

Remote I/O R7G4H Series

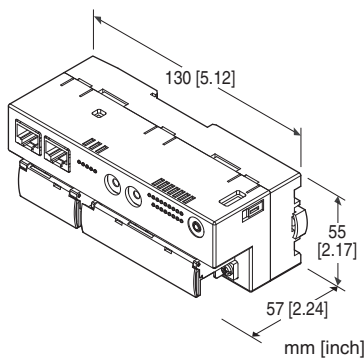
HI-SPEED LINK SYSTEM I/O MODULE

(HLS-compatible, high-speed DC voltage/current input, 4 points, isolated, screw terminal block)

Functions & Features

- High-speed DC voltage/current input via HLS
- Easy parameter setting of individual channels with M-System's configurator software

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



MODEL: R7G4HH-A-SVF4-R[1]

ORDERING INFORMATION

- Code number: R7G4HH-A-SVF4-R[1]
- Specify a code from below for [1].
(e.g. R7G4HH-A-SVF4-R/H/E/Q)
- Specify the specification for option code /Q
(e.g. /C01/SET)

TERMINAL BLOCK

- A: Screw terminal block for power supply
- RJ-45 Modular jack for communication
- Screw terminal block for I/O

I/O TYPE

SVF4: DC voltage /current input (10 V/20 mA), high-speed, 4 points

POWER INPUT

DC power

R: 24 V DC

(Operational voltage range: $\pm 10\%$; ripple 10 %p-p max.)

[1] OPTIONS (multiple selections)

Communication Mode

blank: Full-duplex

/H: Half-duplex

Communication Connector Pin Assignment

Blank: 3, 4 - 5, 6 pair wiring

(M-System HLS related device standard pin assignment)

/E: 4, 5 - 3, 6 pair wiring (Ethernet cable pin assignment)

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 M-System's web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

EX-FACTORY SETTING

/SET: Preset according to the Ordering Information Sheet
(No. ESU-7777-SVF4)

RELATED PRODUCTS

- PC configurator software (model: R7CFG)

Downloadable at M-System's web site.

A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

GENERAL SPECIFICATIONS

Connection

HLS: RJ-45 Modular Jack

Power input, input: M3 separable screw terminals
(torque 0.5 N·m)

Screw terminal material: Nickel-plated steel

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

Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,Ltd

Applicable wire size: 0.25 to 1.65 mm² (AWG 22 to 16)

Housing material: Flame-resistant resin (gray)

Isolation: Input 0 to input 1 to input 2 to input 3 to HLS or FE to power

Input bias adjustment: Configurable via R7CFG

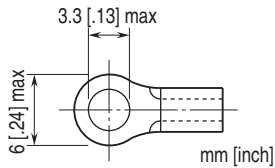
Input gain adjustment: Configurable via R7CFG

Input range: Selectable with the DIP SW on the top of the unit or configurable via R7CFG

Number of times of averaging: Configurable via R7CFG

Status indicator LEDs: PWR and ERR LEDs indicate operating conditions of the unit. (Refer to the instruction manual for detail)

■ Recommended solderless terminal



HLS COMMUNICATION

Communication mode: Full-duplex or half-duplex

Network cable

•Shield cable

Full-duplex communication:

ZHY262PS / 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:

12 Mbps: 100 meters (328 ft)

6 Mbps: 200 meters (656 ft)

(Baud rate configurable with DIP SW; factory default: 12 Mbps)

Note: The above transmission distance is a reference value when the HLS master unit is one-to-one connected to the HLS slave unit (R4GHH) with a designated double shielded cable. The actual distance may differ depending on the system configuration (types of the master/slave units, communication cable, the number of slaves connected, etc.), settings, and/or the installation environment.

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

Status indicator: RUN

(Refer to the instruction manual for details.)

Station address: Selectable with rotary switch

(Refer to the instruction manual for details.)

