

Programmable Controller

MELSEC iQ-R
series

MELSEC iQ-R Motion Module User's Manual (Startup)

-RD78G4
-RD78G8
-RD78G16
-RD78G32
-RD78G64
-RD78GHV
-RD78GHW

WHEN USING A HUB WITH CC-Link IE TSN

A dedicated TSN hub may be required depending on parameter settings or the network topology used to connect modules on CC-Link IE TSN.

Read the following carefully.

 Page 33 Structure of Authentication Class B Devices and Ethernet Devices

 Page 43 Hub

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. Refer to the MELSEC iQ-R Module Configuration Manual for a description of the PLC system safety precautions.

In this manual, the safety precautions are classified into two levels: "  WARNING" and "  CAUTION".

 WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
 CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "  CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

WARNING

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - (1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.
 - (2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
 - Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
 - Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.
 - (3) All outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to "General Safety Requirements" in the MELSEC iQ-R Module Configuration Manual.
 - (4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.
 - In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
 - Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
 - For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.
-

[Design Precautions]

WARNING

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
 - Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
 - Do not write any data to the "system area" and "write-protect area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-protect area", and the "use prohibited" signals, refer to the user's manual for the module used.
 - If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.
 - Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - (1) Machine homing is controlled by two kinds of data: a homing direction and a homing speed. Deceleration starts when the proximity dog signal turns on. If an incorrect homing direction is set, motion control may continue without deceleration. To prevent machine damage caused by this, configure an interlock circuit external to the programmable controller.
 - (2) When the module detects an error, the motion slows down and stops or the motion rapidly stops, depending on the stop group setting in parameter. Set the parameter to meet the specifications of a positioning control system. In addition, set the homing parameter and positioning data within the specified setting range.
 - (3) Outputs may remain on or off, or become undefined due to a failure of a component such as an insulation element and transistor in an output circuit, where the module cannot detect any error. In a system that the incorrect output could cause a serious accident, configure an external circuit for monitoring output signals.
 - If safety standards (ex., robot safety rules, etc.) apply to the system using the module, drive unit and servomotor, make sure that the safety standards are satisfied.
 - Construct a safety circuit externally of the module or drive unit if the abnormal operation of the module or drive unit differs from the safety directive operation in the system.
-

[Design Precautions]

CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100 mm or more between them. Failure to do so may result in malfunction due to noise.
 - During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
 - After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.
 - Do not power off the programmable controller or reset the CPU module while the settings are being written. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so also may cause malfunction or failure of the module.
-

[Installation Precautions]

WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.
-

[Installation Precautions]

CAUTION

- Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines included with the base unit. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
 - To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module, and fix it with screw(s). Incorrect interconnection may cause malfunction, failure, or drop of the module.
 - Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
 - When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause malfunction.
 - When using an SD memory card, fully insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
 - Securely insert an extended SRAM cassette or a battery-less option cassette into the cassette connector of the CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
 - Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, battery-less option cassette, or connector. Doing so can cause malfunction or failure of the module.
-

[Wiring Precautions]

WARNING

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
 - After installation and wiring, attach a blank cover module (RG60) to each empty slot and an included extension connector protective cover to the unused extension cable connector before powering on the system for operation. Failure to do so may result in electric shock.
-

[Wiring Precautions]

CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
 - Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
 - Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
 - Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
 - Securely connect the connector to the module. Poor contact may cause malfunction.
 - Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100 mm or more between them. Failure to do so may result in malfunction due to noise.
 - Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in malfunction or damage to the module or cables. In addition, the weight of the cables may put stress on modules in an environment of strong vibrations and shocks. Do not clamp the extension cables with the jacket stripped. Doing so may change the characteristics of the cables, resulting in malfunction.
 - Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
 - Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
 - When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
 - Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
 - A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
 - Programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
 - For Ethernet cables to be used in the system, select the ones that meet the specifications in this manual. If not, normal data transmission is not guaranteed.
-

[Startup and Maintenance Precautions]

WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
 - Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, resulting in injury and fire.
 - Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.
-

[Startup and Maintenance Precautions]

CAUTION

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
 - Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
 - Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
 - Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25 cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
 - Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
-

[Startup and Maintenance Precautions]

CAUTION

- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
 - After the first use of the product, do not perform each of the following operations more than 50 times (IEC 61131-2/JIS B 3502 compliant).
Exceeding the limit may cause malfunction.
 - Mounting/removing the module to/from the base unit
 - Inserting/removing the extended SRAM cassette or battery-less option cassette to/from the CPU module
 - Mounting/removing the terminal block to/from the module
 - After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
 - Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
 - Do not touch the integrated circuits on the circuit board of an extended SRAM cassette or a battery-less option cassette. Doing so may cause malfunction or failure of the module.
 - Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.
 - Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
 - Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.
 - Before testing the operation, set a low speed value for the speed limit parameter so that the operation can be stopped immediately upon occurrence of a hazardous condition.
 - Confirm and adjust the program and each parameter before operation. Unpredictable movements may occur depending on the machine.
 - When using the absolute position system function, on starting up, and when the module or absolute position motor has been replaced, always perform a homing.
 - Before starting the operation, confirm the brake function.
 - Do not perform a megger test (insulation resistance measurement) during inspection.
 - After maintenance and inspections are completed, confirm that the position detection of the absolute position detection function is correct.
 - Lock the control panel and prevent access to those who are not certified to handle or install electric equipment.
-

[Operating Precautions]

CAUTION

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
 - Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so also may cause malfunction or failure of the module.
 - Note that when the reference axis speed is specified for interpolation operation, the speed of the partner axis (2nd, 3rd, or 4th axis) may exceed the speed limit value.
 - Do not go near the machine during test operations or during operations such as teaching. Doing so may lead to injuries.
-

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.
 - When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.
-

[Transportation Precautions]

CAUTION

- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
 - The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.
-

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series programmable controllers.

This manual describes the specifications, procedures before operation and wiring of the relevant products listed below. Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly.

When applying the program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

Please make sure that the end users read this manual.

Relevant products

RD78G4, RD78G8, RD78G16, RD78G32, RD78G64, RD78GHV, RD78GHW

Point

Symbols used in this manual are shown below.

- [RD78GH]: Symbols indicating that it corresponds to only RD78GH
- Underlined variables (AxisName, etc.): Variables defined by users

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

 MELSEC iQ-R Module Configuration Manual

 Safety Guidelines (This manual is included with the base unit.)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

Additional measures

To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the following manuals.

 MELSEC iQ-R Module Configuration Manual

 Safety Guidelines (This manual is included with the base unit.)

CONTENTS

WHEN USING A HUB WITH CC-Link IE TSN	1
SAFETY PRECAUTIONS	1
INTRODUCTION	10
COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES	10
RELEVANT MANUALS	12
TERMS	13
GENERIC TERMS AND ABBREVIATIONS	15
FUTURE SUPPORT PLANNED	16
CHAPTER 1 PART NAMES	17
1.1 LED Display Specifications	18
CHAPTER 2 SPECIFICATIONS	19
2.1 Performance Specifications	19
2.2 Specifications of Interfaces with External Devices	20
2.3 External Circuit Design	22
CHAPTER 3 FUNCTION LIST	24
3.1 Control Functions	24
Basic specifications	24
Motion control 1	25
Motion control 2	26
Control/Operation/Maintenance	26
3.2 List of Network Function	27
CHAPTER 4 PROCEDURES BEFORE OPERATIONS	29
CHAPTER 5 SYSTEM CONFIGURATION	31
5.1 Structure of Authentication Class B Devices and Ethernet Devices	33
5.2 Structure of Authentication Class B/A Devices and Ethernet Devices	36
5.3 Precautions for System Configuration	38
CHAPTER 6 INSTALLATION AND WIRING	40
6.1 Installation and Removal of SD Memory Card	40
6.2 Wiring	42
APPENDICES	44
Appendix 1 Component List	44
Appendix 2 External Dimensions	45
Appendix 3 Open Source Software	49
INDEX	51
REVISIONS	52
WARRANTY	53
TRADEMARKS	54

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R Motion Module User's Manual (Startup) [IB-0300406ENG] (This manual)	Specifications, procedures before operation, system configuration, and wiring of the Motion module	Print book e-Manual PDF
MELSEC iQ-R Motion Module User's Manual (Application) [IB-0300411ENG]	Functions, I/O signals, variables, labels, programming, and troubleshooting of the Motion module	Print book e-Manual PDF
MELSEC iQ-R Motion Module User's Manual (Network) [IB-0300426ENG]	Functions, parameter settings, troubleshooting, and buffer memory of CC-Link IE TSN	Print book e-Manual PDF
MELSEC iQ-R Programming Manual (Motion Module Instructions, Standard Functions/Function Blocks) [IB-0300431ENG]	Instructions for the Motion module and standard functions/function blocks	Print book e-Manual PDF

This manual does not include detailed information on the followings:

- General specifications
- Available CPU modules and the number of mountable modules
- Installation

For details, refer to the following.

 MELSEC iQ-R Module Configuration Manual

For programs, refer to the following.

 MELSEC iQ-R Programming Manual (Program Design)

This manual does not include information on the network function blocks. Refer to the following for details on the network function blocks.

 MELSEC iQ-R Ethernet/CC-Link IE Function Block Reference

Point

e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Actual position	An address that is rounded a position address returned by a slave device. It is affected by a current position change.
Authentication Class	A class classified by CC-Link Partner Association according to functions and performance of CC-Link IE TSN-compatible devices and hubs. For authentication Classes of each product, refer to the CC-Link Partner Association website (www.cc-link.org) or catalogs and manuals.
Axis	A target to carry out the motion control
Buffer memory	A memory in an intelligent function module, where data (such as setting values and monitoring values) are stored.
Buffer mode	A generic term for multiple start
Continuous update	Continuously reflecting input values to the control while the ContinuousUpdate input of the motion control FB is TRUE
Cyclic transmission	A function by which data are periodically exchanged among stations on the same network using a slave station
Dedicated instruction	An instruction for using functions of the module
Device	Various memory data in a CPU module. There are devices handled in each bit and in each word.
Disconnection	A process of stopping data link if a data link error occurs
Execute	Set TRUE to the Execute input or the Enable input to the motion control FB
General-purpose hub	An authentication Class A hub authorized by CC-Link Partner Association
GX Works3	The product name of the software package for the MELSEC programmable controllers
Hardware reboot	Turning ON the power of the system again or resetting
Intelligent function module	A module that has functions other than input and output, such as an A/D converter module and D/A converter module
Label	A label that represents a device in a given character string
Link device	A device in a module on CC-Link IE
Link refresh	Data transfer between a link device in a Motion module and a device in a CPU module. Link refresh is performed in the END processing of the CPU module's sequence scan.
Master station	A station that controls the entire network. This station can perform cyclic transmission and transient transmission with all stations. Only one master station can be used in a network.
Motion area	A software that performs the motion control in the Motion module
Motion control FB	An FB that is related to the motion control. Its name starts with MC_ or MCv_.
Motion FB	A motion control FB that takes an axis or an axes group for the argument and changes the axis status or the axes status by execution
Motion management station	A station that updates a link device in the Motion module
Multiple start	Executing another motion control FB to the same axis while a motion control FB is executed
Network area	A software that performs the network control in the Motion module
Object	Various data of a slave device compatible with CANopen
PDO	A communication object of CANopen (Process Data Object)
RAS	The abbreviation for Reliability, Availability, and Serviceability. This term refers to usability of automated equipment.
RD78G	Another term for the MELSEC iQ-R series Motion module (compatible with CC-Link IE TSN)
RD78GH	
Real axis	An axis that is linked with a slave device on network
Remote station	A station that exchanges I/O signals (bit data) and I/O data (word data) with another station by cyclic transmission. A transient transmission is available.
Real drive axis	An axis that is linked with a slave device which supports CC-Link IE TSN compatible with csp/csv/cst mode (sequential command) of the CiA402 drive profile
Real encoder axis	An axis that generates a commanded position from the current position of the encoder connected with a slave device. It is used for the master axis of the single axis synchronous control.
Retrigger	Starting up the Execute input again while executing an FB to a motion control FB that has the Execute input
Return	A process of restarting data link when a station recovers from an error
SB	Link special relay Bit data that indicates the operating status and data link status of a module on CC Link IE.
Set position	A command position address rounded by the ring counter. It is affected by a current position change.
Software reboot	Resetting only motion area and network area without a hard reboot
Start	Executing a motion FB for the first time to an axis or an axes group
Target position	A command position address that is specified in the motion FB

