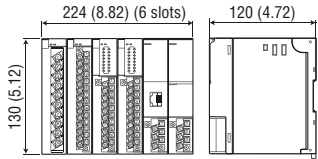


Remote I/O Series Lineup

Multi-channel,
Scalable Remote I/O

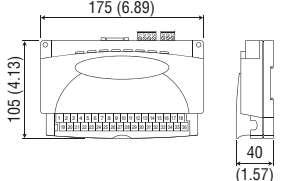
R3 Series



CC-Link DeviceNet Modbus PROFIBUS
TLink FL-net Modbus/TCP LONWORKS
EtherNet/IP MECHATROLINK MECHATROLINK-III CC-Link IE Field
EtherCAT

Compact,
Multi-point Remote I/O

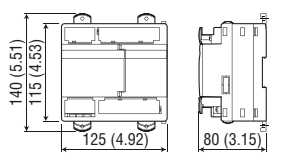
R1 Series



Modbus DeviceNet CC-Link

Multi-point Remote I/O

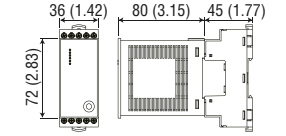
R9 Series



Modbus/TCP Modbus CC-Link LONWORKS

Plug-in Remote I/O

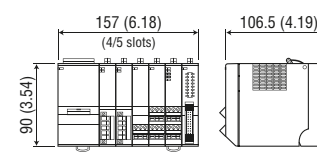
R10 Series



Modbus

Compact,
Scalable Remote I/O

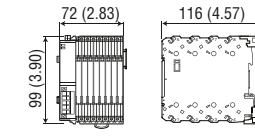
R5 Series



Modbus/TCP Modbus DeviceNet
CC-Link PROFIBUS TLink

Ultra-slim,
Scalable Remote I/O

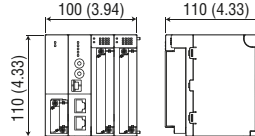
R6 Series



Modbus/TCP Modbus DeviceNet
CC-Link PROFIBUS TLink

Compact,
Scalable Remote I/O

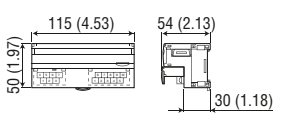
R30 Series



CC-Link IE Field CC-Link IETSN
Modbus/TCP EtherCAT OPC UA

Expandable,
Compact Remote I/O

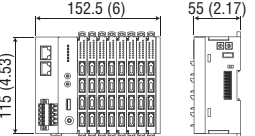
R7 Series



CC-Link DeviceNet TLink Modbus
LONWORKS Modbus/TCP MECHATROLINK
FLEX NETWORK EtherNet/IP HLS High-speed Link System
EtherCAT CC-Link IE Field

Slice Type,
Scalable Remote I/O

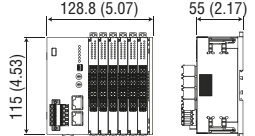
R8 Series



EtherCAT Modbus DeviceNet
CC-Link EtherNet/IP

Slice Type,
Scalable Remote I/O

R80 Series



CC-Link IETSN EtherCAT
DeviceNet

Dimensions in mm (inch)

Remote I/O Series



2025-01
EC-Z665
6-0013
Rev. 2

Remote I/O Series

24 years of successful sales, more than 1200 thousand units sold!

Freely communicates with host devices without needing extra programming.

Network redundancy selectable.

Compliant with major open networks regularly used around the world.

See list on pages 6 and 7.

Line up of 10 series available. Choose based on installation location and specific network needs.

Great variety in supported input and output signals.

See page 8.

Feel free to contact us about customized customer specifications.

Isolation applied to all input signals.

Multi-point Remote I/O **R9 Series**

Multi-channel, Scalable Remote I/O **R3 Series**

Compact, Scalable Remote I/O **R30 Series**

Expandable, Compact Remote I/O **R7 Series**

Slice Type, Scalable Remote I/O **R8 Series**

Slice Type, Scalable Remote I/O **R80 Series**

Compact, Multi-point Remote I/O **R1 Series**

Compact, Scalable Remote I/O **R5 Series**

Ultra-slim, Scalable Remote I/O **R6 Series**

Plug-in Remote I/O **R10 Series**

What is Remote I/O?