INPUT SPECIFICATIONS

■ DC Current

Input resistor: 50 Ω

Input range: -20 to +20 mA DC, 0 to 20 mA DC,

4 to 20 mA DC

■ Narrow span voltage

Input resistance: ≥ 100 kΩ

Input range: -1 to +1 V DC, 0 to 1 V DC, -0.5 to +0.5 V DC

■ Wide span voltage

Input resistance: ≥ 1 MΩ

Input range: -10 to +10 V DC, -5 to +5 V DC,

0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC

INSTALLATION

Current consumption

•DC: Approx. 70 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: Surface or DIN rail (35 mm rail)

Weight: 210 g (0.46 lb)

PERFORMANCE

Conversion accuracy: ±0.1 %

Conversion rate: 200 μsec. per 4 channels

Data range: 0 - 10000 of the input range

Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)

Input delay time: ≤ 1 msec. (0 - 90 %)

Insulation resistance: ≥ 100 MΩ with 500 V DC

Dielectric strength: 1500 V AC @ 1 minute

(input 0 to input 1 to input 2 to input 3 to HLS or FE to power)

STANDARDS & APPROVALS

EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

RoHS Directive

PC CONFIGURATOR

The following parameters can be set with using PC Configurator Software (model: R7CFG)

Refer to the users manual for the R7CFG for detailed operation of the software program.

■ SETTINGS FOR INDIVIDUAL CHANNELS

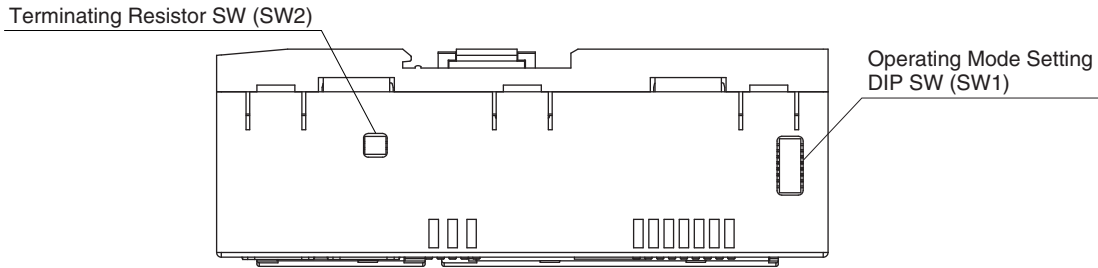
| PARAMETER | SETTING RANGE | DEFAULT SETTING |
|-----------------------------|--|-----------------|
| Validating/ Invalidating | Valid Invalid | Valid |
| Input range | -10 – +10 V DC -5 – +5 V DC -1 – +1 V DC 0 – 10 V DC 0 – 5 V DC 1 – 5 V DC 0 – 1 V DC -0.5 – +0.5 V DC -20 – +20 mA DC 0 – 20 mA DC 4 – 20 mA DC | -10 – +10 V DC |
| Bias | -320.00 – +320.00 (%) | 0.00 (%) |
| Gain | -3.2000 – +3.2000 | 1.0000 |
| Zero scale | -32 000 – +32 000 | 0 |
| Full scale | -32 000 – +32 000 | 10 000 |

■ SETTINGS FOR ALL CHANNELS

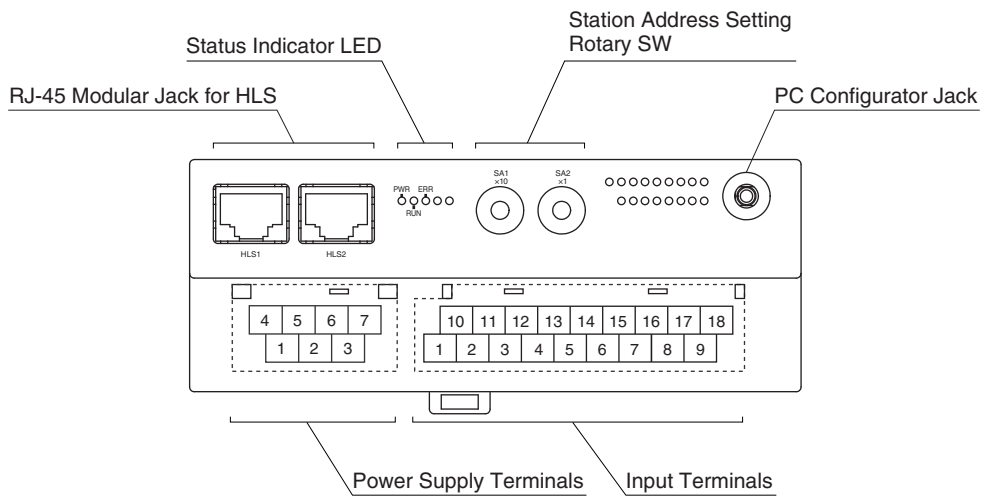
| PARAMETER | SETTING RANGE | DEFAULT SETTING |
|------------------------------|----------------------------------|-----------------|
| Number of times of averaging | 1, 2, 4, 8, 16, 32, 64, 128, 256 | 1 |

