

R7HL / R7F4DH Series

High Speed Remote I/O for FA Equipment Control

- Remote I/O modules for HLS (High-speed Link System) proposed by StepTechnica Co., Ltd.
- Wide variety of discrete signals (8 points, 16 points, 32 points) and analog signals.
- Four connection styles are selectable to fit with various sensors and devices.

Ultra-High Speed

High Noise Immunity

HLS Network



RoHS Screw Terminal Type
R7HL Series



RoHS Mini-Clamp (e-CON) Connector, MIL Connector, Spring Cage (tension-clamp) Terminal Types
R7F4DH Series

HLS Hi-speed Link System

Consult factory for availability with particular products.

High Speed Remote I/O for FA Equipment Control

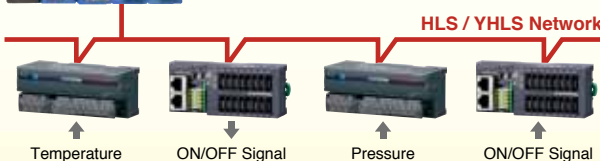
Application Example with Yokogawa FA-M3 YHLS Master Module



YOKOGAWA **FA-M3**

YHLS Master Module
Model: F3LH01-1N, F3LH02-1N

- Chip shooter machines
- Semiconductor manufacturing equipment
- Injection molding machines
- Large printers
- LCD panel manufacturing equipment/carrier devices
- Automatic carrier robots
- Welding machines
- Electrical discharge machines
- Warehouse management systems



YHLS (Yokogawa Hi-speed Link System) adopts a HLS-compliant open protocol, enhanced to allow easy monitoring of transmission line quality during development and operation of IT machine systems.

YHLS and HLS network devices are compatible.

Screw Terminal Type*1

R7HL SERIES

The R7HL Series is equipped with robust screw terminal blocks*1 for both analog and discrete signal I/O. A wide variety of analog signals including temperature and pulse input, analog outputs are available.



Separable screw terminal blocks*1 are beneficial to ease of wiring and maintenance.

- Connection : M3 screw terminal (torque 0.5 N·m)
- Screw terminal material : Nickel-plated steel

Terminal blocks are separable.

*1. Not all models

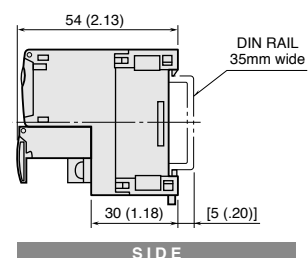
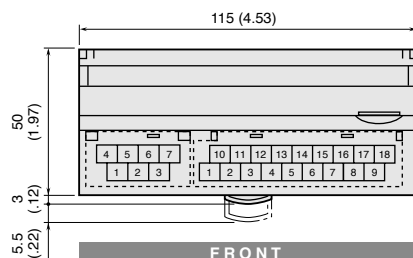
I/O SIGNAL	MODEL	SPECIFICATIONS
Ai4 DC voltage/current input, 4 points	R7HL-SV4	Input range: ± 10 V, ± 5 V, ± 1 V, ± 0.5 V, 0-10 V, 0-5 V, 1-5 V, 0-1 V, ± 20 mA, 0-20 mA, 4-20 mA Conversion rate/accuracy: 10 ms / $\pm 0.8\%$, 20 ms / $\pm 0.4\%$, 40 ms / $\pm 0.2\%$, 80 ms / $\pm 0.1\%$
Ai4 High speed DC voltage/current input, 4 points (non-isolated between channels)	R7HL-SVF4	Input range: ± 10 V, ± 5 V, ± 1 V, ± 0.5 V, 0-10 V, 0-5 V, 1-5 V, 0-1 V, ± 20 mA, 0-20 mA, 4-20 mA Conversion rate/accuracy: 2 ms / $\pm 0.1\%$
Ai1-Ao1 High speed DC voltage input, 1 point / DC voltage output, 1 point	R7HL-SYVF2S*2 Available in August 2012	Input range: ± 10 V Output range: ± 10 V (Preliminary) Conversion rate/accuracy: $\leq 200 \mu\text{s}$ / $\leq \pm 0.1\%$
TC4 Thermocouple input, 4 points	R7HL-TS4	Thermocouple: K, E, J, T, B, R, S, C, N, U, L, P, PR Conversion accuracy: $\pm 1^\circ\text{C}$ ($\pm 2.0^\circ\text{C}$ for B, R, S, C, PR)
RTD4 RTD input, 4 points	R7HL-RS4	RTD: Pt 100 (JIS '97, IEC), Pt 100 (JIS '89), JPt 100 (JIS '89), Pt 50 Ω (JIS '81), Ni 100, Cu 10 (25 $^\circ\text{C}$), Cu 50 Conversion accuracy: $\pm 1^\circ\text{C}$ ($\pm 3^\circ\text{C}$ for Cu 10)
LoadCell2 Strain gauge input, 2 points	R7HL-LC2 Available in August 2012	
Pulse4 Totalized pulse input, 4 points (non-isolated between channels)	R7HL-PA4E*3 NEW	Totalized pulse count: 0000H to FFFFH (16 bits)
Encoder2 Rotary encoder input, 2 points (speed and position)	R7HL-PA2S*2 Available in July 2012	RS422 line driver or 5V/12V/24V open collector (Phase A, B, Z) Position conversion: Max. 4 MHz (when quadrupled) (Preliminary) Speed conversion: Max. 100 kHz
Ao2 DC voltage output, 2 points	R7HL-YV2	Output range: ± 10 V, ± 5 V, ± 1 V, ± 0.5 V, 0-10 V, 0-5 V, 1-5 V, 0-1 V Conversion accuracy: $\pm 0.1\%$
Ao2 DC current output, 2 points	R7HL-YS2	Output range: 4-20 mA Conversion accuracy: $\pm 0.1\%$

