

## Remote I/O R7G4H Series

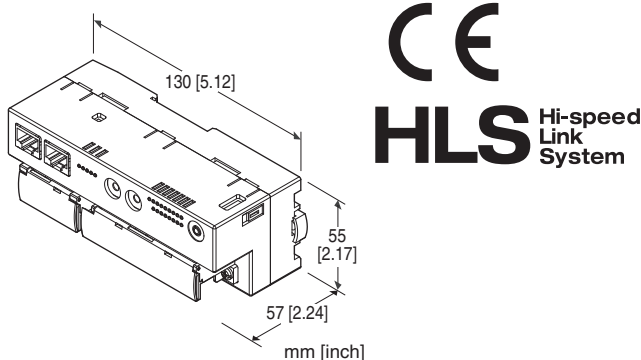
### HI-SPEED LINK SYSTEM I/O MODULE

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

#### Functions & Features

- High-speed DC voltage output via HLS
- Easy parameter setting of individual channels with the configurator software

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



## MODEL: R7G4HH-A-YVF4R[1]

### ORDERING INFORMATION

- Code number: R7G4HH-A-YVF4-R[1]  
Specify a code from below for [1].  
(e.g. R7G4HH-A-YVF4-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

**YVF4:** DC voltage output, 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

(The 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 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-7777-YVF4)

### RELATED PRODUCTS

- PC configurator software (model: R7CFG)

Downloadable at our 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, output:** 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 mm<sup>2</sup> (AWG 22 to 16)

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

**Isolation:** Output 0 to output 1 to output 2 to output 3 to HLS or FE to power

**Output bias adjustment:** Configurable via R7CFG

**Output gain adjustment:** Configurable via R7CFG

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

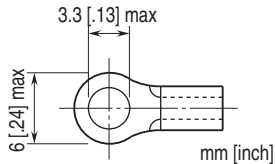
**Output at the loss of communication:** Selectable with the DIP SW on the top of the unit or configurable via R7CFG

**Output reset value:** 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

# MODEL: R7G4HH-A-YVF4



**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)

## 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.)

## OUTPUT SPECIFICATIONS

■ Narrow Span voltage

**Output range:** -1 - +1 V DC, 0 - 1 V DC, -0.5 - +0.5 V DC

**Load resistance:** 100 kΩ min.

■ Wide Span voltage

**Output range:** -10 - +10 V DC, -5 - +5 V DC, 0 - 10 V DC, 0 - 5 V DC, 1 - 5 V DC

**Load resistance:** 100 kΩ min.

■ Operational range

**Except -10 to +10 V DC:** -15 to +115 % of output range

**-10 to +10 V DC:** Approx. -11.5 to +11.5 V DC

## INSTALLATION

**Current consumption**

•DC: Approx. 70 mA

## PERFORMANCE

**Conversion accuracy:** ±0.1 %

**Conversion rate:** 200 μsec. per 4 channels

**Data range:** 0 - 10000 of the output range

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

**Output delay time:** ≤ 250 μsec. (0 - 90 %)

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

**Dielectric strength:** 1500 V AC @ 1 minute

(output 0 to output 1 to output 2 to output 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/<br>Invalidating | Valid<br>Invalid  | Valid           |
| Output range                | -10 – +10V DC<br>-5 – +5V DC<br>-1 – +1V DC<br>0 – 10V DC<br>0 – 5V DC<br>1 – 5V DC<br>0 – 1V DC<br>-0.5 – +0.5V DC | -10 – +10V 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          |
| Output clear<br>value*1     | -15.00 – +115.00 (%)  | -15.00 (%)      |