EXTERNAL VIEW

■ TOP VIEW



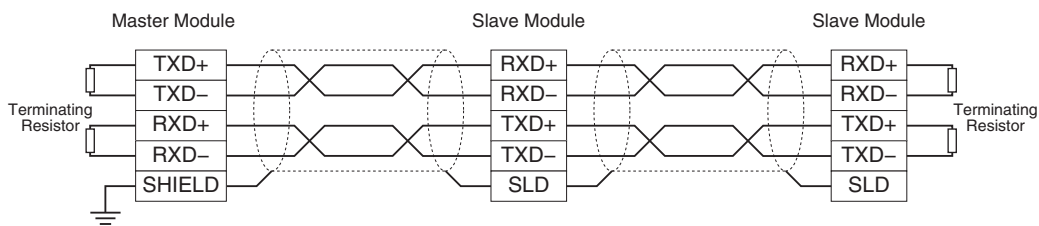
■ FRONT VIEW



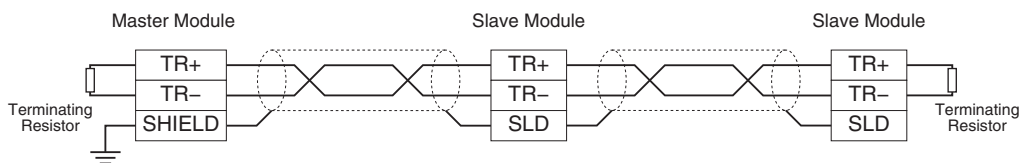
CONNECTION DIAGRAMS

■ 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

■ INPUT TERMINAL ASSIGNMENT

| | | | | | | | | |
|-----|------|-----|------|----|-----|------|-----|------|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| VL0 | I0 | VL1 | I1 | NC | VL2 | I2 | VL3 | I3 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| VH0 | COM0 | VH1 | COM1 | NC | VH2 | COM2 | VH3 | COM3 |

| NO. | ID | FUNCTION | NO. | ID | FUNCTION |
|-----|------|-------------------|-----|-----|---------------------|
| 1 | VH0 | Wide span volt. 0 | 10 | VL0 | Narrow span volt. 0 |
| 2 | COM0 | Common 0 | 11 | I0 | Current range 0 |
| 3 | VH1 | Wide span volt. 1 | 12 | VL1 | Narrow span volt. 1 |
| 4 | COM1 | Common 1 | 13 | I1 | Current range 1 |
| 5 | NC | No connection | 14 | NC | No connection |
| 6 | VH2 | Wide span volt. 2 | 15 | VL2 | Narrow span volt. 2 |
| 7 | COM2 | Common 2 | 16 | I2 | Current range 2 |
| 8 | VH3 | Wide span volt. 3 | 17 | VL3 | Narrow span volt. 3 |
| 9 | COM3 | Common 3 | 18 | I3 | Current range 3 |

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

- 1. NC -
- 2. NC -
- 3. FE Functional earth
- 4. NC -
- 5. NC -
- 6. +24V Power supply (24V DC)
- 7. 0V Power supply (0V)

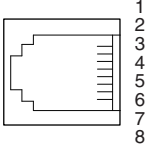
■ COMMUNICATION CABLE CONNECTIONS

Recommended connector : TM21P-88P; Hirose Electric (does not come with the unit)

• COMMUNICATION CONNECTOR PIN ASSIGNMENT

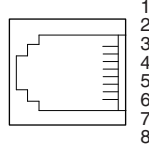
Blank : 3, 4 - 5, 6 pair wiring (M-System HLS related device standard pin assignment)