Remote I/O, otherwise called distributed I/O, refers to electronic devices that use transmission technology to send and receive input and output signals to/from master electronics like DCS, PLC and PCs often in the fields of process or factory automation. Remote I/O communication uses open networks with open communication protocols. We support our customers with a line up of Remote I/O solutions that use globally accepted major open networks like Modbus, CC-Link, MECHATROLINK, PROFIBUS, etc.



MG CO., LTD.
www.mgco.jp

Your local representative:

1. Replacing I/O modules of PLC and DCS

Reduce system wiring

Before Remote I/O

Wiring each and every sensor and actuator from the onsite panel to a control panel requires an enormous amount of cables!

Control panel PLC / DCS

Onsite panel A Onsite panel B Onsite panel n

Signal conditioner

Wires

Sensor

With Remote I/O...

Linking up the communication network in daisy chain only takes one cable and greatly reduces wiring.

Only one cable required! Or just two cables even with redundancy!

Control panel PLC / DCS

Onsite panel A Onsite panel B Onsite panel n

R3 Series

2. I/O for PC based SCADA systems

No programming required. Reduced costs.

Before Remote I/O

PLCs won't operate without programming. Signal conditioners are needed at the input.

PLC network

PLC PLC Network module PLC

Signal conditioner

Sensor CPU

With Remote I/O...

Using Remote I/O doesn't require a program. The technology has a built-in signal conditioning circuit that allows the user to plug and play, reducing cost and work load.

PC/SCADA software, etc.

Open network (Modbus, etc.)

R7 Series R1 Series R3 Series

Sensor

3. As I/O solution for IoT terminals

Using Remote I/O as an I/O interface for IoT terminal devices like **Web Data Logger** and **Tablet Recorder** has the advantages listed in A through C.

PC/SCADA software, etc.

Router Internet Cloud

Smartphone Tablet

Web Data Logger DL30-G R3 Series

I/O signal I/O signal

A. Compatible with many types of input/output

B. Reduces system wiring needs

C. Reduces internet connectivity costs by collecting all the signals from various I/O devices throughout a site into a single network connection point.

It's the IoT!

Structure of Remote I/O R3 Series

Redundant or two independent communication and power supply systems

As shown in the following image, the **R3 Series** is made from the combination of a power supply module, network module and input/output modules. The modules are inserted onto the base in basically any combination, with redundant or two independent power/network system a standard feature of the series. The input/output modules and network module can be replaced with the power turned ON. This replacement method is called "hot swap."

Network A Network B

Structure diagram

Base

I/O module n I/O module 2 I/O module 1

Network module B Network module A

Power supply module 2 Power supply module 1

Internal bus A Internal bus B

Conversion circuit

Network circuit

Power supply circuit

Power line bus

I/O signal

Power supply 2 Power supply 1

Dotted line shows configuration for redundancy.

Redundant network or two independent network protocols

Redundant network (example)

CC-Link CC-Link

Redundancy with two same network modules

Two network protocols (example)

CC-Link PROFIBUS

Two independent network modules communicating with each master at once

Redundant power supply or two independent power sources

Redundant power supply (example)

AC Power supply

Redundancy with two power supply modules

Two power sources (example)

DC Power supply 2 AC Power supply 1

Two independent power sources

Many types of input/output modules are available

Analog I/O module 64ch discrete I/O module 32ch discrete I/O module CT input module Multi-power monitoring module

Hot-swappable I/O modules

A line up of over 50 signal types and 120 models is available, which can be switched out even while the power is still on (hot swap).