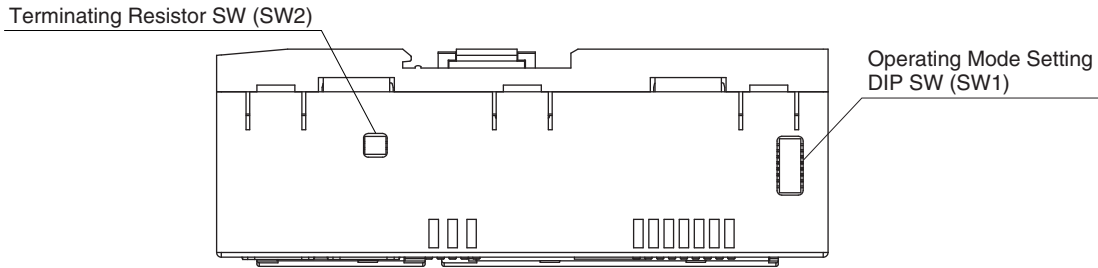
### ■ SETTINGS FOR ALL CHANNELS

| PARAMETER   | SETTING RANGE | DEFAULT SETTING |
|---|---------------|-----------------|
| Setting output at<br>the loss of com-<br>munication | Hold<br>Clear | Hold            |

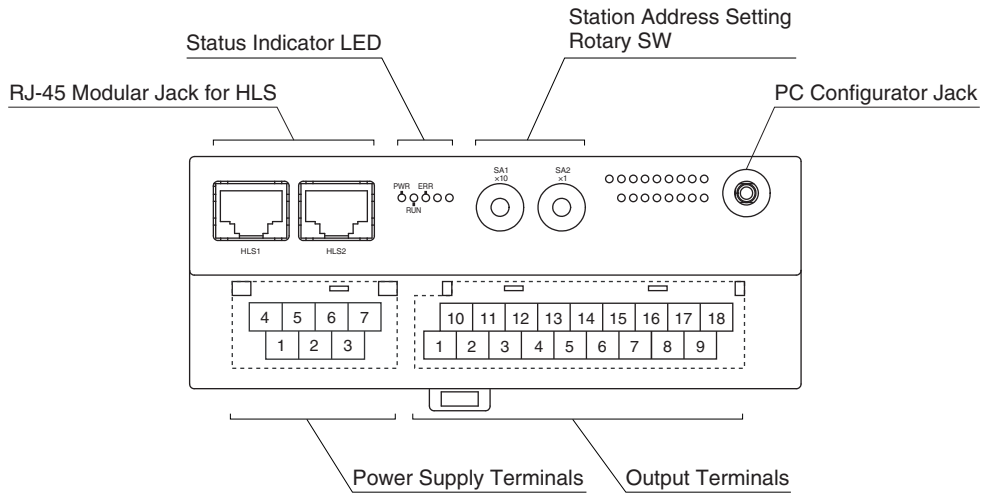
\*1. When output range is -10 – +10V DC, approx. -11.5V DC at approx. -7.5 – -15% and approx. 11.5V DC at approx. 107.5 – 115% are outputted respectively.

## EXTERNAL VIEW

### TOP VIEW



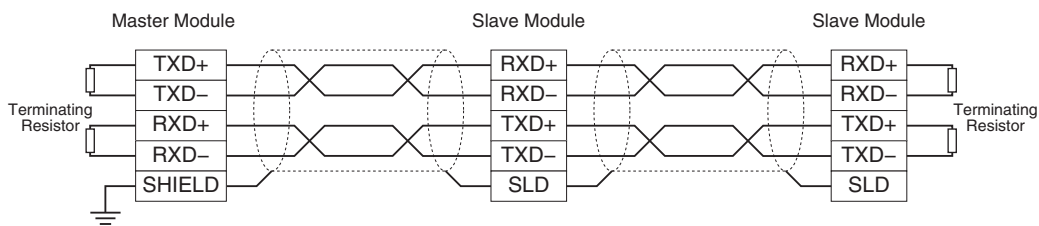
### FRONT VIEW



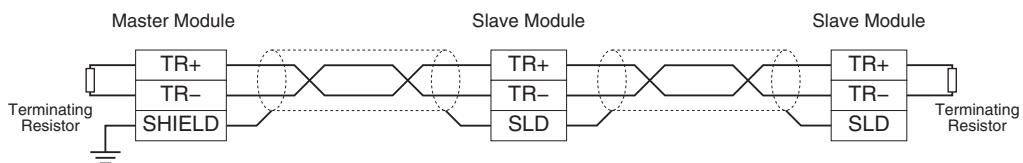
## CONNECTION DIAGRAMS

### 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

### ■ OUTPUT TERMINAL ASSIGNMENT

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

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

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

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

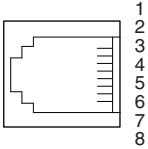
## ■ COMMUNICATION CABLE CONNECTIONS

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

### • COMMUNICATION CONNECTOR PIN ASSIGNMENT

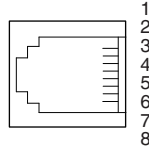
**Blank :** 3, 4 - 5, 6 pair wiring (M-System HLS related device standard pin assignment)