Full duplex communication



| | |
|---------|---------------------------------|
| 1. NC | Unused |
| 2. NC | Unused |
| 3. TXD+ | Network (Slave, transmission +) |
| 4. TXD- | Network (Slave, transmission -) |
| 5. RXD+ | Network (Master, transmission+) |
| 6. RXD- | Network (Master, transmission-) |
| 7. NC | Unused |
| 8. SLD | Shield |

Half duplex communication

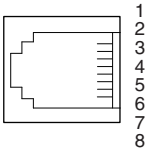


| | |
|--------|-------------|
| 1. NC | Unused |
| 2. NC | Unused |
| 3. TR+ | Network (+) |
| 4. TR- | Network (-) |
| 5. NC | Unused |
| 6. NC | Unused |
| 7. NC | Unused |
| 8. SLD | Shield |

• COMMUNICATION CONNECTOR PIN ASSIGNMENT

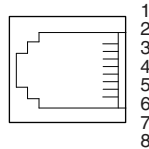
/E : 4, 5 - 3, 6 pair wiring (Ethernet cable pin assignment)

Full duplex communication



| | |
|---------|---------------------------------|
| 1. NC | Unused |
| 2. NC | Unused |
| 3. TXD+ | Network (Slave, transmission +) |
| 4. RXD- | Network (Master, transmission-) |
| 5. RXD+ | Network (Master, transmission+) |
| 6. TXD- | Network (Slave, transmission -) |
| 7. NC | Unused |
| 8. SLD | Shield |

Half duplex communication



| | |
|--------|-------------|
| 1. NC | Unused |
| 2. NC | Unused |
| 3. NC | Unused |
| 4. TR- | Network (-) |
| 5. TR+ | Network (+) |
| 6. NC | Unused |
| 7. NC | Unused |
| 8. SLD | Shield |

DATA CONVERSION

■ INPUT RANGE AND DATA CONVERSION (FACTORY DEFAULT SETTING)

Analog input data is converted into digital representations of 0 – 100% proportional to each scaled range.

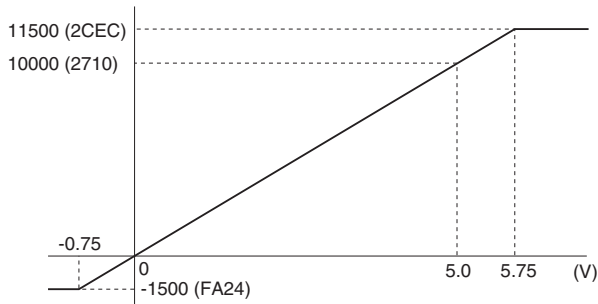
The converted % values are multiplied by 100 and expressed in 16 bits.

Overrange input is possible from -15 to +115% of the nominal range.

When the signal exceeds the limit, the data is fixed at -15% or +115%.

• Input Range 0 – 5V DC

| Input Value | Input % | Converted Data, Decimal | Converted Data, Hex |
|-------------|---------|-------------------------|---------------------|
| ≤ -0.75V | -15% | -1500 | FA24 |
| 0V | 0% | 0 | 0 |
| 5V | 100% | 10000 | 2710 |
| ≥ 5.75V | 115% | 11500 | 2CEC |



RESPONSE TIME

Response time of analog input module (R7G4HH-A-SVF4; slave) is time from when 0 to 100% stepwise signal change is applied to the module until the communication ASIC of the module transmits 90% of input signal.

T_{COM} : HLS scan time

HLS scan time varies according to communication method, the number of operating slave stations (FS), transmission rate (T_{BPS}), and the hop count (LF).

· Full-duplex communication

LF = 0 : HLS scan time = $182 \times FS \times T_{BPS}$ (sec.)

LF = 1 to 7: HLS scan time = $(184 + (144 \times LF)) \times FS \times T_{BPS}$ (sec.)

· Half-duplex communication

LF = 0 : HLS scan time = $354 \times FS \times T_{BPS}$ (sec.)

LF = 1 to 7: HLS scan time = $(328 + (144 \times LF)) \times FS \times T_{BPS}$ (sec.)

