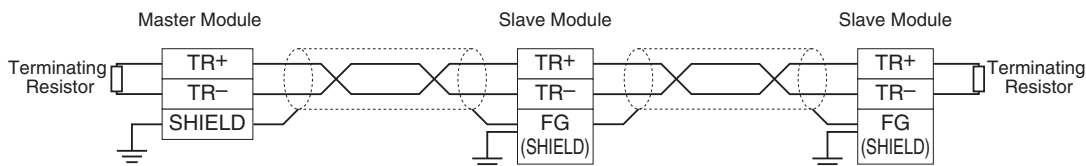
## COMMUNICATION CABLE CONNECTIONS

### ■ MASTER CONNECTION

#### • Full-duplex communication



#### • Half-duplex communication



Note: Be sure to turn ON the switch of the terminating resistor located at both ends of the modules.

**TERMINAL ASSIGNMENTS****■ I/O TERMINAL ASSIGNMENT**

|    |       |      |      |    |       |      |      |    |
|----|-------|------|------|----|-------|------|------|----|
| 10 | 11    | 12   | 13   | 14 | 15    | 16   | 17   | 18 |
| NC | +EXC0 | +IN0 | NC   | V0 | +EXC1 | +IN1 | NC   | V1 |
| 1  | 2     | 3    | 4    | 5  | 6     | 7    | 8    | 9  |
| NC | -EXC0 | -IN0 | SLD0 | C0 | -EXC1 | -IN1 | SLD1 | C1 |

| NO. | ID    | FUNCTION          | NO. | ID    | FUNCTION          |
|-----|-------|-------------------|-----|-------|-------------------|
| 1   | NC    | No connection     | 10  | NC    | No connection     |
| 2   | -EXC0 | Excitation 0-     | 11  | +EXC0 | Excitation 0+     |
| 3   | -IN0  | Input 0-          | 12  | +IN0  | Input 0+          |
| 4   | SLD0  | Shield 0          | 13  | NC    | No connection     |
| 5   | C0    | Voltage output 0- | 14  | V0    | Voltage output 0+ |
| 6   | -EXC1 | Excitation 1-     | 15  | +EXC1 | Excitation 1+     |
| 7   | -IN1  | Input 1-          | 16  | +IN1  | Input 1+          |
| 8   | SLD1  | Shield 1          | 17  | NC    | No connection     |
| 9   | C1    | Voltage output 1- | 18  | V1    | Voltage output 1+ |

**■ NETWORK, POWER SUPPLY TERMINAL ASSIGNMENT****• Full-duplex communication**

|      |      |      |    |
|------|------|------|----|
| 4    | 5    | 6    | 7  |
| RXD+ | RXD- | +24V | 0V |
| 1    | 2    | 3    |    |
| TXD+ | TXD- | FG   |    |

| NO. | ID   | FUNCTION, NOTES                  |
|-----|------|----------------------------------|
| 1   | TXD+ | Network (slave, transmission +)  |
| 2   | TXD- | Network (slave, transmission -)  |
| 3   | FG   | FG                               |
| 4   | RXD+ | Network (master, transmission +) |
| 5   | RXD- | Network (master, transmission -) |
| 6   | +24V | Power input (24V DC)             |
| 7   | 0V   | Power input (0V)                 |

**• Half-duplex communication**

|     |     |      |    |
|-----|-----|------|----|
| 4   | 5   | 6    | 7  |
| TR+ | TR- | +24V | 0V |
| 1   | 2   | 3    |    |
| NC  | NC  | FG   |    |

| NO. | ID   | FUNCTION, NOTES      |
|-----|------|----------------------|
| 1   | NC   | No connection        |
| 2   | NC   | No connection        |
| 3   | FG   | FG                   |
| 4   | TR+  | Network              |
| 5   | TR-  | Network              |
| 6   | +24V | Power input (24V DC) |
| 7   | 0V   | Power input (0V)     |

## DATA CONVERSION

### ■ I/O RANGE AND DATA CONVERSION (FACTORY DEFAULT SETTING)

Analog input data is converted into digital representations of -100 – +100% proportional to each scaled range.

The converted % values are multiplied by 100 and expressed in 16 bits.