#### 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

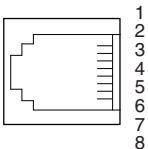


|        |             |
|--------|-------------|
| 1. NC  | Unused      |
| 2. NC  | Unused      |
| 3. TR+ | Network (+) |
| 4. TR- | Network (-) |
| 5. NC  | Unused      |
| 6. NC  | Unused      |
| 7. NC  | Unused      |
| 8. SLD | Shield      |

### • COMMUNICATION CONNECTOR PIN ASSIGNMENT

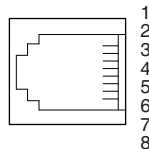
**/E :** 4, 5 - 3, 6 pair wiring (Ethernet cable pin assignment)

#### 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

### ■ OUTPUT RANGE AND DATA CONVERSION (FACTORY DEFAULT SETTING)

Discrete output data is converted into analog representations of 0 – 100% proportional to each scaled range.

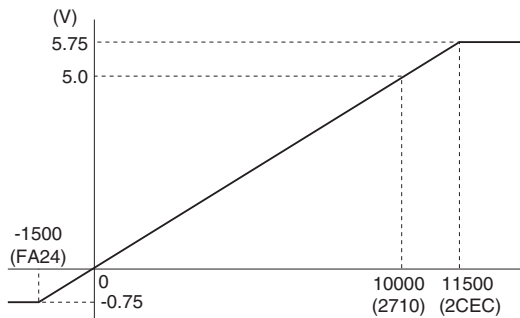
Overrange output is possible from -15 to +115% of the nominal range.

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

(approx. -11.5 V or 11.5 V when the output range is -10 - +10 V)

#### • Output Range 0 – 5V DC

| Digital Value, Decimal | Digital Value, HEX | Output Value, Engineering Unit | Output value, % |
|------------------------|--------------------|--------------------------------|-----------------|
| -1500                  | FA24               | ≤ -0.75V                       | -15%            |
| 0                      | 0                  | 0V                             | 0%              |
| 10000                  | 2710               | 5V                             | 100%            |
| 11500                  | 2CEC               | ≥ 5.75V                        | 115%            |



## RESPONSE TIME

Response time of analog output module (R7G4HH-A-YVF4; slave) is time from when 0 to 100% stepwise signal change is received by the communication ASIC of the module till when the analog output signal reaches 90%.

$T_{COM}$ : 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.)

$T_{OUT}$ : Output unit response time ≤ Delay time of output internal processing ( $T_d$ ) (HLS scan time) + Conversion rate ( $T_e$ ) + Delay time of output circuit ( $T_f$ )

e.g.

Communication: Full-duplex,

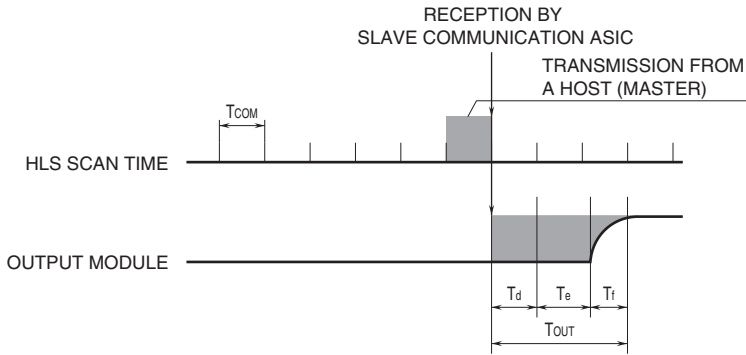
Number of operating slave station (FS): 63,

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

The hop count (LF): 0,

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

Output unit response time ( $T_{INP}$ ): Delay time of output internal processing (0.9555 msec.) + Conversion rate (0.2 msec.) + Delay time of output circuit (0.25 msec.) = 1.4 [msec.]