I/O SIGNAL	MODEL	SPECIFICATIONS
Di16 Contact input, 16 points	R7HL-DA16	Position or negative common (NPN/PNP), 16 points
Do16 Transistor output, 16 points	R7HL-DC16A	Negative common (NPN), 16 points
Do16 Transistor output, 16 points	R7HL-DC16B	Positive common (PNP), 16 points
Di8-Do8 Contact input, 8 points / Transistor output, 8 points	R7HL-DAC16A	Negative common (PNP) input, 8 points Negative common (NPN) output, 8 points
Di8-Do8 Contact input, 8 points / Transistor output, 8 points	R7HL-DAC16B	Positive common (NPN) input, 8 points Positive common (PNP) output, 8 points
Di8-Do8 Contact input, 8 points / Transistor output, 8 points	R7HL-DAC16ES*2	Positive or negative common (NPN/PNP) input, 8 points Negative common (NPN) output, 8 points, independent common terminals for I/O
Do8 Relay output, 8 points	R7HL-DC8C	Rated load: 250 V AC @1 A (cos ϕ =1), 30 V DC @1 A (resistive load) No limit in the number of simultaneous outputs (at 24 V DC)

*2. Tension clamp terminal block *3. e-CON connector

EXTERNAL DIMENSIONS mm (inch)

■ Screw Terminal Type*4



*4. Dimensions may differ depending on models.

R7F4DH SERIES

The R7F4DH Series is equipped with easy-to-wire connectors and terminal blocks typically used for machinery control. They can be flexibly designed to suit with your sensor connector types. Most typical three connection styles are available right now.



● Mini-clamp (e-CON) connector

Easy, quick and reliable IDC termination using standard pliers (e-CON compliant)

● MIL connector

MIL standard connector for flat cables

● Spring cage (tension-clamp) terminal

Quick push-in bridging system using a standard minus screwdriver; Pluggable terminal block

I/O SIGNAL	MODEL	INPUT		OUTPUT	
		Positive Common NPN	Negative Common PNP	Negative Common NPN	Positive Common PNP
Di16 Contact input, 16 points	R7F4DH-x-DA16A	16 points	---	---	---
Di16 Contact input, 16 points	R7F4DH-x-DA16B	---	16 points	---	---
Do16 Transistor output, 16 points	R7F4DH-x-DC16A	---	---	16 points	---
Do16 Transistor output, 16 points	R7F4DH-x-DC16B	---	---	---	16 points
Di8-Do8 Contact input, 8 points / Transistor output, 8 points	R7F4DH-x-DAC16A	---	8 points	8 points	---
Di8-Do8 Contact input, 8 points / Transistor output, 8 points	R7F4DH-x-DAC16B	8 points	---	---	8 points
Di8-Do8 Contact input, 8 points / Transistor output, 8 points	R7F4DH-x-DAC16C	8 points	---	8 points	---
Di8-Do8 Contact input, 8 points / Transistor output, 8 points	R7F4DH-x-DAC16D	---	8 points	---	8 points

CONTACT I/O SPECIFICATIONS

INPUT	R7HL	R7F4DH
ON voltage / current	≥15 V DC / ≥3.5 mA	
OFF voltage / current	≤5 V DC / ≤1 mA	
ON delay	≤0.5 msec.	
OFF delay	≤0.5 msec.	

OUTPUT	R7HL	R7F4DH
Rated output current	16 pt	0.25 A/point, 2.0 A/common
	8 pt	0.25 A/point, 2.0 A/common
Residual voltage	≤1.2 V	
ON delay	≤0.5 msec.	
OFF delay	≤0.5 msec.	
Overload protection	---	Current limited when overload is detected.
Overheat protection	---	Output turned off when overheat is detected.