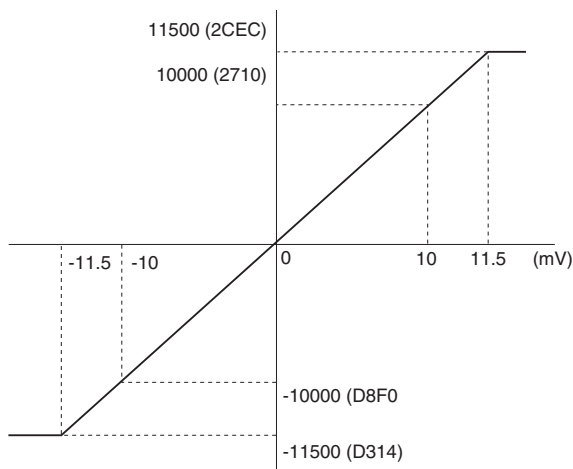
Overrange input is possible from -115 to +115% of the nominal range.

When the signal exceeds the limit, the data is fixed at -115% or +115%.

Minus value is converted into negative values, represented in 2's complements.

#### • Input Range 0 – 10 mV DC ( $\pm 2$ mV/V, 5 V DC excitation)

| Input Value     | Input % | Converted Data, Decimal | Converted Data, Hex |
|-----------------|---------|-------------------------|---------------------|
| $\leq -11.5$ mV | -115 %  | -11500                  | D314                |
| -10 mV          | -100 %  | -10000                  | D8F0                |
| 0 mV            | 0 %     | 0                       | 0                   |
| 10 mV           | 100 %   | 10000                   | 2710                |
| $\geq 11.5$ mV  | 115 %   | 11500                   | 2CEC                |



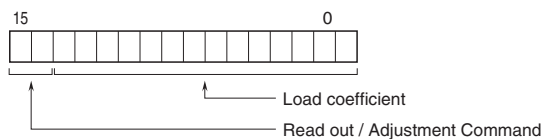
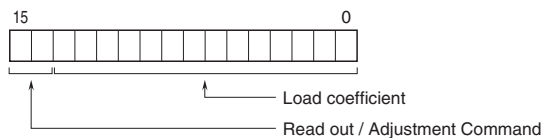
## I/O DATA DESCRIPTIONS

### ■ STRAIN GAUGE INPUT

#### • Di area



#### • Do area



The value in the input range corresponding to -10000 to +10000 is represented in 16 bits binary data. Address allocation for full-duplex and half-duplex communication is same.

### ■ LOAD COEFFICIENT

It is available to configure the load coefficient to 0 or the range of 1000 (10.00%) to 10000 (100.00%).

The load coefficient: 0 is equivalent to 100.00%.

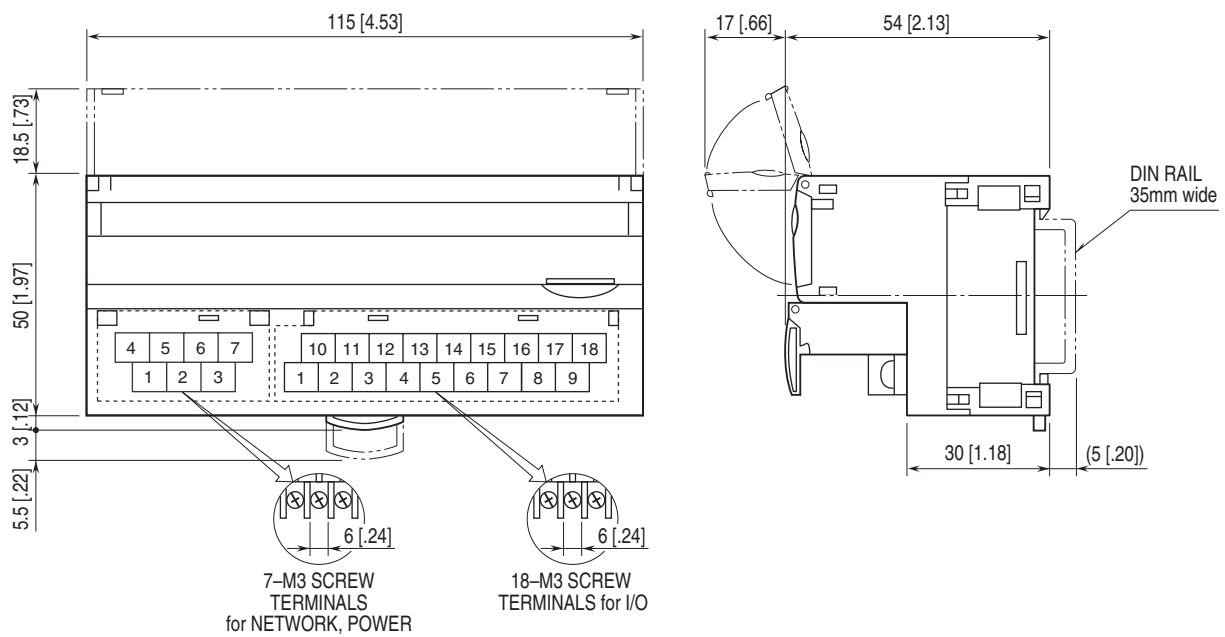
### ■ READ OUT / ADJUSTMENT COMMAND

Read out command and adjustment command for data are allocated to bit 14 and 15.