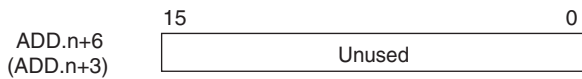
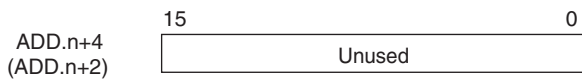
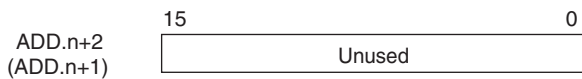
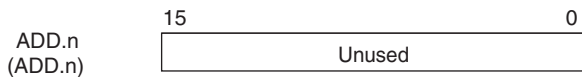


## I/O DATA DESCRIPTIONS

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

### ANALOG OUTPUT DATA

#### · Di area



#### · Do area

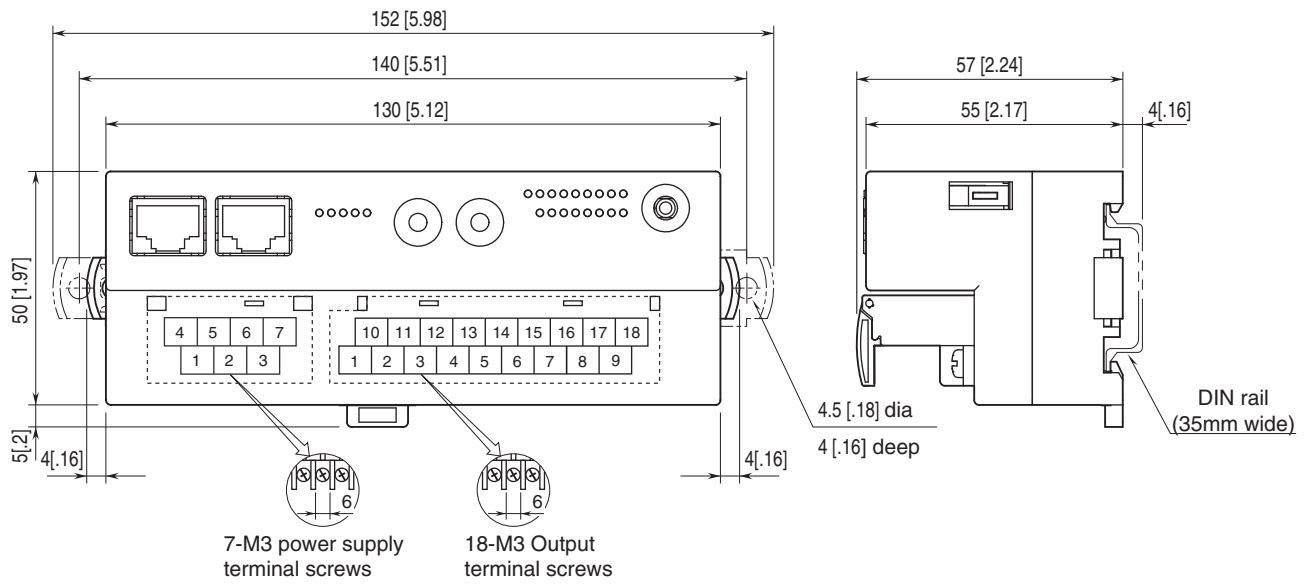


Data is represented in 16-bit binary.  
 Negative value is represented in 2's complements.  
 Assignment for half-duplex communication in parentheses.