Analog input

- Universal
- DC voltage
- DC current
- Thermocouple
- RTD
- Thermistor
- Potentiometer
- 4-20 mA input with 2-wire transmitter excitation supply
- Strain gauge

Analog output

- DC voltage
- DC current

AC power input

- CT
- AC voltage
- AC current
- Zero-phase current transformer
- Multi-power monitoring
- AC power

Pulse input

- Speed/position
- High speed pulse
- High speed totalized pulse
- Low speed totalized pulse
- Totalized pulse

Pulse output

- Pulse output
- One-shot pulse output

Discrete input

- Discrete input
- AC contact input

Discrete output

- Discrete output
- Remote control relay

Discrete input/output

- Speed/position
- BCD input
- BCD output

Air conditioning

- I/I positioner
- Heat meter

2

3

Examples of Remote I/O Applications

In-plant LAN (PC SCADA)

Remote I/O system is used for SCADA to monitor signals from a manufacturing process. Cost per data input is still low even with hundreds of data inputs using **R3 Series**, and reductions in wiring needs also helps push down costs.

The diagram shows a SCADA system connected to an In-plant LAN (Ethernet). This LAN is connected to three R3 Series I/O modules, each interfacing with a different manufacturing process (1, 2, and 3) via I/O signals.

I/O for DCS (redundant communication network)

The made-in-Japan products comply with the international PROFIBUS-DP standard and can be used in redundant network configurations.

The diagram illustrates a redundant communication network for a DCS. It includes SCADA for DCS connected via Ethernet to a DCS (redundant system). This system is also connected via PROFIBUS (redundant system) to R5 Series I/O modules, which are then connected to an onsite panel for I/O signals.

I/O for Tablet Recorder

Here's an example of using a remote I/O for several testing devices distributed in different locations to collect measurement data by **Tablet Recorder** over a LAN line.

The diagram shows a Tablet Recorder TR30 connected to an Ethernet network. This network is linked to three R7 Series I/O modules, each serving a different device (1, 2, and 3). A WLAN router is also connected to the network, enabling a tablet to access the data.

Super high speed I/O for motion control

Here's an example of using remote I/O for MECHATROLINK-III, network for motion control.

The diagram depicts a motion control system. A Controller is connected to an R7 Series I/O module via MECHATROLINK. This module handles various signals: Temperature (thermocouple), Rotary encoder, Contact input for control, and Contact output for control. An example of such a system is shown as a bread-making machine.

I/O for DCS/PLC

Here's an example of using our **R3 Series** for providing PLC I/O for a motor control application. The **R3 Series** allows direct CT input which eliminates the need for a converter. In addition, using CC-Link reduces the costs associated wiring needs.

The diagram shows a DCS/PLC system connected to an R3 Series I/O module via CC-Link. The module provides I/O for process input/output and CT input to an MCC (Motor Control Center). The system is also connected to SCADA for DCS via Ethernet.

Wireless remote I/O

Device sensor signals are collected using a multi-hop wireless system using 920 MHz band and the data then sent to a PLC.

The diagram illustrates a multi-hop wireless system. A Parent unit (Wireless gateway) is connected to a PLC via Ethernet. It communicates with multiple Child units (Wireless I/O) using a 900-920 MHz ISM Band. These Child units are connected to various devices (1, 2, and 3) via I/O signals. Some Child units can also interface with Modbus-RTU.

Internet connection

R3 Series or **R7 Series** can be used as a remote I/O device for **Web Data Logger**. Data saved on **Web Data Logger** can be viewed remotely from a PC or mobile device over the internet.


The diagram shows R3 or R7 Series I/O modules connected to a Web Data Logger DL30-G. The logger is connected to the Internet via a Router and ISP. A PC or smartphone can then access the data stored on the logger remotely.


I/O for high speed data logger (two independent communication networks)


Remote I/O data can be interfaced with two network systems, CC-Link and Modbus/TCP.


The diagram shows a High speed data logger connected to R3 Series I/O modules via CC-Link. The logger is also connected to a PLC and SCADA via Modbus/TCP over an Ethernet network.