Term	Description
Transient transmission	A function of data communication unperiodically among nodes (station) on network. A function used to send message to the target station when requested by a link dedicated instruction or the engineering tool Communication is available with station on another network via relay station, or gateway.
TSN hub	An authentication Class B hub authorized by CC-Link Partner Association
Virtual axis	An axis that is not linked with a slave device on network
Virtual drive axis	A virtual axis that can generate a command virtually
Virtual encoder axis	An axis that generates a set position from a variable. It is used for the master axis of the single axis synchronous control.
Virtual linked axis	An axis that connects FBs and transmits a command in the single axis synchronous control

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Generic term/abbreviation	Description
CC-Link IE	The generic terms for the followings: • CC-Link IE TSN • CC-Link IE Controller Network ( MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)) • CC-Link IE Field Network ( MELSEC iQ-R CC-Link IE Field Network User's Manual (Application))
CPU module	An abbreviation for the MELSEC iQ-R series CPU module
Data link	A generic term for a cyclic transmission and a transient transmission
Drive unit	A generic term for motor drive devices such as a servo amplifier
Engineering tool	A generic term for GX Works3 and MR Configurator2
Ethernet device	A generic term for the devices supporting IP communication (such as a personal computer, a vision sensor, and a bar code reader)
GOT	A generic term for Mitsubishi Electric Graphic Operation Terminal GOT1000 and GOT2000 series
Hub	A generic term for a TSN hub and a general-purpose hub
Motion module	A generic term for the RD78G(H)_
Network module	A generic term for the following modules: • Ethernet interface module • Module on CC-Link IE TSN (the Motion module and a module on a remote station) • CC-Link IE Controller Network module • Module on CC-Link IE Field Network (a master/local module, and a module on a remote I/O station, a remote device station, and an intelligent device station) • MELSECNET/H network module • MELSECNET/10 network module • RnENCPU (network part)
RAS	An abbreviation for Reliability, Availability, and Serviceability. This term refers to the overall usability of automated equipment.
RD78G(H)	A generic term for RD78G_, RD78GH_ (high performance version)
Slave station	• A generic term for a local station and remote station on CC-Link IE TSN • A generic term for a local station, remote I/O station, remote device station, and intelligent device station on CC-Link IE Field Network
SLMP	A SeamLess Message Protocol. This protocol is used to access an SLMP-compatible device from an external device (such as a personal computer or HMI (Human Machine Interface)) or an SLMP-compatible module (such as the Ethernet-equipped module or modules on CCLink IE TSN).

FUTURE SUPPORT PLANNED

The following functions are mentioned in this manual, but it is planned for a future support.

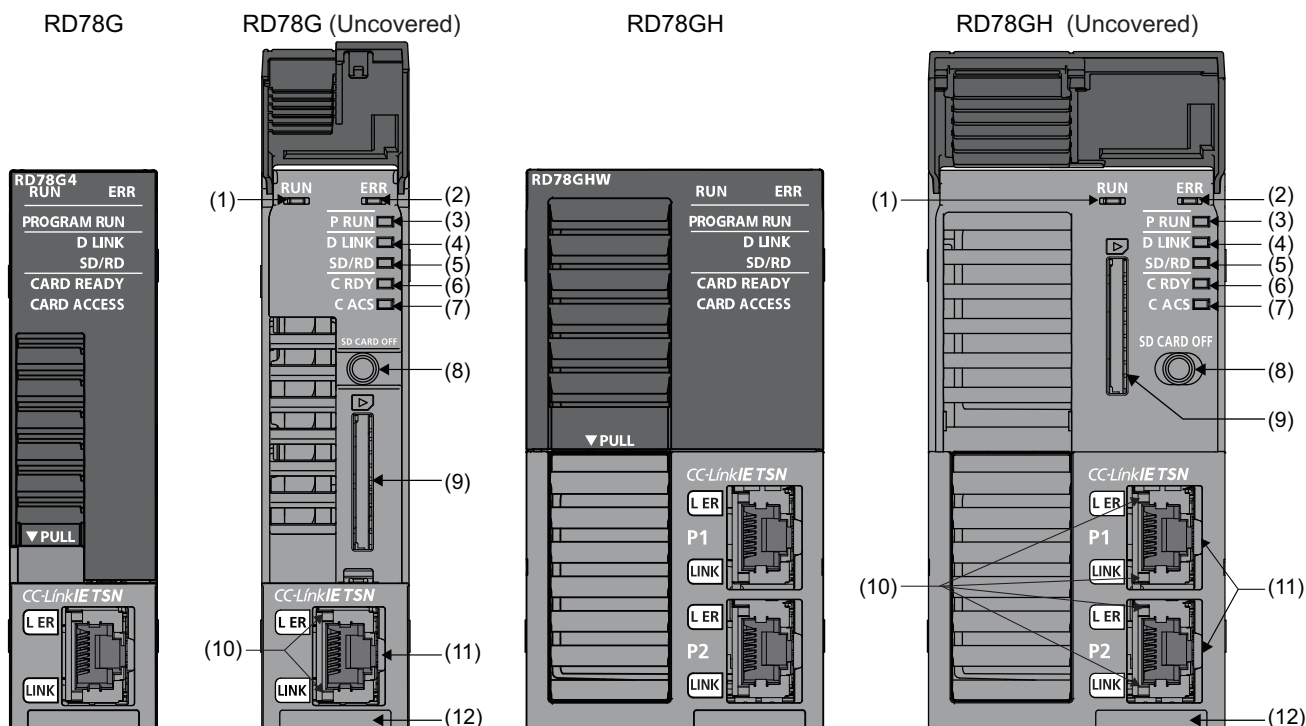
The information in this page might be changed for improvement without prior notice.

Function	Description
Operation cycle	Auto refresh link devices of motion synchronization stations
Current position change function	Trigger current position change
External signal selection Touch probe	Data type [OBJ]
Operation profile data	Profile operation Change of current value per cycle Multidimensional profile
Logging	Real-time monitor
Motion system software installation	Motion software package for the RD78G(H) (including files) • Basic system software simulator DLL • Data definition file (axis data, etc.) • Add-on simulator DLL • The engineering tool window definition file for add-on • Boot software binary for network • Bood software simulator DLL for network

1 PART NAMES

1

This chapter describes the part names of the Motion module.



No.	Name	Description
(1)	RUN LED	For details, refer to the following.  Page 18 LED Display Specifications
(2)	ERR LED	
(3)	PROGRAM RUN LED (P RUN is shown inside the cover)	
(4)	D LINK LED	
(5)	SD/RD LED	
(6)	CARD READY LED (C RDY is shown inside the cover)	
(7)	CARD ACCESS LED (C ACS is shown inside the cover)	
(8)	SD memory card access control switch	
(9)	SD memory card slot	
(10)	LEDs for CC-Link IE TSN connector*1	P1 L ER LED
		LINK LED
		P2 L ER LED
		LINK LED
(11)	Ethernet port	Connects to a slave station.
(12)	Serial No. marking	Shows the serial No. printed on the Motion module.

*1 For the details of a two slots product, refer to the following.

 MELSEC iQ-R Module Configuration Manual

1.1 LED Display Specifications

This section lists the LED display specifications of the Motion module.

□: OFF, ■: ON, ●: Flashing

Name	Description	LED display		Status
RUN LED	Indicates the operating status.	RUN LED	■	Operating normally
			□	Error, Initializing
ERR LED	Indicates the error status.	ERR LED	■	Error
			●	200 ms interval: Error 500 ms interval: A data link faulty station detected
			□	Operating normally
PROGRAM RUN LED	Indicates the execution status of built-in programs.	PROGRAM RUN LED	■	Executing program
			□	Stopping program
D LINK LED	Indicates the data link status.	D LINK LED	■	Data link (cyclic transmission being performed)
			●	Data link (cyclic transmission stopped)
			□	Data link not performed (disconnection)
SD/RD LED	Indicates the data communicating status.	SD/RD LED	■	Communicating data
			□	Not communicating data
CARD READY LED	Indicates the status of SD memory card.	CARD READY LED	■	An SD memory card is usable.
			●	Preparing
			□	No SD memory card inserted
CARD ACCESS LED	Indicates the access status of SD memory card.	CARD ACCESS LED	■	Accessing SD memory card
			□	Not accessing SD memory card
L ER LED	Indicates the port status.	P1	L ER LED ■	Abnormal data received
			L ER LED □	Normal data received
		P2	L ER LED ■	Abnormal data received
			L ER LED □	Normal data received
LINK LED	Indicates the link status.	P1	LINK LED ■	Link-up
			LINK LED □	Link-down
		P2	LINK LED ■	Link-up
			LINK LED □	Link-down

Error status can be determined by status of the RUN LED and the ERR LED.

RUN LED	ERR LED	Error status	Description
Off	On, flashing	Major error	An error such as hardware failure or memory failure. The module stops operating.
On	Flashing	Moderate error	An error, such as parameter error, which affect module operation. The module stops operating.
On	On	Minor error	An error such as communication, positioning control, and program error. The module continues operating.

When multiple errors occur, the error status is displayed in the order of major, moderate, and minor.

2 SPECIFICATIONS

2.1 Performance Specifications

This section lists the performance specifications of the RD78G(H).

Item		RD78G4	RD78G8	RD78G16	RD78G32	RD78G64	RD78GHV	RD78GHW
Number of controlled axes* ¹	Real drive axis* ²	4 axes	8 axes	16 axes	32 axes	64 axes	128 axes	256 axes
	Virtual drive axis	Total 1024 axes. The number of settable axes depends on the setting of the system memory capacity.						
	Virtual linked axis							
	Real encoder axis							
	Virtual encoder axis							
Operation cycle* ³		62.5 μs to 8 ms* ⁴					31.25 μs to 8 ms	
Interpolation function		1- to 4-axis linear interpolation 2-axis circular interpolation						
Control method		PTP (Point To Point) control, path control (linear, and arc can be set), speed control, speed-torque control						
Control unit		pulse, m, degree, Revolution, inch, arbitrary unit character string						
Positioning	Positioning range	-10000000000.0 ≤ Positioning range < 10000000000.0						
	Speed command	In position control: 0, +0.0001 to +2500000000.0 In speed control: 0, ±0.0001 to ±2500000000.0						
	Acceleration/ deceleration process	Acceleration/deceleration specification method (acceleration, deceleration, jerk), acceleration/deceleration time constant method						
	Acceleration/ deceleration time	Acceleration/deceleration specification method [Unit] U/s ² [Range] 0.0000, 0.0001 to 2147483647.0						
	Rapid stop deceleration time	Acceleration/deceleration time constant method [Unit] s [Range] 0.000000, 0.000001 to 8400.0						
Flash ROM write count		Up to 100,000 times						
Number of occupied I/O points		32 points					32 points + 16 points (for the amount of empty slot)	
Internal current consumption (5 V DC)		1.93 A					2.33 A	
External dimensions	Height	106 mm (4.17 inch)						
	Width	27.8 mm (1.09 inch) (1 slot width)					56 mm (2.2 inch) (2 slots width)	
	Depth	110 mm (4.33 inch)						
Mass		0.26 kg					0.44 kg	

*1 Even when an axis (real axis, and virtual axis) does not exist in the system setting, an error does not occur. Since there is no axis to be controlled, the motion control cannot be carried out. Operation other than the motion control, such as program execution by ST language is available.

*2 When a multi-axis drive unit and a general output device are used as multiple axes, the number of those axes are counted.
Ex: The 2-axis drive unit is counted as 2 axes.

*3 It depends on the number of controlled axes.

*4 For the version of Add-on baseSystem, "Ver. 1.4 or earlier", operation cycle is "125 μs to 4 ms".

2.2 Specifications of Interfaces with External Devices

This section lists the external interfaces.