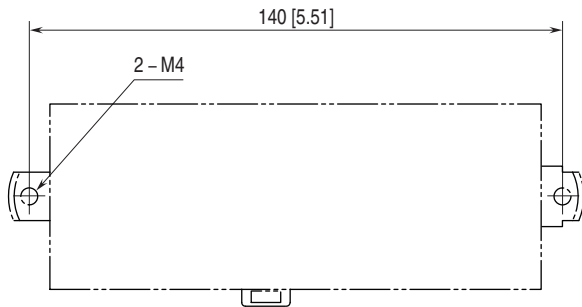


# MODEL: R7G4HH-A-YVF4

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



## MOUNTING REQUIREMENTS unit: mm [inch]

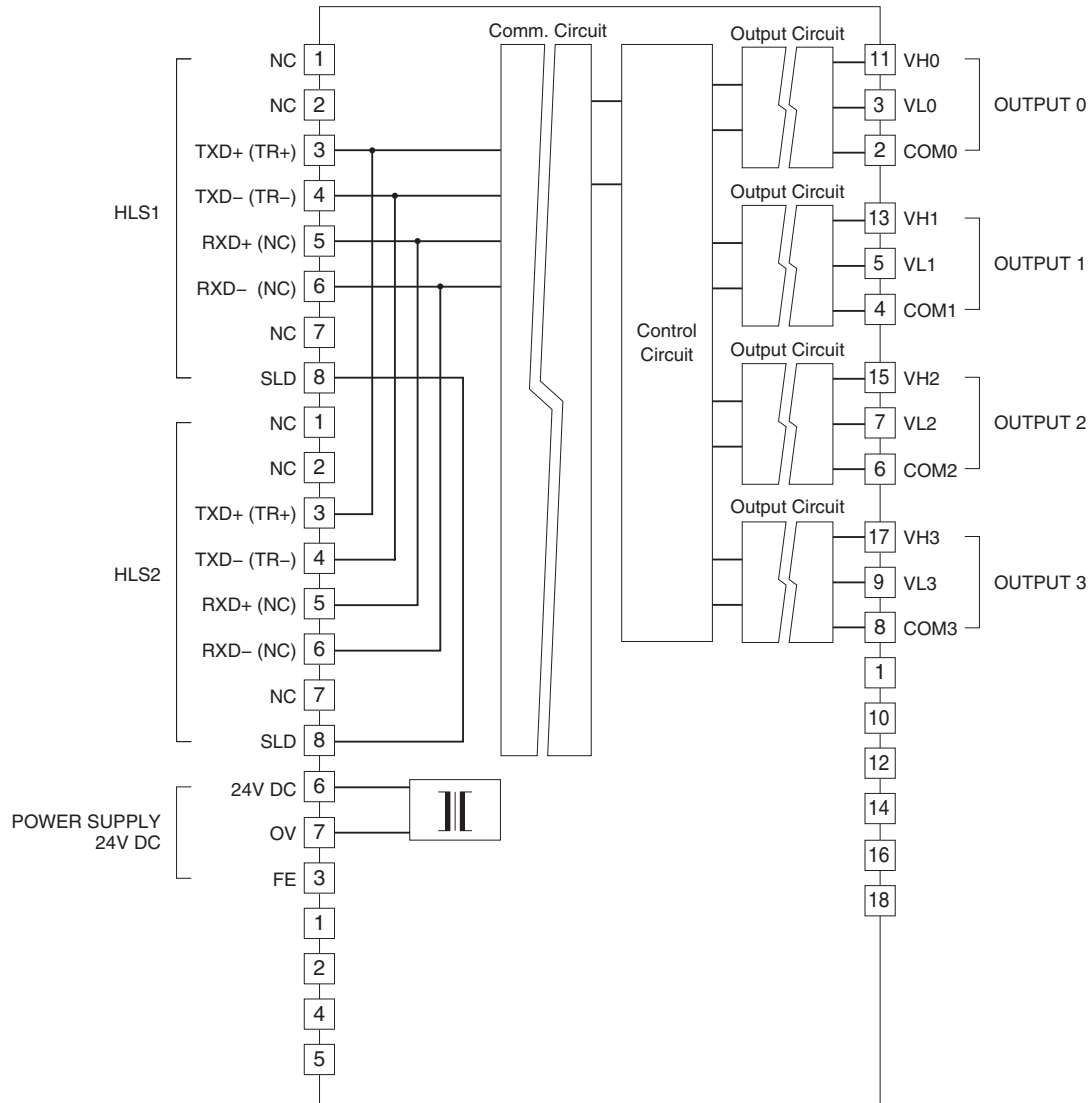


## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