Open Networks in Terms of Communication Speeds and Transmission Distance


EtherCAT			
Origins	Bechhoff Automation GmbH		
Main sponsor	EtherCAT® Technology Group		
Number of participants	5,920		
Transmission speed	Full duplex, 100 Mbps		
Number of nodes	65,535		
Network configuration, total length	Up to 100 m STP cables category 5/5e Star / line / tree		
Open network that leverages the super high speed of Ethernet and has functionality for high-precision synchronization between nodes, as well as simple wiring configurations.			
Remote I/O	R7 Series, R8 Series, R30 Series, R80 Series, JC Series		


CC-Link IE Field			
Origins	Mitsubishi Electric Corporation		
Main sponsor	CC-Link Partner Association		
Number of participants	3,823		
Transmission speed	1 Gbps		
Number of nodes	254 (total number of master and slave nodes)		
Network configuration, total length	Max. distance between nodes: 100 m STP cable (category 5e) Line / star / ring configurations		
A comprehensive Ethernet based network that seamlessly connects an information network to production sites.			
Remote I/O	R3 Series, R7 Series, R30 Series		


CC-Link IE TSN			
Origins	Mitsubishi Electric Corporation		
Main sponsor	CC-Link Partner Association		
Number of participants	3,823		
Transmission speed	1 Gbps / 100 Mbps		
Number of nodes	64,770 (total number of master and slave nodes)		
Network configuration, total length	Double shielded twisted-pair cable (category 5e) Line / star / line-star / ring / ring-star / mesh configurations Maximum distance between nodes: 100 m		
Leading the world in combining gigabit Ethernet bandwidth with Time-Sensitive Networking (TSN). Multiple network protocols can be mixed on the same trunk line while ensuring time-sharing, real-time communications.			
Remote I/O	R30 Series, R80 Series		


HLS Hi-speed Link System			
Origins	Step Technica Co., Ltd.		
Main sponsor	---		
Number of participants	---		
Transmission speed	3 Mbps / 6 Mbps / 12 Mbps	Number of nodes	Maximum 63 nodes
Network config., total length	Multidrop connection, Shielded twisted-pair cable (half duplex) or shielded 4-core twisted-pair cable (full duplex), Maximum 300 m (@ 3 Mbps)		
Super high-speed, highly reliable open field network offered by Step Technica. Used in various control device networks in factory automation for applications like with semiconductor manufacturing or high precision machining.			
Remote I/O	R7 Series JC Series		


CUnet			
Origins	Step Technica Co., Ltd.		
Main sponsor	---		
Number of participants	---		
Transmission speed	3 Mbps / 6 Mbps / 12 Mbps	Number of nodes	Maximum 64 nodes
Network config., total length	Multimaster broadcasting, Multidrop connection (RS-485). Shielded cable (cat. 3), Maximum 300 m (@ 3 Mbps)		
Multimaster remote I/O control network offered by Step Technica, which supports discrete I/O, analog I/O and positioning control.			
Remote I/O	JC Series		

EtherNet/IP			
Origins	Control equipment manufacturers		
Main sponsor	ODVA, Inc.		
Number of participants	Over 700		
Transmission speed	10/100 Mbps	Number of nodes	No limitations
Network config., total length	Distance between nodes: up to 100 mm, STP cables category 5/5e, Star / line / tree		
Network for industrial applications that has a control protocol on top of an Ethernet TCP/IP. Other commonly available Ethernet devices can be mixed on the Ethernet network.			
Remote I/O	R3 Series R7 Series		

MECHATROLINK MECHATROLINK - III			
Origins	Yaskawa Electric Corporation		
Main sponsor	MECHATROLINK Members Association		
Number of participants	3,381		
Transmission speed	100 Mbps	Number of nodes	Maximum 62 stations
Network config., total length	Cascade / star configurations, Max. transmission distance: 100 m between stations Minimum distance between stations: 20 cm		
Motion network that maintains synchronization between all slaves in a system. In addition to offering complete synchronization with the servo drives, can also be used for connecting actuators for inverters, stepping motors and sliders, and peripheral devices for motion control applications such as other I/O, temperature controllers and image processing devices.			
Remote I/O	R3 Series R7 Series		


PROFINET			
Origins	Control equipment manufacturers		
Main sponsor	PROFIBUS & PROFINET International		
Number of participants	Over 1,400		
Transmission speed	100 Mbits/s with copper wires, 1 Gbits/s (Option)	Number of nodes	No limitations
Network config., total length	Copper wires: 100 m, Communication cables: copper wires, fiber optic cables, wireless		
PROFINET is an Ethernet based network developed by PI (PROFIBUS & PROFINET International) for industrial automation that is 100 % compatible with IEEE standard IEEE802.3 defining Ethernet.			
Remote I/O	Please contact us for further details.		