○: Support possible

Interface name	RD78G	RD78GH	Application
CC-Link IE TSN	1 port	2 ports	Network connection
SD memory card	○	○	Restoration of parameters and logs

CC-Link IE TSN

The specifications of the CC-Link IE TSN is shown below.

Item			RD77GF4	RD77GF8	RD77GF16	RD77GF32	RD78G64	RD78GHV	RD78GHW
Maximum number of link points per network		RX/RY (Slave label)	16K points each (16384 points, 2K bytes)						
		RWr/RWw (including PDO) (Slave label)	8K points each (8192 points, 16K bytes)						
Maximum number of link points per station	Master station	RX/RY (Slave label)	16K points each (16384 points, 2K bytes)						
		RWr/RWw (Slave label)	8K points each (8192 points, 16K bytes)						
Communication speed			1 Gbps						
Minimum synchronization cycle			62.5 μs ^{*7}					31.25 μs	
Time synchronization accuracy			±1 μs						
Maximum number of connectable stations per network ^{*2}			120 stations ^{*3*4*5}						
Maximum number of connectable devices per network			256 devices ^{*6}						
Communication cable			Ethernet cable which satisfies standard( Page 43 Wiring products)						
Maximum number of networks			239						
Network topology ^{*8}			Line topology, star topology ^{*1} , line + star topology						
Transient transmission capacity			1920 bytes maximum						

*1 TSN hub is required for star topology.

*2 An error will not occur even if there is no station and axis in the network setting.

*3 Even if the station is a multi-axis drive unit device (a device which can control two axes or more), the number of station is counted as one station when it is recognized as one station. For details, refer to each drive unit instruction manual.

*4 When a slave emulate is carried out, the number of stations is counted according to the connected device setting.

*5 For the version of Add-on baseSystem, "Ver. 1.4 or earlier", the maximum number of stations is "64 stations".

*6 For the version of Add-on baseSystem, "Ver. 1.4 or earlier", the maximum number of devices is "64 devices".

*7 For the version of Add-on baseSystem, "Ver. 1.4 or earlier", the minimum synchronization cycle is "125.00 μs".

*8 When the communication cycle is 31.25 μs or 62.50 μs, the line topology is only available. When connecting with the star + line topology, the communication cycle must be set to 125.00 μs or more.

SD memory card

The specifications of the SD memory card is shown below.

Item	Specification
Card type	SD/SDHC memory card
Card capacity	Up to 32G bytes
UHS, UHS-I	Unsupported
Number of times of installation/removal	Within 500 times

Use the recommended SD memory card listed below.

Model ^{*1}	Manufacturer	Card capacity
NZ1MEM-xGBSD	Mitsubishi Electric Corporation	2, 4, 8, 16G bytes

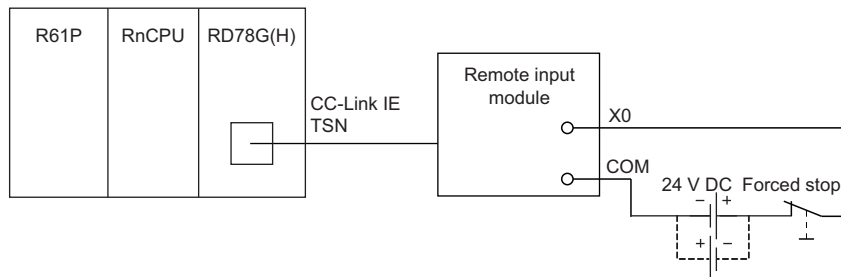
^{*1} The "X" of the model name represents the card capacity.

Before using a commercially available SD memory card, check that the card does not affect the control of the target system on user's own responsibility.

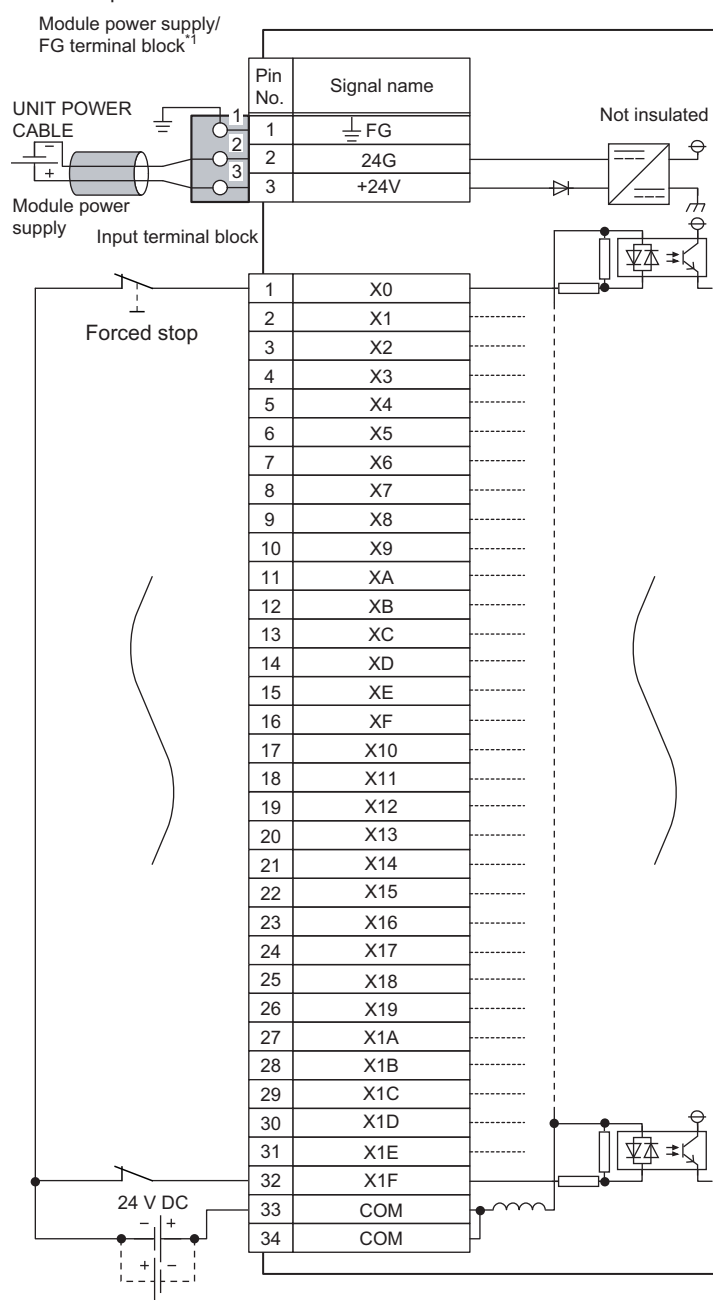
2.3 External Circuit Design

Forced stop circuit

A wiring example which uses a remote input module (NZ2GN2B1-32D) for the forced stop input is shown below. Set AxisName.Pr.ForcedStop_Signal according to the input modules.



<Remote input module NZ2GN2B1-32D>



*1 Only one wire can be connected to a terminal of the terminal block for module power supply and FG. Multiple wires cannot be connected to a terminal. Connecting two or more wires may cause a poor contact.

It is also possible to use the forced stop signal of the drive unit. Operation status of the emergency stop, drive unit forced stop and the Motion controller forced stop are as follows.

Item	Operation when the signal is turned on	Remarks
Emergency stop	Servo OFF	The power supply of the drive unit is shut off by external circuit, and the servomotor stops.
Drive unit forced stop		A stop command from the external circuit to the drive unit is output, and the drive unit stops the servomotor.
Motion controller forced stop		A stop command from the remote input module to the drive unit is output, and the drive unit stops the servomotor.

Shut-off the main circuit power supply of a drive unit when an emergency stop, alarm, servo amplifier forced stop, or remote input module forced stop occurs. Make sure to use molded-case circuit breakers (MCCB) for input wires of a drive unit power supply. For details, refer to the drive unit manual.

3 FUNCTION LIST

There are restrictions in the function that can be used by the software of the Motion module and the version of engineering tool. Refer to the following for details.

 MELSEC iQ-R Motion Module User's Manual (Application)

3.1 Control Functions

The Motion module has several functions. Refer to the following for details on each function.

 MELSEC iQ-R Motion Module User's Manual (Application)

Basic specifications

Functions		Details
Axis control function	Technical units	The position command unit and the velocity command unit used in the motion control can be set. Since the unit can be specified freely depending on the control target, intuitive programming and monitoring are available.
	Servo ON/OFF	This function executes servo ON/OFF of the real axis connected to the Motion module. The servo ON enables the operation of the real axis.
	Follow up	In an axis which has the current position (Position actual value) as the slave object, this function can convert the unit of the current position by the driver unit conversion numerator/denominator (electronic gear) and reflect in the set position.
	Absolute position control	Restores the current position of an axis.
Basic functions	Operation cycle	In the Motion module, operation processing related to the motion control is performed in the fixed cycle (operation cycle).
	Add-on function	The Motion module functions can be expanded by installing add-on libraries.
	System memory settings	Sets the memory size used in the add-on library in the system memory (RAM) and the system memory (backup RAM).
	Software reboot	The software reboot (reset the system) is executed by writing the reboot command to the control command. When "Clear" is specified at the software reboot command, the system restarts and all data of the system is deleted.

Motion control 1

Functions			Details
Start and stop	Start		Starts motion control.
	Retrigger/continuous update		Changes the control of the on-going FB with a retrigger/continuous update.
	Multiple start (buffer mode)		Multiple motion control FBs execute continuously without stopping by executing the motion FB of another instance to the axis and the axes group that are executing MCFB.
	Stop		Stops motion control.
	Forced stop		Stops axes by the forced stop signal.
Homing	Homing request		Establishes the start point for carrying out positioning control (home position), and carries out positioning toward that start point. This is used to return a machine system, located at a position other than the home position when the Motion module requires "homing request" such as when the power is turned ON or after positioning stop, to the home position.
	Driver homing method		
	Data set homing method		
	Operation setting for incompletion of homing		Selects whether the axis starts or not, when the homing request is TRUE.
Axis control function	Single axis positioning control		Executes positioning to the specified position by using address information.
	Single axis speed control		Executes the speed control for the specified axis with the specified speed.
	Single axis manual control		Executes the random positioning operation by inputting a signal from an external device. The following method is available. • JOG operation: the machine is moved by only an movement amount.
	Multiple axes positioning control		Uses address information and executes positioning to the specified position using interpolation control.
Direct control	Velocity control		The driver control mode is switched to csv, and the control excluding the position loop is executed.
	Torque control		The driver control mode is switched to cst, and the control is carried out.
Functions related to position	Current position change function		Changes the set position to an arbitrary address.
	Command in-position		Checks the remaining distance to the target position, and turns the command in-position flag to TRUE.
	Software stroke limit		An address is set as the movable range. Even if a movement command to the address outside the setting range is issued, the command will not be executed.
	Hardware stroke limit		Limit switches are set at the upper/lower limit of the physical movable range, and the control is stopped by the input of a signal from the limit switch.
Functions related to speed	Acceleration/deceleration processing function		Adjusts the acceleration/deceleration of each motion control to the acceleration/deceleration curve suitable for device.
	Speed limit		Limits the command speed to a value within the speed limit value setting range when the command speed during control exceeds the speed limit value.
	Override function		Changes the speed during control.
Functions related to torque	Torque limit		Limits the generated torque to a value within the torque limit value range when the torque generated in the servomotor exceeds the torque limit value.
	Torque limit value change function		Changes the torque limit value during control.
Sub functions of control	Compensation function	Driver unit conversion function	Converts the cumulative current position to the driver command value and pass it to the target position (Target Position). Also, it converts the current position of the driver and calculates the actual position.
		Command filter	
	Command filter	Direction limit filter	Limits a direction of an axis.
		Speed limit filter	Limits a speed of axis.
		Backlash compensation filter	Compensates amont of mechanical backlash (play).
	Input variable change in execution		Changes input variables during control.
Common functions	External signal selection		Sets I/O signals to be used in various control.
	Touch probe		Records (latches) arbitrary data at trigger input signal detection.
	Slave emulate		Carries out axis control on the real axis without connecting the slave station.