32-point Type Available in July 2012



16 contact inputs + 16 transistor outputs type with e-CON connector will be released first. Other types will follow.

Count On M-System !

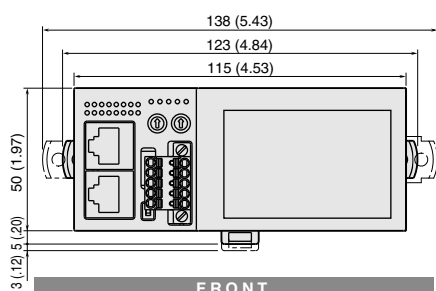
For your specific needs of I/O connectors, power input connector and network connectors with the R7F4DH Series, consult M-System.



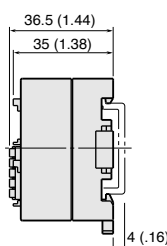
E-mail

info@m-system.co.jp

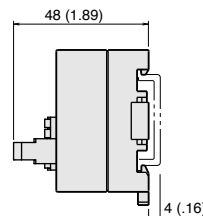
EXTERNAL DIMENSIONS mm (inch)



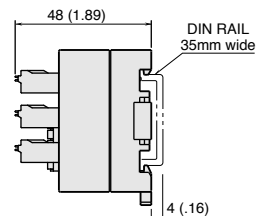
e-CON connector



MIL connector



Tension clamp terminal block



CC-Link Gateway Module



Model **R7G**

- The R7G is a slave to both CC-Link and HLS network.
- 32-point inputs to CC-Link are handed to 32-point outputs at HLS, while 32-point inputs to HLS are handed to 32-point outputs at CC-Link.

EtherCAT Gateway Module



Model **R3G-SECAT**
Under development

- The R3G-SECAT is a HLS master which is a slave to EtherCAT.
 - Inputs at HLS slaves are handed to EtherCAT inputs, while EtherCAT outputs are handed to outputs at HLS slaves.
- (Specifications are subject to change without notice.)

R7HL / R7F4DH Series Common Specifications

Power input	24 V DC $\pm 10\%$	Communication mode	Full-duplex or half-duplex
Dielectric strength	1500 V AC @1 minute (between isolated circuits)	Network cable (Shinko Seisen Industry Co., Ltd.)	<ul style="list-style-type: none"> ● Shielded cable Full-duplex: ZHY262PS, ZHT262PS Half-duplex: ZHY221PS ● Double shielded cable ZHY262PBA
Insulation resistance	≥ 100 M Ω with 500 V DC		
Operating temperature	-10 to +55°C (23 to 131°F)		
Operating humidity	30 to 90 %RH (non-condensing)	Transmission distance	100 meters (328 ft) @12 Mbps, 200 meters (656 ft) @6 Mbps, 300 meters (984 ft) @3 Mbps*2
Atmosphere	No corrosive or heavy dust		
Mounting	DIN rail (35 mm wide) or wall mounting*1		

*1. R7F4DH only *2. Consult M-System for 3 Mbps rate with the R7HL.

Features of HLS (High-speed Link System)

Control network IC manufactured by StepTechnica Co., Ltd.

HLS Hi-speed Link System

Ultra-high speed wire-saver

Only 0.96 millisecond to scan at the maximum of 63 slaves with full-duplex, 12 Mbps transfer rate.

High noise immunity achieves long distance transmission

Waveforms distorted by noise or long distance transmission can be automatically corrected.

Constant cycle communication

Overall response time remains stable thanks to the constant cycle communication method without retries that could cause delays and instability.

Flexible data transfer methods

Transfer rate is selectable among 12 Mbps / 6 Mbps / 3 Mbps, with either full-duplex or half-duplex transmission.

Hot swappable slave modules

Remote I/O modules can be added or removed while the network is active.

Multi-vendor network

Yokogawa FA-M3 master module (F3LH01-1N, F3LH02-1N) and other HLS compatible master boards.

Response Time & Transmission Distance

RESPONSE TIME (full-duplex)

	12 Mbps	6 Mbps	3 Mbps
4 nodes	60.7 μ s	121.4 μ s	242.7 μ s
8 nodes	121.4 μ s	242.7 μ s	485.4 μ s
16 nodes	242.7 μ s	485.4 μ s	970.7 μ s
32 nodes	485.4 μ s	970.7 μ s	1.942 ms
63 nodes	955.5 μ s	1.911 ms	3.822 ms

TRANSMISSION DISTANCE

	12 Mbps	6 Mbps	3 Mbps
100 m		200 m	300 m

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