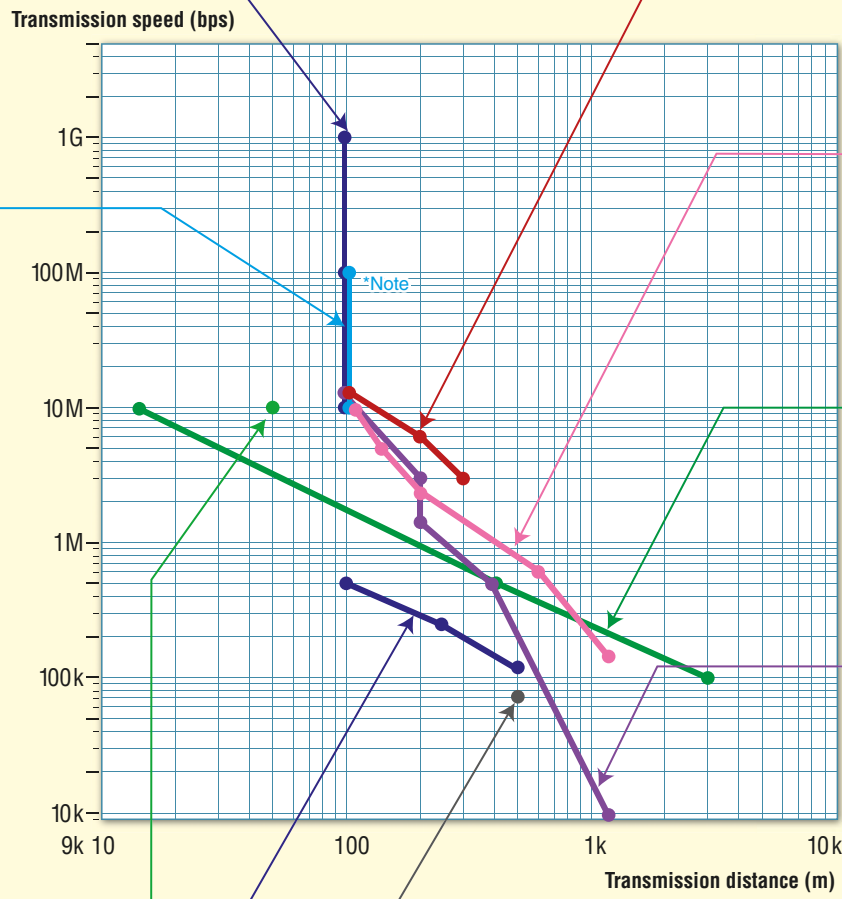
Modbus/TCP			
Origins	Modicon Inc.		
Main sponsor	Modbus-IDA		
Number of participants	682		
Transmission speed	10 Mbps / 100 Mbps / 1,000 Mbps	Number of nodes	Max. 1024 (Max. numbered nodes supported: 248)
Network config., total length	Line / star configurations, Maximum 500 m (depends on cable type)		
Modbus protocol that operates with Ethernet TCP/IP.			
Remote I/O	R3 Series R5 Series R6 Series R7 Series R9 Series R30 Series		


FL-net			
Origins	Requested user specifications from Japan Automobile Manufacturing Association		
Main sponsor	JEMA (The Japan Electrical Manufacturers' Association)		
Number of participants	Over 34		
Transmission speed	10 Mbps / 100 Mbps	Number of nodes	254 nodes
Network config., total length	10BASE-T: 100 m when using twisted-pair cable, 10BASE5: 500 m when using thick type coaxial cable, 10 BASE-FL: 2000 m when using fiber optic cable		
Open network originating from Japan's industry for factory automation. Operates with Ethernet UDP/IP using a communications protocol with token passing methodology so no master node is required.			
Remote I/O	R3 Series		


*Note: Communication speeds and distances are with STP cables.