Motion control 2

Functions		Details
Operation profile data function	Operation profile data	Opens the profile for the cam and reads/writes the cam.
Synchronous control	Cam operation	Operates by synchronizing the slave axis with the master axis based on cam table.
	Gear operation	Sets the speed ratio between the master axis and the slave axis, and starts gear operation.
	Addition/subtraction positioning	Combines the movement amount of 2 axes and transmits.

Control/Operation/Maintenance

Functions			Details
Logging	Data logging function		Collects the Motion module data at a specified interval based on the logging setting (trigger condition or data collection condition) written by the engineering tool and save the result to the data logging file.
	Real-time monitor		Sets the data collection and monitor the collected data (waveform display) in real time in the status where the engineering tool has been connected with the Motion module.
	Application function	Event detection	When File save setting is set to "Disabled" in the logging setting, only the trigger detection is executed without saving files.
		Auto logging	When inserting an SD memory card, which holds logging setting, into the Motion module, the data logging automatically starts based on the logging setting information on the SD memory card.
RAS functions	Execution time monitor		Monitors the operation cycle processing and the normal task execution time.
	History data	Event history function	Saves the data such as the error detected by the Motion module, the operation executed to the module, and the event related to the motion control of start and stop as even history.
		Position data history	The position data history of each axis can be monitored by the engineering tool.
File control	File transfer function		Executes file operation based on the specified command.
	Parameter read/write function		Parameters can be read or written.
Module software install			When updating or changing to the new software, users have to install the software again.

3.2 List of Network Function

The following table lists the functions of CC-Link IE TSN. For details on the functions, refer to the following.

📖 MELSEC iQ-R Motion Module User's Manual (Network)

Cyclic transmission

Data are periodically exchanged among stations on the network using slave label.

Function	Description
Communications using slave label	Regularly communicates data between the stations on the same network by using the slave label of the Motion module.
PDO communication	Periodically communicates with the slave device.

Transient transmission

Uses for communications at arbitrary timing.

Function	Description
SLMP communication	Reads/writes data from/in the device memory of the self-station or another station CPU module on the CC-Link IE and the buffer memory of the intelligent function module, via Ethernet from the upper system.

Ethernet connection

This function connects an Ethernet device to a module without interfering with CC-Link IE TSN.

Function	Description
Connection with MELSOFT products and a GOT	Allows programming and monitoring of the CPU module using the engineering tool, and monitoring and testing of the CPU module from the GOT via Ethernet.
Connection with SLMP-compatible devices	Connects SLMP-compatible devices (personal computer or a vision sensor, etc.) to RD78G(H).

Security

This function ensures optimal security according to the network environment by restricting access for each communication path to the CPU module.

Function	Description
Remote password	Prevents illegal access of the CPU module from a remote location for each function.
IP filter	Identifies the IP address of the access source to limit access to the Motion module.

RAS

This function improves Reliability, Availability, and Serviceability and makes automated equipments easy to use comprehensively.

Function	Description
Slave station disconnection	In star topology, the data link of the slave station where an error occurred is stopped, and data link continues only for slave stations that are operating normally.
Station type duplication, IP address duplication detection	Detects master station duplication and IP address duplication.
Time synchronization	Automatically sets the time of the CPU module and the remote device by IEEE1588 or IEEE802.1AS synchronization.

Troubleshooting

This function shows the status of the module and network by executing diagnostics and operation tests using the engineering tool.

Function	Description
CC-Link IE TSN/CC-Link IE Field diagnostics	Monitors the CC-Link IE TSN status. The network maps, stations where data link is not operating, selected station communications status monitor and so on are displayed on the engineering tool.
Communication test	Checks if transient transmission data can be properly routed from the own station to the communication target.

Others

Function	Description
Network synchronous communication (Motion control station)	The control cycle of the slave station can be synchronized according to the communication cycle specified in the master station.
Automatic detection of connected devices (iQSS)	Reflects the installation status of network configuration in the network configuration setting of the master station on engineering tool. At startup of the system, it supports the network configuration setting of the master station when slave stations are added.
Slave station parameter automatic setting	Parameters of the slave station on CC-Link IE TSN set using the engineering tool are written in the data memory of the CPU module or the SD memory card, and those are automatically set via the master station when the slave station is returned/replaced by power ON or connected.
Label access to the remote device	To slave stations on the network, it allows labels and FBs are used like the proximity module.
Searching CPU modules on the network	Searches Ethernet function installed modules that are connected with the same hub as the engineering tool, and it displays the list of the search result.

4 PROCEDURES BEFORE OPERATIONS

This chapter describes the procedures before operation of RD78G(H).

1. Mounting the module

Mount the Motion module to the main base unit or extension base unit.

For details, refer to the following.

 MELSEC iQ-R Module Configuration Manual

2. Wiring

Connect the Motion module to external devices.

3. Adding the module

Add the RD78G(H) to the module map of the project using an engineering tool.

4. Network construction

Set network parameters in "Module Parameter (Network)" of the engineering tool.

- Set the communication cycle setting for Network Configuration Settings.

Set the basic communication cycle according to the number of controlled axes or network device configuration. For a reference of the cycle, refer to the following manual for operation cycle.

 MELSEC iQ-R Motion Module User's Manual (Application)

- Set a slave station for Network Configuration Settings.

The slave station controlled in the Motion module needs to be set in the motion control station. Also, when setting in the motion control station, set the basic cycle for the communication cycle.

For details, refer to the following.

 MELSEC iQ-R Motion Module User's Manual (Network)

5. Module setting (module extended parameter)

Configure the setting related to axis control in "Module Extended Parameter" of the engineering tool.

For details, refer to the following.

 MELSEC iQ-R Motion Module User's Manual (Application)

6. Auto refresh setting

Set the link refresh settings in "Basic Settings" of Module Parameter (Network).

For details, refer to the following.

 MELSEC iQ-R Motion Module User's Manual (Network)

7. Programming

Create programs.

For details, refer to the following.

 MELSEC iQ-R Motion Module User's Manual (Application)

8. Writing parameters

Write the set parameters and programs to the Motion module.

- "Motion Module (internal memory)" or "Motion Module (SD memory card)" can be selected as a storage location for module extended parameters. The initial setting is "Motion Module (internal memory)". When writing module extended parameters, specify the same storage location in the writing destination of the engineering tool as "Module extended parameter storage location setting" in "Module operation setting" of Module Parameter (Motion).

For details, refer to the following.

 MELSEC iQ-R Motion Module User's Manual (Application)

9. Network diagnostics

Using network diagnostics, check if the cables are connected properly and communication are performed normally with the parameters.

For details, refer to the following.

 MELSEC iQ-R Motion Module User's Manual (Network)

10. Parameter settings in slave devices

Set parameters of the drive unit to use.

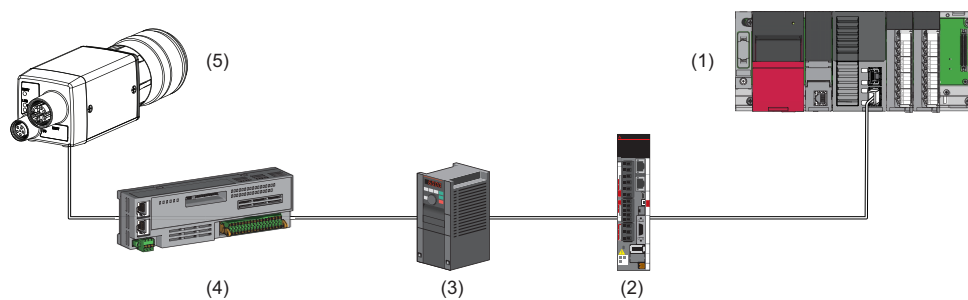
For details, refer to each drive unit manual.

11. Test operation

Check that the program is correctly carried out as created

5 SYSTEM CONFIGURATION

CC-Link IE TSN is configured using Ethernet cables. (☞ Page 43 Ethernet cable)



- (1) Motion module
- (2) Drive unit
- (3) Inverter device
- (4) Remote I/O module
- (5) Ethernet device

5

Point

[RD78GH]

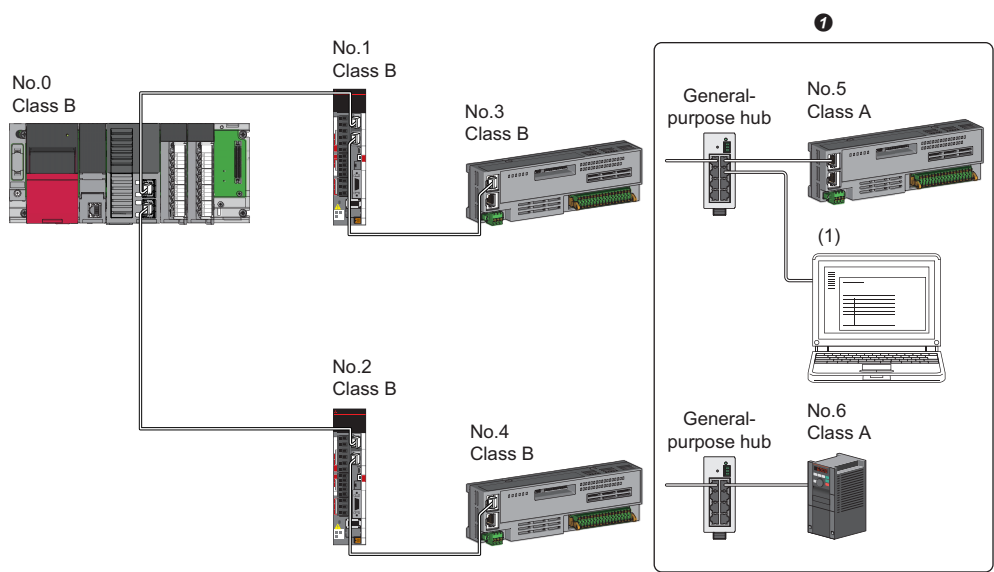
Both P1 and P2 can be used. When only one port is used, either P1 or P2 can be connected.

Authentication Class setting

From "Connection Device Information" under "Basic Settings" of the engineering tool, select either of the following items according to devices to be connected.

Connected device information	System configuration	Hub
Authentication Class B Only	Select this if the system is to be configured without connecting the authentication Class A device. ☞ Page 33 Connection with modules on CC-Link IE TSN only ☞ Page 34 Connection with modules on CC-Link IE TSN and Ethernet devices	TSN hub (authentication Class B hub)
Mixture of Authentication Class B/A or Authentication Class A Only	Select this if the authentication Class A device or Ethernet device is connected to the configuration of an authentication Class B device only. (☞ Page 36 Connection with modules on CC-Link IE TSN and Ethernet devices)	General-purpose hub (authentication Class A hub)

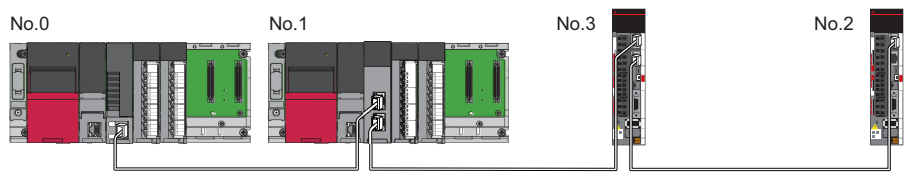
When "Connection Device Information" is set to "Mixture of Authentication Class B/A or Authentication Class A Only", line topology can be used with the structure with the authentication Class B device only as shown below. To implement this setting, select this when connecting the authentication Class A device and Ethernet device after connecting a general-purpose hub to the end of the network of the authentication Class B device only.



No.0: Master station
No.1, No.2, No.3, No.4, No.5, No.6: Slave station
(1) Ethernet device
① When the authentication Class A device or Ethernet device is connected

Point

Modules can be connected in any order regardless of the station number. No. □ shown in the following figure represents station No..



5.1 Structure of Authentication Class B Devices and Ethernet Devices

Set "Connection Device Information" under "Basic Settings" to "Authentication Class B Only" in the engineering tool.