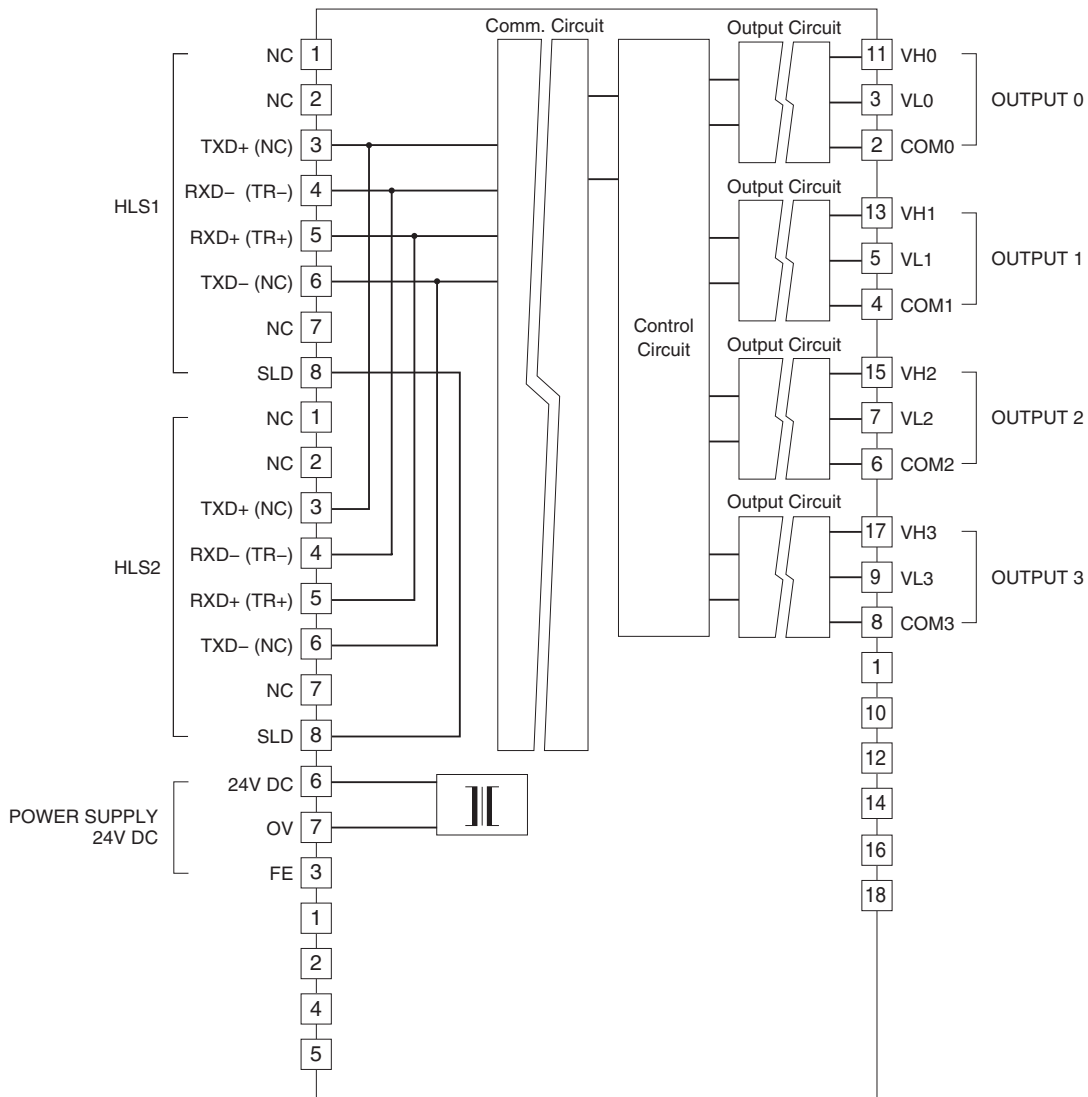
Note: In order to improve EMC performance, bond the FE terminal to ground.

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.

## ■ OUTPUT CONNECTION EXAMPLES



Specifications are subject to change without notice.