T_{INF} : Input unit response time ≤ Delay time of input circuit (T_a) + (Conversion rate x Moving average order) (T_b) + Input internal processing time (T_c) (HLS scan time x 2)

e.g.

Number of moving average: 1,

Communication: Full-duplex,

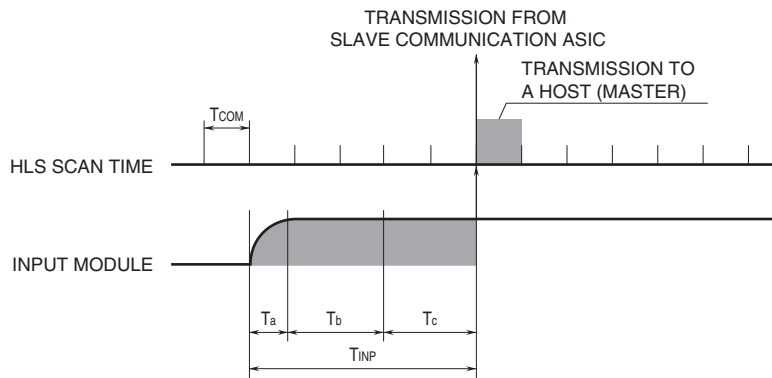
Number of operating slave station (FS): 63,

Transmission rate (T_{BPS}): 12Mbps,

the hop count (LF): 0

HLS scan time (T_{COM}): $182 \times 63 \times 1 / 12 M = 0.9555$ [msec.]

Input unit response time (T_{INF}): Delay time of input circuit (1 msec.) + Conversion rate (0.2 msec.) x Number of moving average (1 time) + Input internal processing time (0.9555 msec. x 2) = 3.1 [msec.]

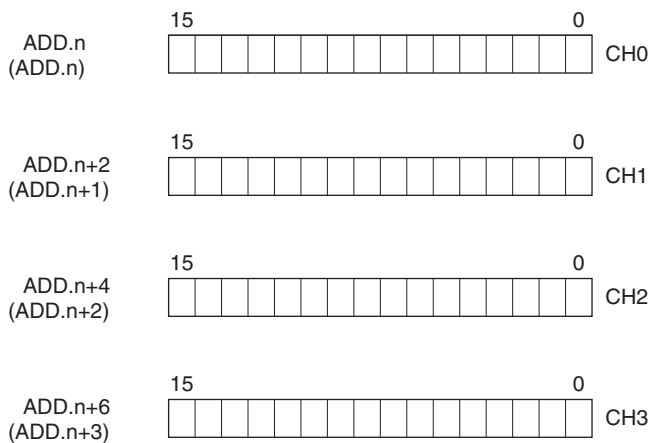


I/O DATA DESCRIPTIONS

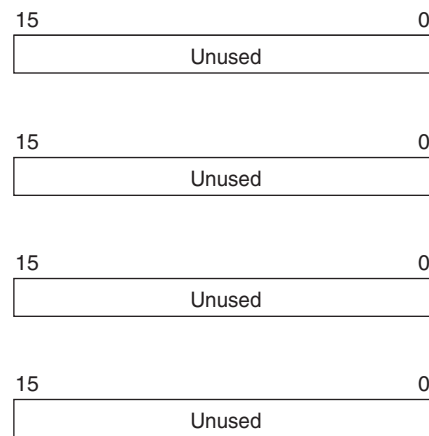
Scaling of analog input module is configurable with the configurator software (model: R7CFG). Refer to the software manual for details.

ANALOG INPUT DATA

- Di area



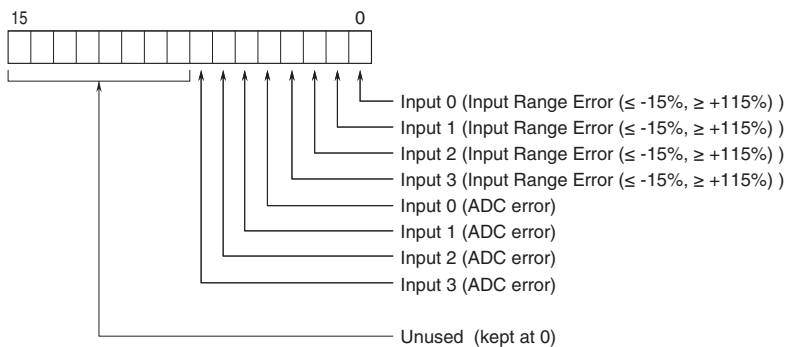
- Do area



Data is represented in 16-bit binary.
 Negative value is represented in 2's complements.
 Assignment for half-duplex communication in parentheses.