Restriction

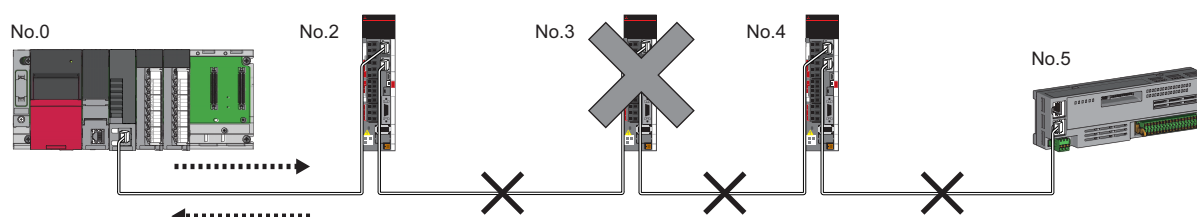
Use a TSN hub. A slave station connected to a hub other than the TSN hub does not perform data link.
([Page 43 Hub](#))

Connection with modules on CC-Link IE TSN only

Line topology

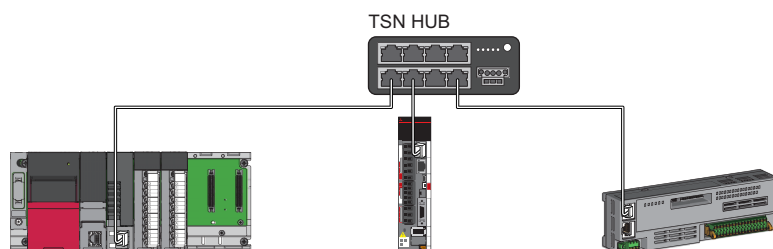
The network is configured in a line topology. A TSN hub is not required.

When an error occurs in a slave station, the stations connected after the faulty station will be disconnected. No. □ shown in the following figure represents a station No..



Star topology

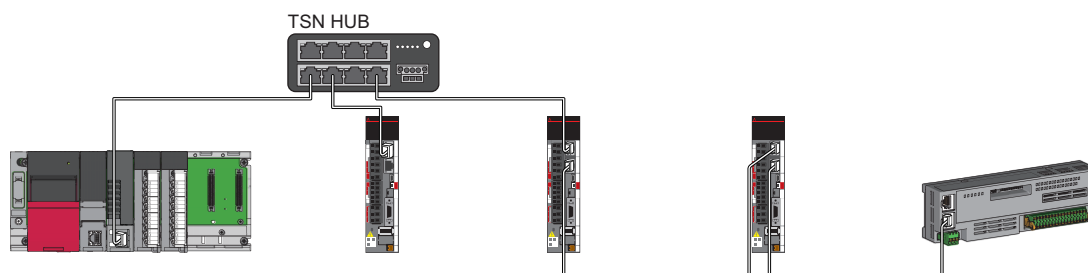
The network is configured in a star topology via a TSN hub. This allows devices to be added easily.



Even when an error occurs in a slave station, a data link can be continued with the stations that are operating normally.

Coexistence of line and star topologies

Line and star topologies are mixed.

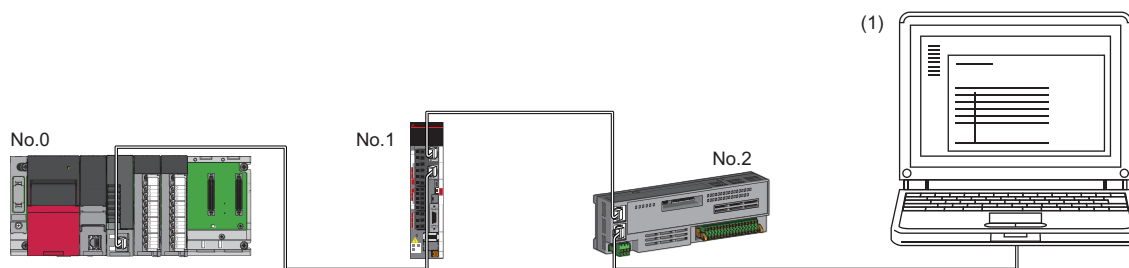


Connection with modules on CC-Link IE TSN and Ethernet devices

■Line topology

The network with modules and devices is configured in a line topology. A TSN hub is not required.

Connect an Ethernet device to the end of the network.



No.0: Master station

No.1, No.2: Remote station

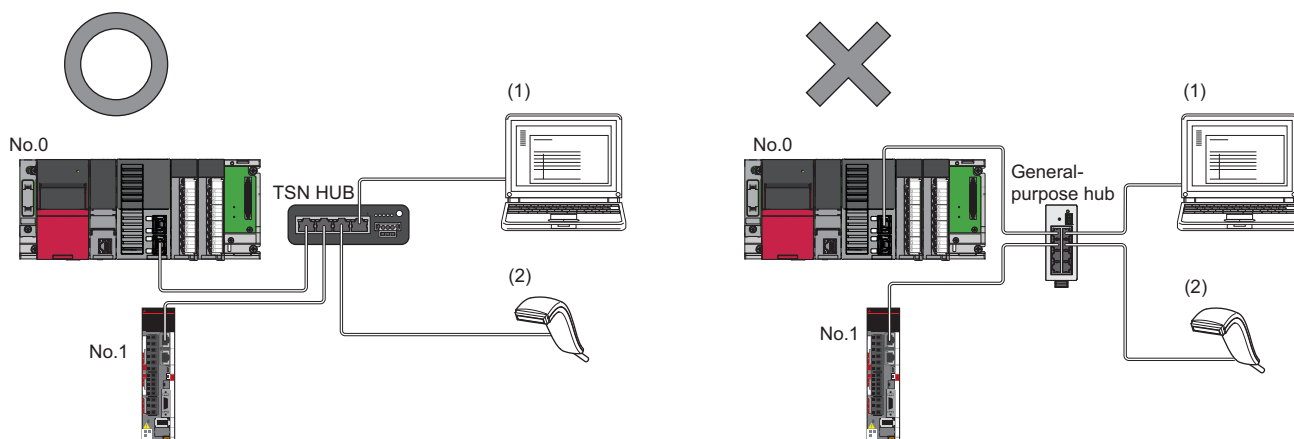
(1) Ethernet device (such as a personal computer)

When an error occurs in a slave station, the stations connected after the faulty station will be disconnected.

■Star topology

Modules or devices are connected in a star topology via a hub.

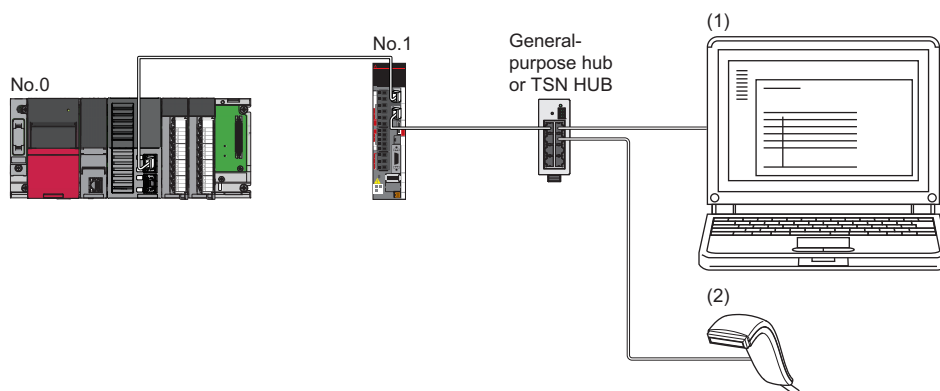
- Because cyclic data is sent to an Ethernet device when the local station is used with an Ethernet device on the end side via a hub, communication may not be possible depending on the type of an Ethernet device.



■ Coexistence of line and star topologies

Line and star topologies can be mixed in the same network configuration.

Connect Ethernet devices to the end of the network.



No.0: Master station
No.1: Remote station
(1), (2): Ethernet device

5.2 Structure of Authentication Class B/A Devices and Ethernet Devices

Set "Connection Device Information" under "Basic Settings" to "Mixture of Authentication Class B/A" or "Authentication Class A Only" in the engineering tool.

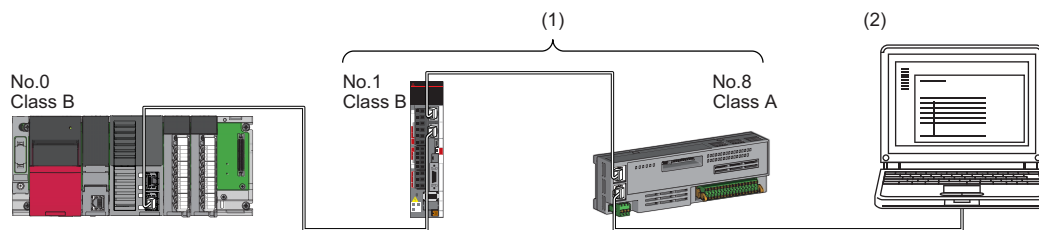
Connection with modules on CC-Link IE TSN and Ethernet devices

■Line topology

The network with modules and devices is configured in a line topology. A general-purpose hub is not required.

Up to eight modules on CC-Link IE TSN can be connected to Ethernet port of the master station at the position indicated with (1).

Connect an Ethernet device at the end.



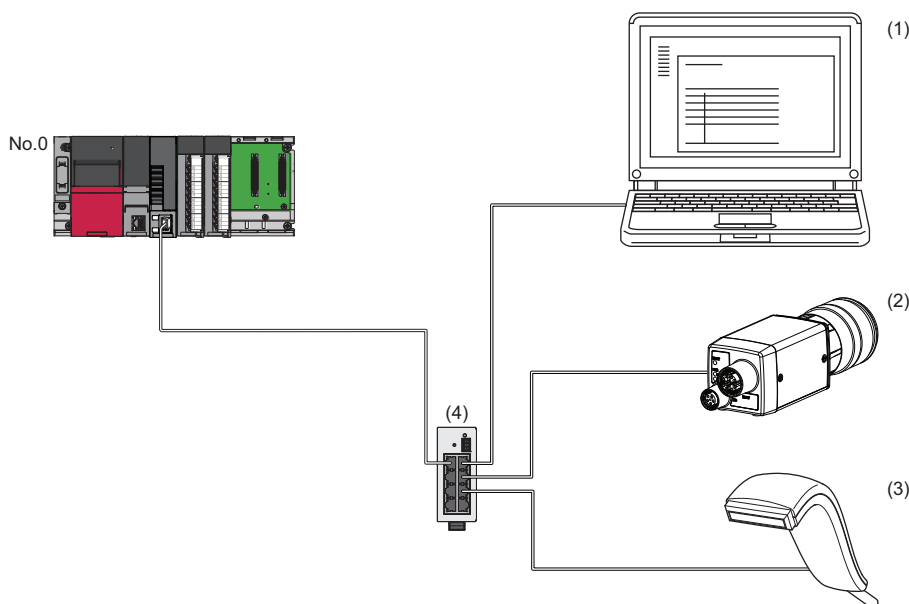
No.0: Master station
 No.1: Remote station (1st module)
 No.8: Remote station (8th module)
 (2) Ethernet device
 Class A: Authentication Class A device
 Class B: Authentication Class B device

■Star topology

Modules or devices are connected in a star topology via a general-purpose hub. This allows devices to be added easily. When connecting an Ethernet device with a communication speed of 100Mbps to the network, a general-purpose hub is required.

[RD78GH]

A general-purpose hub can be connected to P1 or P2 of the master station respectively.