Client-Server Type Open Network


OPC UA			
Origins	Industrial automation and other fields		
Main sponsor	OPC Foundation		
Number of participants	Over 680		
Transmission speed	--- (depending upon the connected network communication type)	Number of nodes	No limit (depending upon the server specifications)
Network config., total length	Client-Server configurations. The server specifications determine the number of connectable nodes. Transmission distance depends upon the connected network communication type.		
OPC UA (Unified Architecture) solves various issues recognized with the conventional OPC (OPC Classic). Based on SOAP/XML/Web services, it realizes high-security data communication without depending upon the platform.			
Remote I/O	R30 Series		




CC-Link			
Origins	Mitsubishi Electric Corporation		
Main sponsor	CC-Link Partner Association		
Number of participants	3,823		
Transmission speed	156 kbps / 625 kbps / 2.5 Mbps / 5 Mbps / 10 Mbps	Number of nodes	Maximum 64 nodes
Network config., total length	Bus type network using shielded 3-core twisted-pair cable. Maximum 1200 m (@ 156 kbps). Also has fiber optic repeater.		
High speed network for device level and sensor level PLCs (by Mitsubishi Electric) widely used primarily for factory automation.			
Remote I/O	R1 Series R3 Series R5 Series R6 Series R7 Series R8 Series R9 Series		

Modbus			
Origins	Control equipment manufacturers		
Main sponsor	Modbus Organization		
Number of participants	682		
Transmission speed	300 - 115.2 kbps (RS-232-C), Max. 10 Mbps (RS-485)	Number of nodes	Maximum 247 nodes
Network config., total length	Has no physical layer standards and typically uses serial connections like RS-232-C or RS-485. Maximum length of 1200 m when using RS-485 (depends on communication speed)		
A versatile open field network that uses a simple protocol and can be used on multiple levels. Used extensively around the world.			
Remote I/O	R1 Series R3 Series R5 Series R6 Series R7 Series R8 Series R9 Series R10 Series		

PROFIBUS			
Origins	Control equipment manufacturers		
Main sponsor	PROFIBUS & PROFINET International		
Number of participants	Over 1,400		
Transmission speed	9.6 k - 12 Mbps	Number of nodes	Maximum 126 nodes
Network config., total length	Special copper wire (STP cable) or fiber optic cable with bus / ring / tree configurations. Maximum 1200 m (@ 9.6 kbps)		
A device level and sensor level network for PLC and DCS used around the world but heavily in Europe. Comes in three types: DP, PA, FMS			
Remote I/O	R3 Series R5 Series R6 Series		

LonWorks			
Origins	Echelon Corporation		
Main sponsor	LonMark International		
Number of participants	Over 850		
Transmission speed	610 - 2.5 Mbps	Number of nodes	64 nodes/subsystem (FTT-10)
Network config., total length	For the network, uses media like twisted-pair cables, power line cables, coaxial cables and fiber optic cables. Free topology, bus configurations. Maximum 2700 m (twisted-pair cables)		
An autonomous distributed network used for the controller, device and sensor levels. Comes in a wide variety of applications for building controls, factory automation and home automation.			
Remote I/O	R3 Series R7 Series R9 Series		

DeviceNet			
Origins	Control equipment manufacturers		
Main sponsor	ODVA, Inc.		
Number of participants	Over 700		
Transmission speed	125 kbp / 250 kbps / 500 kbps	Number of nodes	Maximum 64 nodes
Network config., total length	Bus and tree configurations made with shielded 4-core twisted-pair cables. Maximum 500 m (@ 100 kbps)		
Widely used around the world primarily for factory automation applications as a device level network for PLC and DCS.			
Remote I/O	R1 Series R3 Series R5 Series R6 Series R7 Series R8 Series R80 Series		

Number of participants as of August 2020