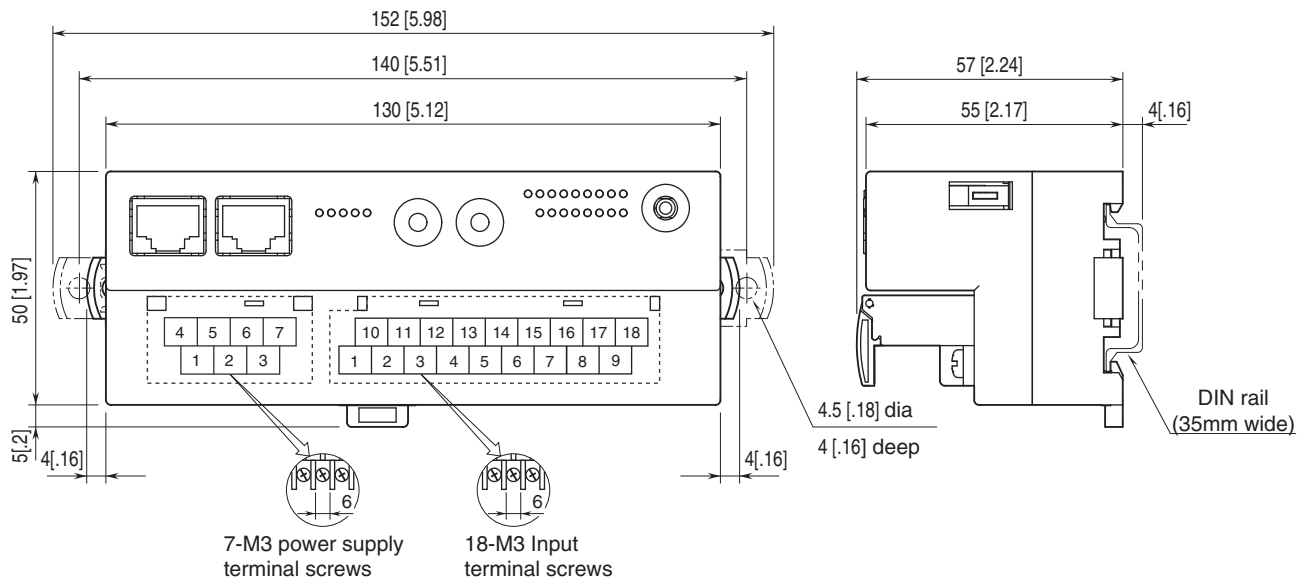
STATUS

• Analog input module indicates status of each channel.

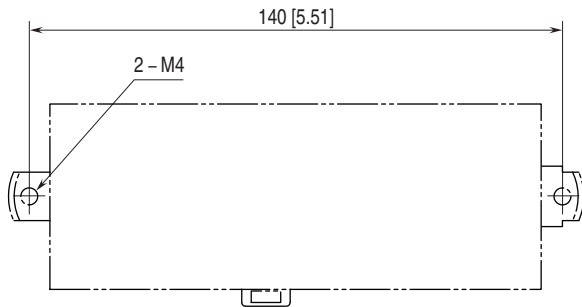


Input Range Error
 0: Normal operation 1: Error
 ADC error (no response from ADC)
 0: Normal operation 1: Error

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



MOUNTING REQUIREMENTS unit: mm [inch]