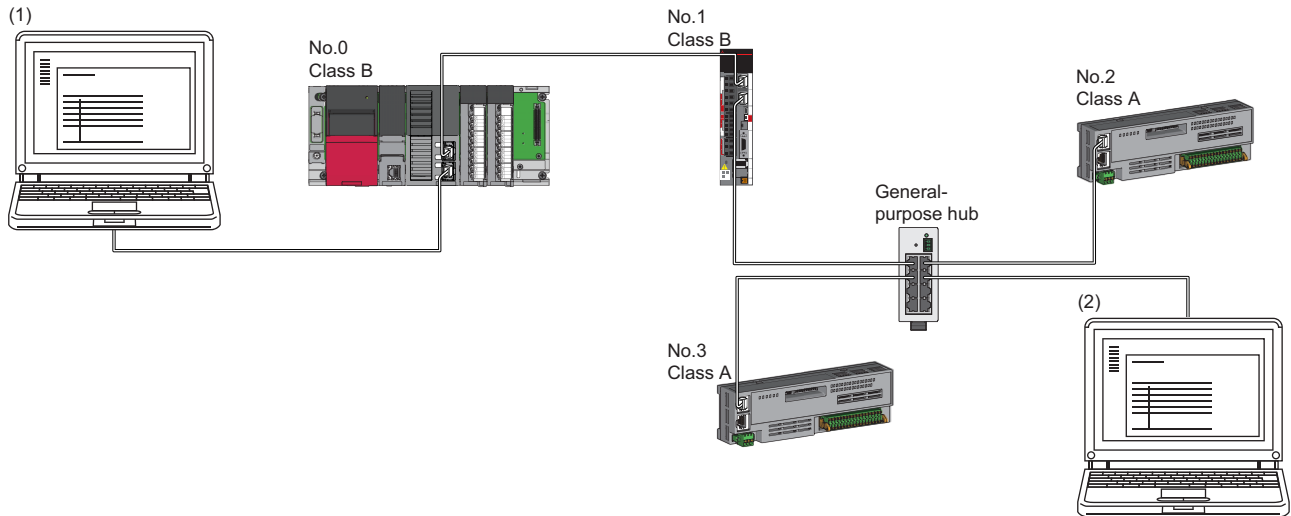
No. □ represents station No..
 No.0: Module on CC-Link IE TSN (Master station)
 (1), (2), (3) Ethernet device (such as a personal computer, vision sensor, or bar code reader)
 (4) General-purpose hub (NZ2EHG-T8(N) or DT135TX)

Even when an error occurs in a slave station, a data link can be continued with the stations that are operating normally.

■Coexistence of line and star topologies

Line and star topologies can be mixed according to the availability of each connection.

- Connect Ethernet devices at the end.
- When connecting the Ethernet device in a star topology, connect the Ethernet device to the general-purpose hub.



No.0: Master station
No.1, No.2, No.3: Remote station
(1), (2): Ethernet device
Class A: Authentication Class A device
Class B: Authentication Class B device

5.3 Precautions for System Configuration

Devices connected to the same network

Do not connect the devices as described below. Doing so may cause the disconnection of all stations.

- The devices having network types other than CC-Link IE TSN and Ethernet (such as CC-Link IE Controller Network and CC-Link IE Field Network) are connected to the same network line.
- The modules on CC-Link IE TSN and Ethernet devices (such as personal computers), both of which are on different networks, are connected to one hub.

Adding more than the maximum number of connectable slave stations

If more than the maximum number of connectable slave stations are already connected and further slave stations are added, data link will not be performed in the added 65th and subsequent slave stations, but the other stations will continue data link. Even if the disconnected stations are returned to a system having more than the maximum number of connectable slave stations, the stations may not start data link.

Point

- Whether more than the maximum number of connectable slave stations are connected can be checked using 'Number of connected modules over occurrence status' (SB0099). Number of connected modules detected by 'Number of connected modules over occurrence status' (SB0099) is the total of the slave stations that are currently connected and the disconnected stations (slave stations that were previously connected).
- The number of stations that were previously connected can be cleared by executing the network map update of the CC-Link IE TSN/CC-Link IE Field diagnostics. ( MELSEC iQ-R Motion Module User's Manual (Network))
- A data link error may momentarily occur in all the stations and outputs of the connected slave stations may turn off since all stations on the network will be reconnected when executing the network map update. Ensure that the output data is held, if necessary.

Station number of the slave station to be added

Do not duplicate station numbers. Data link may be stopped when the station number is duplicated.

Adding a slave station with no IP address setting

In line topology, do not connect the slave station with no IP address setting at a place other than the end of the line. Data link may not be performed in the slave stations after the slave station with no IP address setting.

CC-Link IE TSN/CC-Link IE Field diagnostics

If operations such as the following are performed, the actual network configuration and the network map of the CC-Link IE TSN/CC-Link IE Field diagnostics may be a mismatch.

Network configuration	Operation
Star topology	• Powering off and on a slave station or hub • Connecting/disconnecting an Ethernet cable connected to the hub • Disconnecting an Ethernet cable from a slave station and connecting it to another slave station or a hub • Disconnecting more than nine stations, or half the number of slave stations or more in the system • Changing the network topology when adding a slave station
Line topology	• Simultaneously powering off/on multiple stations • Simultaneously connecting/disconnecting Ethernet cables to/from multiple stations (When a data link faulty station returns, a data link error will occur in all the stations.) • Disconnecting more than nine stations, or half the number of slave stations or more in the system • Changing the network topology when adding a slave station

Point

The actual network configuration and network map can be matched by executing the network map update of the CC-Link IE TSN/CC-Link IE Field diagnostics. ( MELSEC iQ-R Motion Module User's Manual (Network))

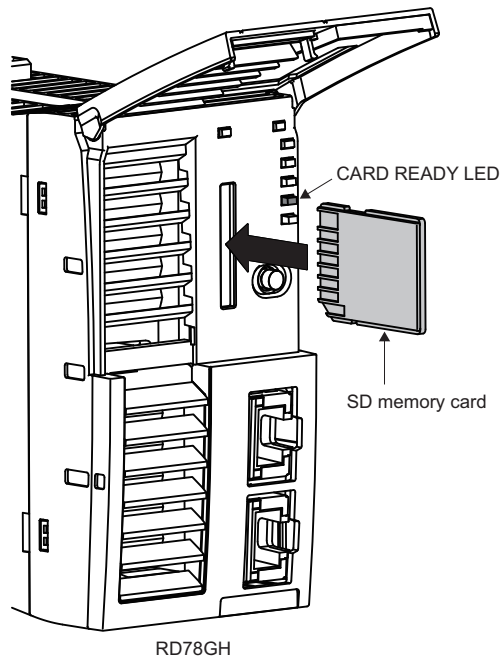
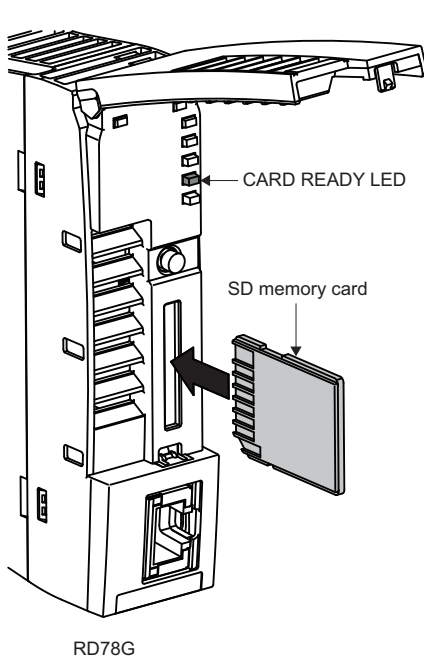
6 INSTALLATION AND WIRING

6.1 Installation and Removal of SD Memory Card

This section describes the methods for installation of an SD memory card to the Motion module, and removal.

Installation of SD memory card

- When installing an SD memory card to the Motion module, take note of the SD memory card position, and install using the following procedure.
1. With the notch facing downwards, insert the SD memory card straight into the slot. After inserting check the SD memory card is inserted all the way in. If the SD memory card is not inserted properly, insufficient contact may cause an operation failure.
 2. The CARD READY LED flickers until the SD memory card can be used. When the CARD READY LED is ON, the SD memory card can be used.
 3. If the CARD READY LED does not turn on after installing an SD memory card, check that `System.Cd.Storage_sdcForcedDisable` and `System.Md.Storage_sdcForcedDisabled` are FALSE.



- Installation of an SD memory card is registered with the event history (type: operation).



When installing an SD memory card, the operation of SD memory card access control switch is not required.

Removal of the SD memory card

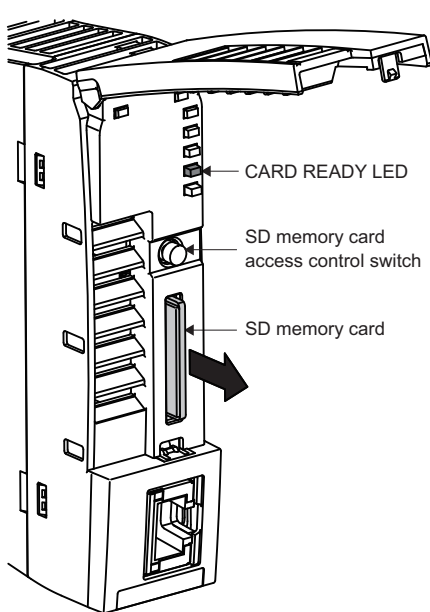
- When removing an SD memory card from the Motion module, remove the SD memory card using the following procedure.

1. Carry out one of the following to stop access of the SD memory card.

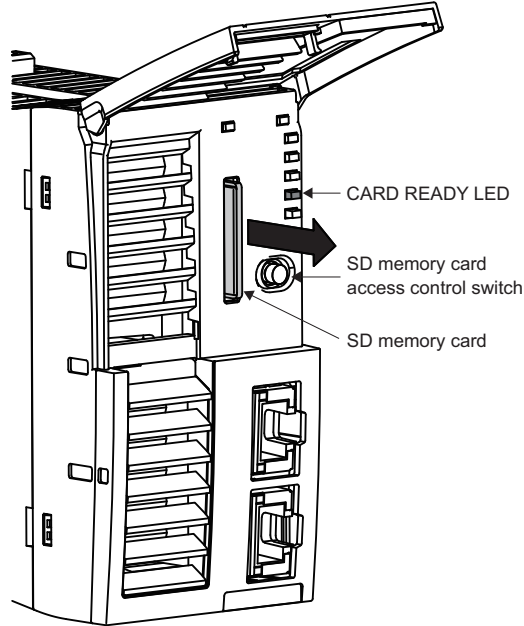
- Hold the SD memory card access control switch for longer than 1s.
- Set System.Cd.Storage_sdcForcedDisable to TRUE.

2. During the process of stopping access to the SD memory card, the CARD READY LED flickers, then turns OFF when the process is complete. Before removing, be sure to confirm that the CARD READY LED turns OFF.

3. After pushing in the SD memory card once, pull the SD memory card out straight.



RD78G



RD78GH

- When System.Cd.Storage_sdcRemovalProhibit is TRUE, removal using the SD memory card access control switch is ignored. To remove an SD memory card while System.Cd.Storage_sdcRemovalProhibit is TRUE, set System.Cd.Storage_sdcForcedDisable to TRUE. Then, System.Cd.Storage_sdcRemovalProhibit turns FALSE in the system and the SD memory card can be removed.
- Removal of an SD memory card is registered with the event history (type: operation).

Point

- Do not remove an SD memory card while the CARD READY LED is not turned OFF. Doing so may damage the data on the SD memory card.
- Even while the SD memory card is accessed (CARD ACCESS LED is ON), holding the SD memory card access control switch for longer than 1s operates the SD memory card forced disable function, and the SD memory card can be stopped access (removal enabled).

Release of the SD memory card forced disable state

The SD memory card forced disable state can be released by turning System.Cd.Storage_sdcForcedDisable from TRUE to FALSE. Also, either of the following operation automatically sets System.Cd.Storage_sdcForcedDisable to FALSE and the SD memory card is enabled.

Operation

Install the SD memory card again. (The CARD READY LED turns from flashing to ON.)

Turn ON the power of the Motion module again or carry out reset operation.

6.2 Wiring

This section describes wiring for when CC-Link IE TSN is used.

Wiring methods

The following describes connection and disconnection of the Ethernet cable.

■Connecting the cable

1. Push the Ethernet cable connector into the Motion module until it clicks. Pay attention to the connector's direction.
2. Lightly pull it to check that it is securely connected.
3. Check whether the LINK LED of P1 or P2 of the Ethernet port connected with an Ethernet cable is on. For details about the LED display specifications, refer to the following.