The details of the commands are shown in the table below.

| COMMAND              | BIT 15 | BIT 14 |
|----------------------|--------|--------|
| Read out data        | 0      | 0      |
| Auto zero adjustment | 0      | 1      |
| Zero adjustment      | 1      | 0      |
| Span adjustment      | 1      | 1      |

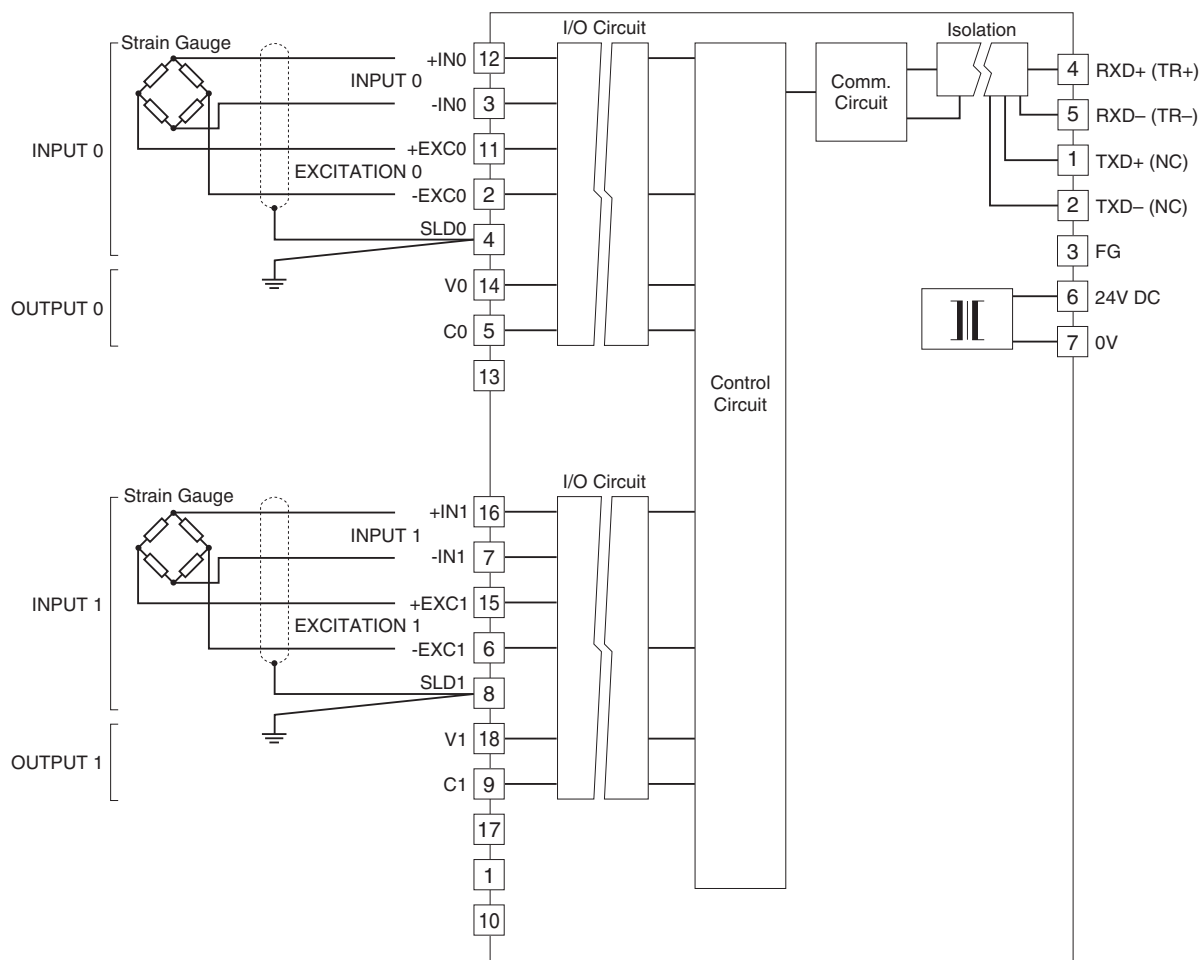
## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

Note: In order to improve EMC performance, bond the FG terminal to ground.

Caution: FG terminal is NOT a protective conductor terminal.



Note: Terminal numbers in parentheses are for half-duplex communication model.



Specifications are subject to change without notice.