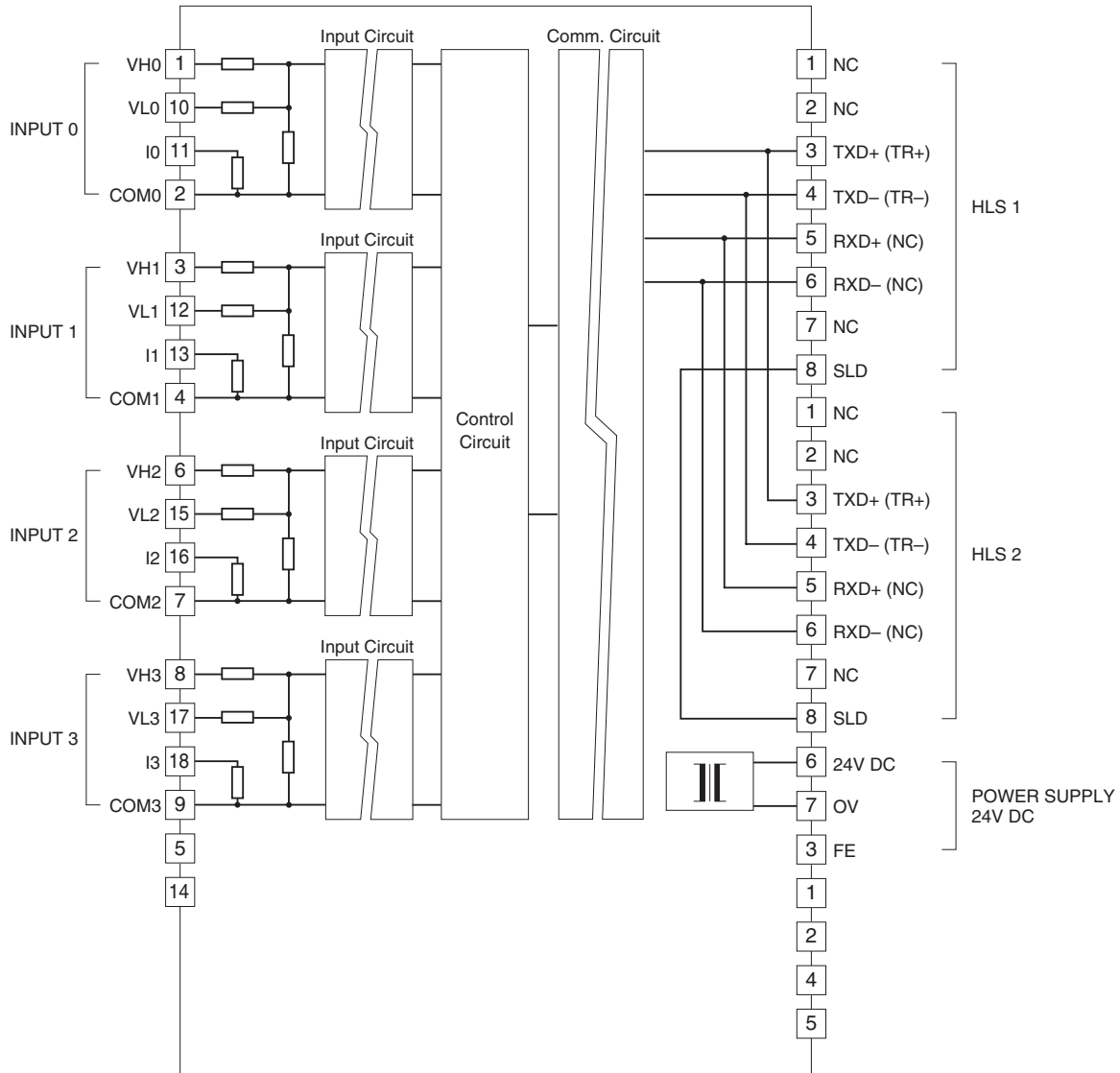


SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

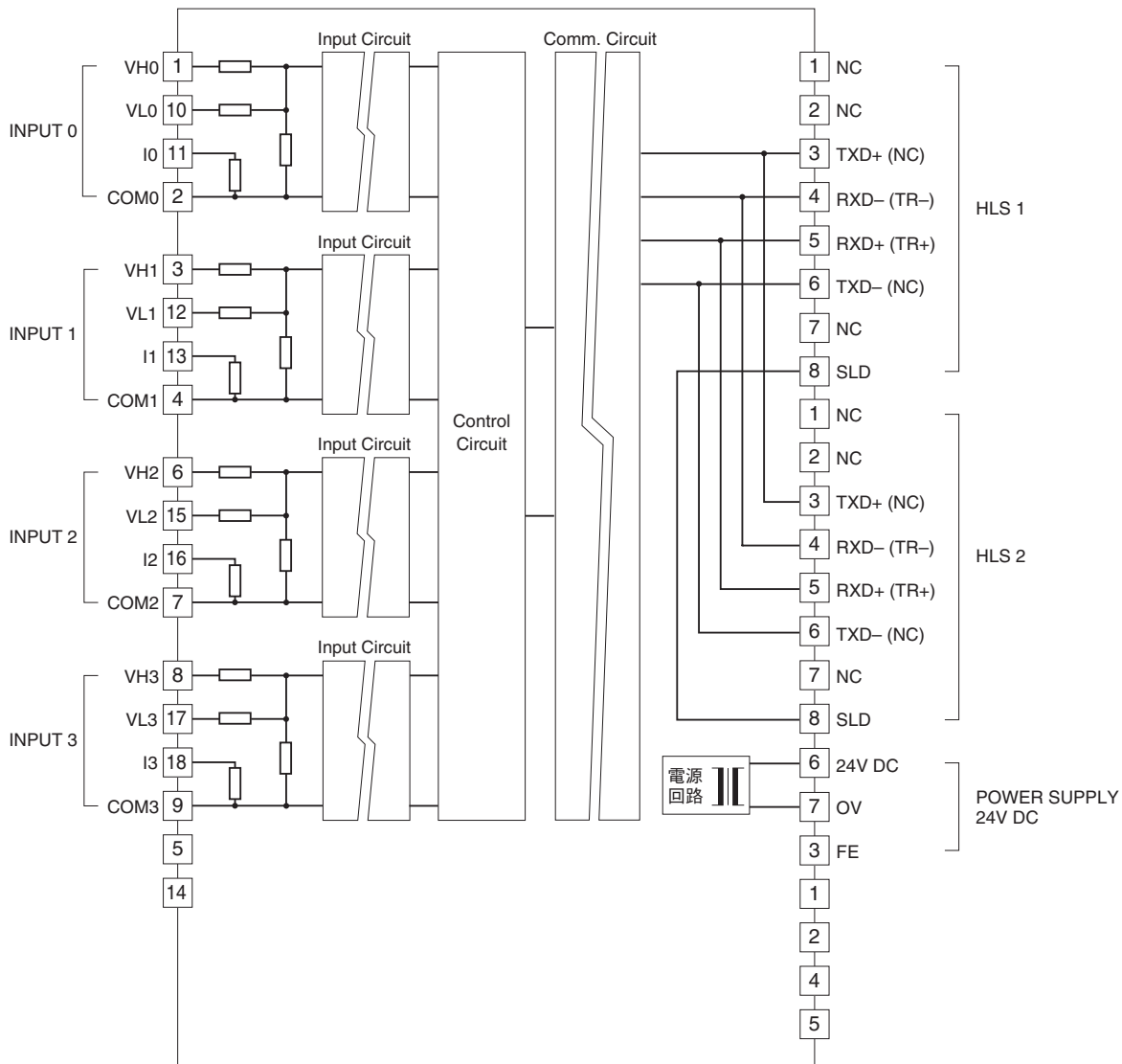
Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.

■ 3, 4 - 5, 6 PAIR WIRING (M-System HLS related device standard pin assignment)

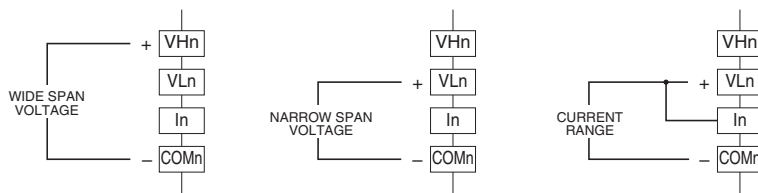


■ 4, 5 - 3, 6 PAIR WIRING (Ethernet cable pin assignment)



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

■ Input Connection Examples



Be sure to close across VLn and In terminals for a current input.



Specifications are subject to change without notice.