➡ Page 18 LED Display Specifications

The time between the cable connection and the LINK LED turning on may vary. The LINK LED usually turns on in a few seconds. Note, however, that the time may be extended further if the link-up processing is repeated depending on the status of the device on the line. If the LINK LED does not turn on, refer to the following and take corrective actions.

📖 MELSEC iQ-R Motion Module User's Manual (Application)

■Disconnecting the cable

1. Press the latch down and unplug the Ethernet cable.

■Precautions

- Place the Ethernet cable in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- Do not touch the core of the cable-side or module-side connector, and protect it from dirt or dust. If oil from your hand, dirt or dust is attached to the core, it can increase transmission loss, arising a problem in a data link.
- Check that the Ethernet cable is not disconnected or not shorted and there is no problem with the connector connection.
- When connecting the Ethernet cable, refer to the CC-Link IE TSN Cable Installation Manual available from the website of CC-Link Partner Association (www.cc-link.org). The cable installation not following the contents of the manual may cause malfunction.
- Do not use Ethernet cables with broken latches. Doing so may cause the cable to unplug or malfunction.
- Hold the connector part when connecting and disconnecting the Ethernet cable. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- For connectors without Ethernet cables, attached connector covers should be placed to prevent foreign matter such as dirt or dust.
- The maximum station-to-station distance of the Ethernet cable is 100 m. However, the length may be shorter depending on the operating environment of the cable. For details, contact the manufacturer of the cable used.
- The bend radius of the Ethernet cable is limited. For details, check the specifications of the Ethernet cable to be used.
- In a line topology, do not connect the slave station with no IP address setting between the master station and slave stations, or between slave stations. A data link may not be performed in the slave stations connected from the slave station with no IP address setting onwards. However, if the slave station with no IP address setting is connected at the end of line topology, the slave stations between the master station and the slave station at the end perform a data link.
- Communication with the Ethernet device may not be possible depending on the specifications of the connected Ethernet device or hub. If communication is not possible, reduce the communication data volume of the Ethernet device.

Wiring products

The following describes the devices used for CC-Link IE TSN.

■Ethernet cable

Use the Ethernet cable that meets the following standards.

Communication speed	Ethernet cable	Connector	Standard
1Gbps	Category 5e or higher, straight cables (shielded, STP)	RJ45 connector	The following conditioning cables: • IEEE802.3 (1000BASE-T) • ANSI/TIA/EIA-568-B (Category 5e)

Cables for CC-Link IE TSN are available from Mitsubishi Electric System & Service Co., Ltd. (Catalogs for cable are also available.)

In addition, the connector processing of cable length is available for your preference. Please consult your local Mitsubishi representative.

Communication speed	Type	Model (Manufacturer)
1 Gbps	Category 5e or higher, straight cable (double shielded, STP)	SC-E5EW series (Mitsubishi Electric System & Service Co., Ltd.)

6

Point

The communication error can occur with the high-frequency noise from the device except CPU unit depending on the connecting environment. The following indicates the countermeasure of the Motion module side to prevent the effect of the high-frequency noise.

Wiring connection

- Use a duplex shield type cable.
- In wiring process, keep a distance with the main circuit lines or power cables.
- Ground the cables with clamping.

■Hub

Use the following industrial switching hub.

Term	Model	Manufacturer	Authentication
TSN hub	For details, refer to the CC-Link Partner Association website (www.cc-link.org).		Class B hub
General-purpose hub	NZ2EHG-T8N	Mitsubishi Electric Corporation	Class A hub
	NZ2EHG-T8 (out of production)	Mitsubishi Electric Corporation	
	DT135TX	Mitsubishi Electric System & Service Co., Ltd.	

A hub can be used for cascade connection.

When the hub is used for cascade connection, check the specifications of the hub used.

Precautions

Since there are different restrictions for system configuration using a TSN hub and system configuration using a general-purpose hub, setting with an engineering tool is required. (➡ 5 SYSTEM CONFIGURATION)

APPENDICES

Appendix 1 Component List

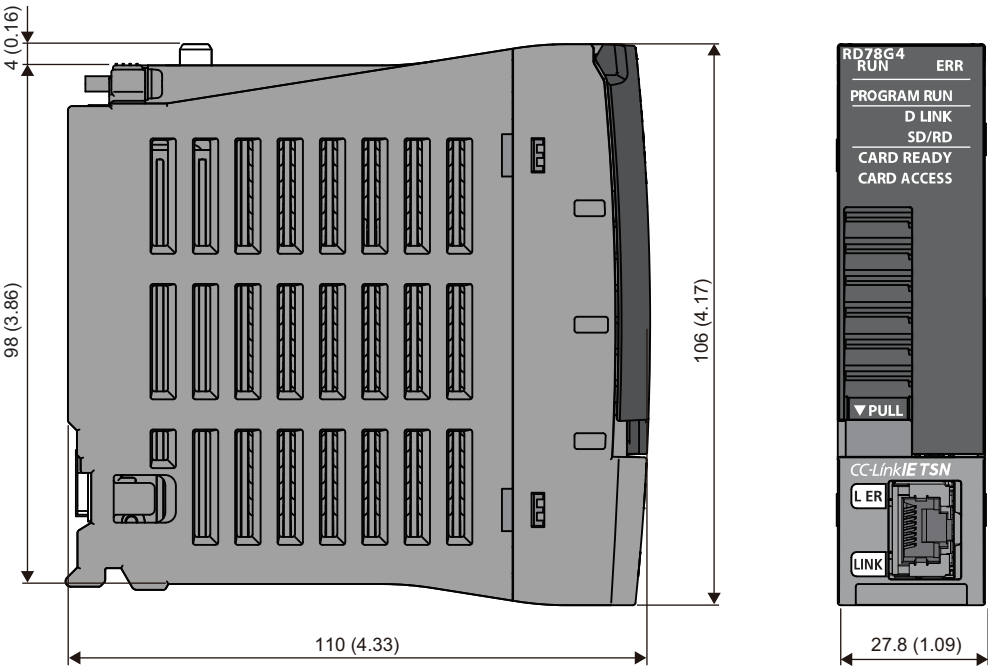
The positioning system using the Motion module is configured of the following devices.

No.	Part name	Type	Remarks
1	Motion module	RD78G4	
		RD78G8	
		RD78G16	
		RD78G32	
		RD78G64	
		RD78GHV	
		RD78GHW	
2	Drive unit	—	—
3	Slave device compatible with CC-Link IE TSN	—	—
4	CC-Link IE TSN Network cable	—	Cables are needed for connecting the Motion module with a drive unit/slave device compatible with CC-Link IE TSN, or between drive units/slave devices compatible with CC-Link IE TSN. (Page 43 Ethernet cable)
5	Ethernet HUB	—	Switching HUB are needed for connecting the Motion module, a drive unit, and other brand drive units in star topology. (Page 43 Hub)

Appendix 2 External Dimensions

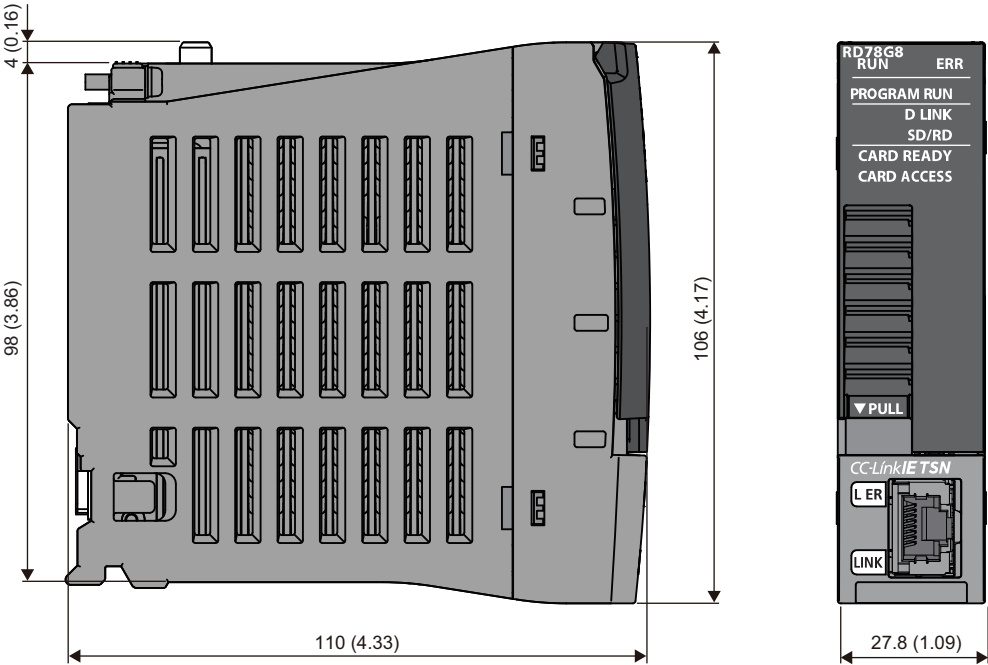
RD78G4

[Unit: mm (inch)]



RD78G8

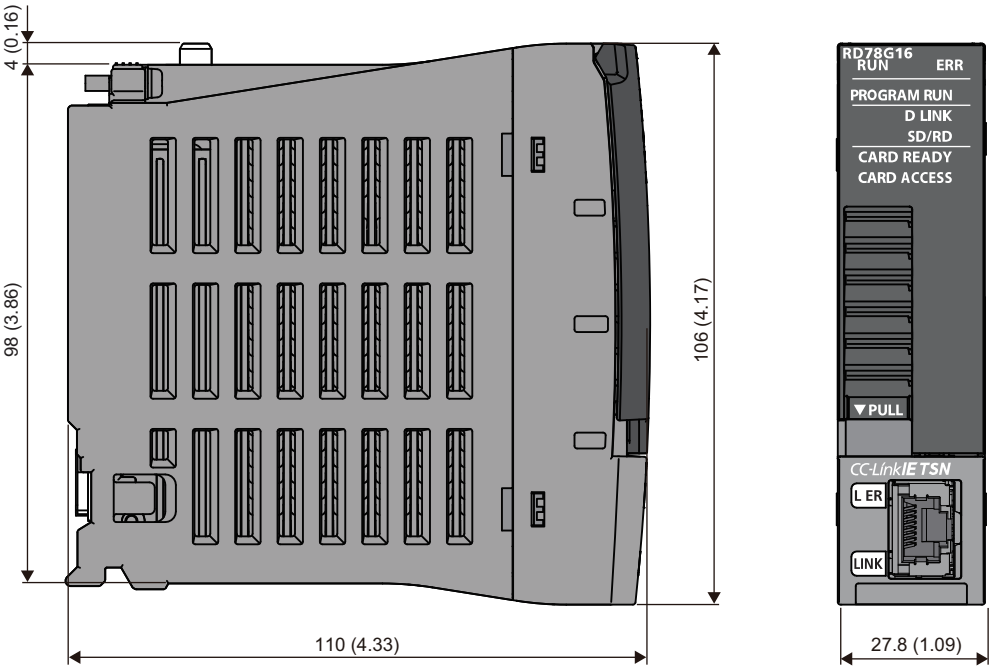
[Unit: mm (inch)]



A

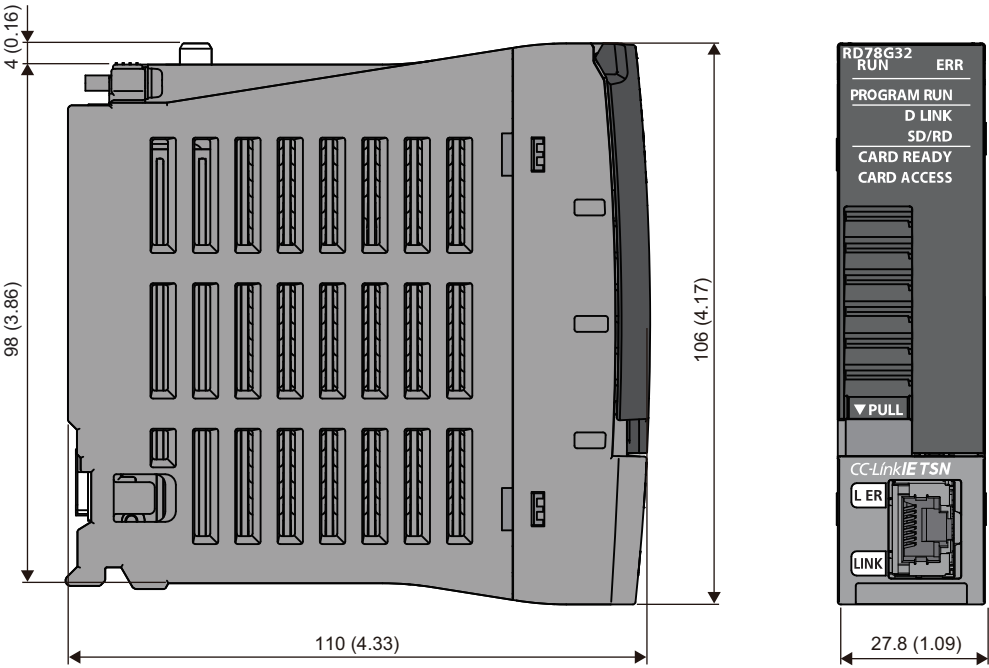
RD78G16

[Unit: mm (inch)]



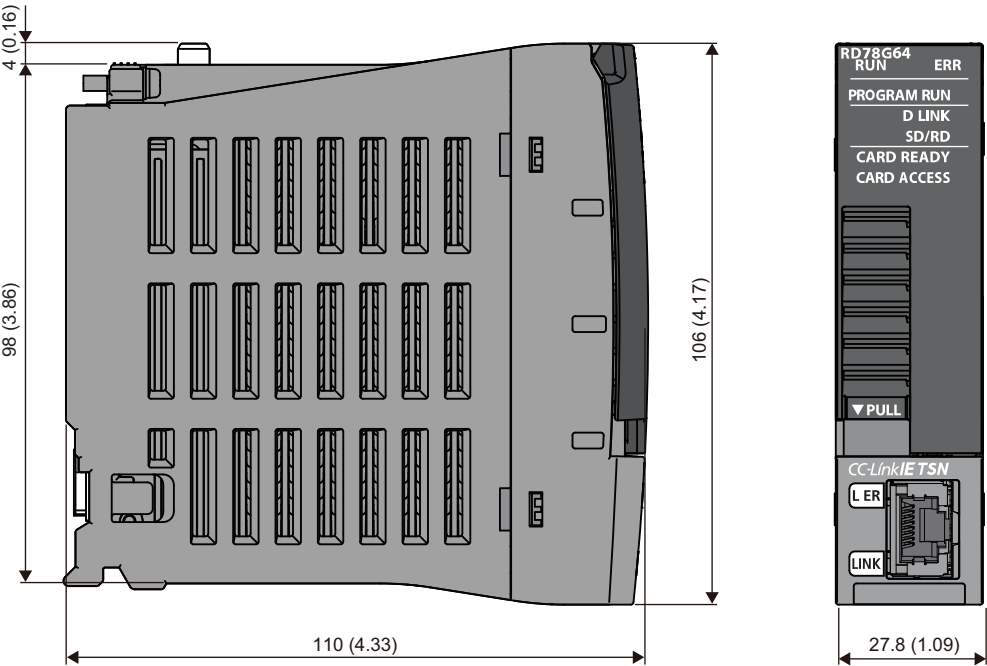
RD78G32

[Unit: mm (inch)]



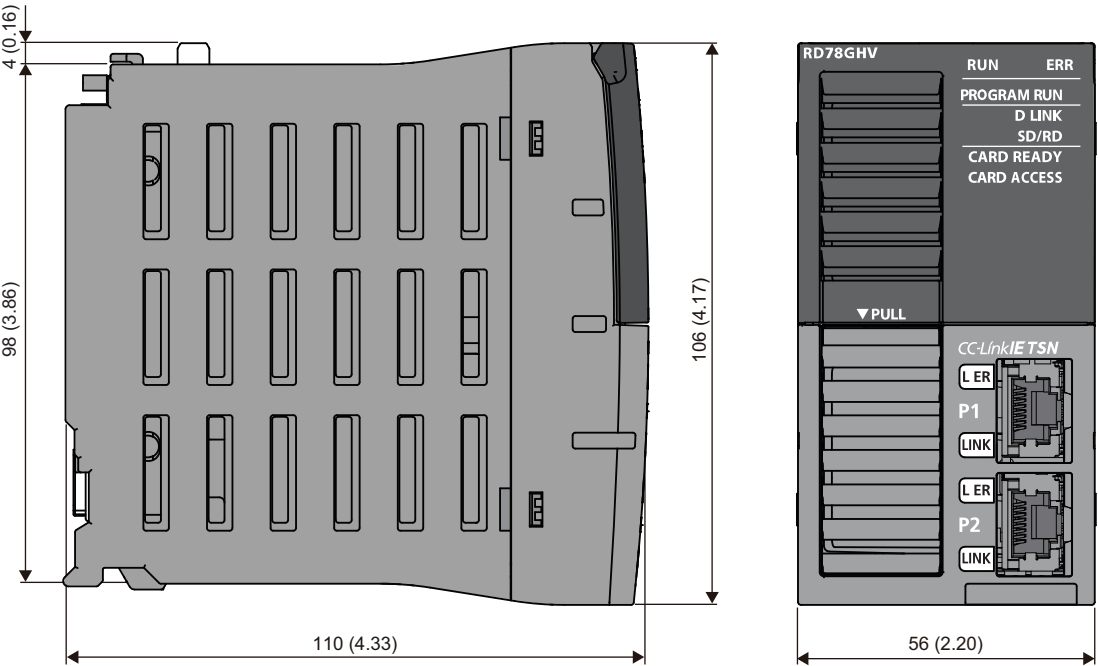
RD78G64

[Unit: mm (inch)]



RD78GHV

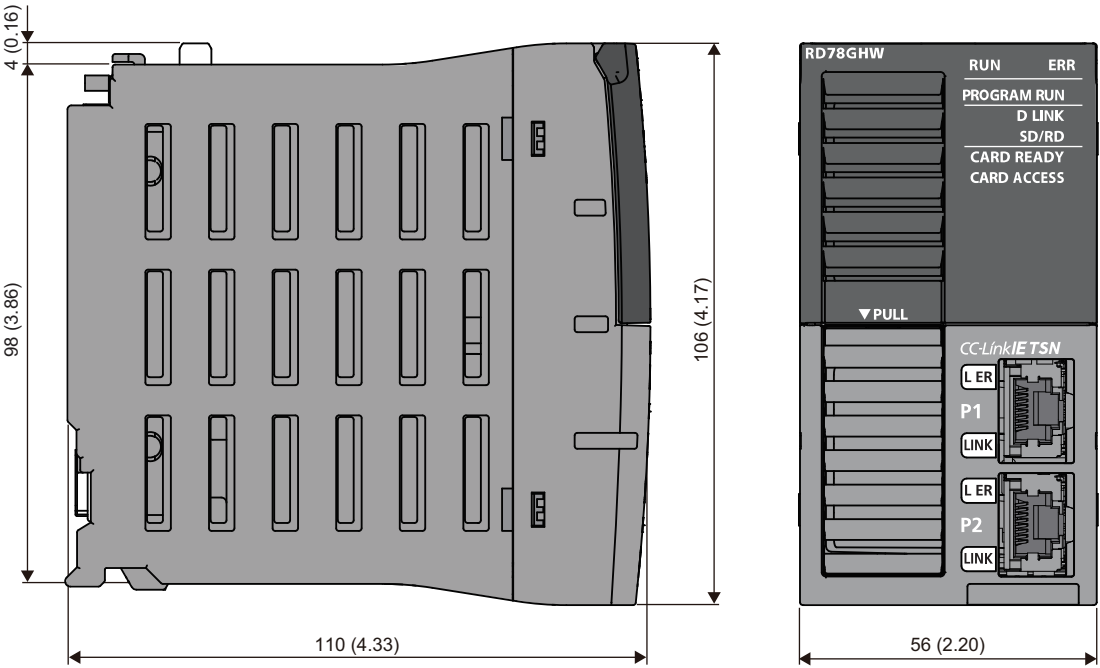
[Unit: mm (inch)]



A

RD78GHW

[Unit: mm (inch)]



Appendix 3 Open Source Software

The software of the Motion module includes the following open software.

- Distributed software as a free software in which copyright of a third party exists.

Software which Mitsubishi Electric Corporation or a third party hold copyright cannot be subjected to a distribution of the source cord.

Besides, please refrain inquiry as to the source cord of the open source.

RapidJSON

RapidJSON distributed by MIT license is used on this product. Copyright notice and license notice of RapidJSON are included below.

Tencent is pleased to support the open source community by making RapidJSON available.

Copyright (C) 2015 THL A29 Limited, a Tencent company, and Milo Yip. All rights reserved.

If you have downloaded a copy of the RapidJSON binary from Tencent, please note that the RapidJSON binary is licensed under the MIT License.

If you have downloaded a copy of the RapidJSON source code from Tencent, please note that RapidJSON source code is licensed under the MIT License, except for the third-party components listed below which are subject to different license terms. Your integration of RapidJSON into your own projects may require compliance with the MIT License, as well as the other licenses applicable to the third-party components included within RapidJSON. To avoid the problematic JSON license in your own projects, it's sufficient to exclude the bin/jsonchecker/ directory, as it's the only code under the JSON license. A copy of the MIT License is included in this file.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

The Software shall be used for Good, not Evil.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

A

msinttypes

msinttypes distributed by BSD license is used on this product. Copyright notice and license notice of msinttypes are included below.

The msinttypes r29

Copyright (c) 2006-2013 Alexander Chemeris

All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- * Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- * Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- * Neither the name of copyright holder nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS ``AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS AND CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

C++ B-tree

C++ B-tree distributed by Apache License, Version 2.0 is used on this product. For copyright notice and license notice of Apache License, Version 2.0, refer to the following.

<http://www.apache.org/licenses/LICENSE-2.0>

INDEX

C

Coexistence of line and star topologies . . . 33,35,37
Communication speed 20

E

Ethernet cable 43

H

Hub 43

I

Internal current consumption (5 V DC). 19

L

LED 17
Line topology 33,34,36

M

Mass 19
Maximum number of link points per network. . . . 20
Maximum number of link points per station 20
Maximum number of networks 20

N

Number of occupied I/O points 19

P

P1 17
P2 17

S

Star topology 33,36

W

Wiring products. 43

REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
July 2019	IB(NA)-0300406ENG-A	First edition
January 2020	IB(NA)-0300406ENG-B	■Added models RD78GHV, RD78GHW ■Added or modified parts WHEN USING A HUB WITH CC-Link IE TSN, TERMS, GENERIC TERMS AND ABBREVIATIONS, FUTURE SUPPORT PLANNED, Chapter 1, 5, Section 1.1, 2.1, 2.2, 3.1, 3.2, 5.1, 5.2, 5.3, 6.2, INDEX, WARRANTY, TRADEMARKS

Japanese manual number: IB-0300405-B

This manual confers no industrial property rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

©2019 MITSUBISHI ELECTRIC CORPORATION

WARRANTY

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

[Term]

For terms of warranty, please contact your original place of purchase.

[Limitations]

(1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule.

It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.

(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;

1. a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
2. a failure caused by any alteration, etc. to the Product made on your side without our approval
3. a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
4. a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
5. any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
6. a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
7. a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
8. any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

- (1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
- (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
- (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
- (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

(1) For the use of our Motion module, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the Motion module, and a backup or fail-safe function should operate on an external system to the Motion module when any failure or malfunction occurs.

(2) Our Motion module is designed and manufactured as a general purpose product for use at general industries.

Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used

In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used. We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

TRADEMARKS

Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.

In some cases, trademark symbols such as TM or ® are not specified in this manual.

IB(NA)-0300406ENG-B(2001)MEE

MODEL: RD78-U-S-E

mitsubishi electric corporation

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN

When exported from Japan, this manual does not require application to the
Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.