

Personal Computer Embedded Type Servo System Controller

Motion Control Board User's Manual (Network)

-MR-EM441G



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.

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	<ul style="list-style-type: none">● Configure safety circuits external to the personal computer to ensure that the entire system operates safely even when a fault occurs in the external power supply, the personal computer or the Motion control board. Failure to do so may result in an accident due to an incorrect output or malfunction.<ul style="list-style-type: none">(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 Motion control board.(2) When the Motion control board detects an abnormal condition, it stops the operation and all outputs are:<ul style="list-style-type: none">• Held the parameter setting if the self-diagnostic function of the Motion control board 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 Motion control board cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the Motion control board.(4) Outputs may remain on or off, or the output status may become undefined 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 Motion control board 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.● Configure a circuit so that the external power supply is turned off first and then turned off the Motion control board or reboot the software. If the Motion control board is turned off first, an accident may occur due to an incorrect output or malfunction.
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[Design Precautions]

WARNING

- For the operating status of each station after a communication failure, refer to manuals for the network used. For the manuals, please consult your local Mitsubishi representative. Incorrect output or malfunction due to a communication failure may result in an accident.
 - When connecting an external device with a Motion control board to modify data of a running Motion control board, 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 Motion control board, 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 Motion control board is controlled by an external device, immediate action cannot be taken if a problem occurs in the Motion control board 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 Motion control board in case of a communication failure.
 - Do not write any data to the "system area" or "area for manufacturer setting" of the buffer memory in the Motion control board. Also, do not use any "use prohibited" signals as an output signal from the Motion control board to each module. Doing so may cause malfunction of the Motion control board system. For the "system area", "area for manufacturer setting", and the "use prohibited" signals, refer to the user's manual, this manual, and the relevant manuals 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. Incorrect output or malfunction due to a communication failure may result in an accident.
 - Configure safety circuits external to the personal computer to ensure that the entire system operates safely even when a fault occurs in the external power supply, the personal computer, or the Motion control board. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - (1) OPR (Original Point Return) is controlled by two kinds of data: an OPR direction and an OPR speed. Deceleration starts when the near-point dog signal turns on. If an incorrect OPR direction is set, motion control may continue without deceleration. To prevent machine damage caused by this, configure an interlock circuit external to the Motion control board.
 - (2) When the Motion control board detects an error, the motion slows down and stops or the motion suddenly stops. Set the parameter to meet the specifications of a positioning control system. In addition, set the OPR 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 Motion control board 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 Motion control board, module, and drive unit, and servo motor, make sure that the safety standards are satisfied.
 - Construct a safety circuit externally of the Motion control board, 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. Doing so may result in malfunction due to electromagnetic interference. Keep a distance of 100mm or more between those cables.
 - 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 Motion control board is powered on or the software is rebooted, the time taken to enter the system startup 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 Motion control board or reboot the software while the settings are being written. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so also may cause malfunction and failure of the Motion control board.
-

[Security Precautions]

WARNING

- To maintain the security (confidentiality, integrity, and availability) of the Motion control board and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.
-

[Installation Precautions]

WARNING

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

[Installation Precautions]

CAUTION

- Use the Motion control board in an environment that meets the general specifications in the Motion Control Board User's Manual (Motion Control). Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
 - Use board fixing screws and securely tighten the Motion control board. 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. For the specified torque range, refer to the attached manual for the personal computer.
 - Beware that the Motion control board and the heat sink could be very hot while power is on and immediately after power-off.
 - Do not directly touch any conductive parts and electronic components of the Motion control board or connector. Hold the front panel or edge of the print board. Doing so can cause malfunction or failure of the Motion control board.
 - Do not disassemble or modify the Motion control board. Doing so may cause failure, malfunction, injury, or a fire.
 - Before handling the Motion control board, 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 Motion control board to fail or malfunction.
 - Install the Motion control board to a personal computer which is compliant with PCI Express® standard. Failure to do so may cause a failure or malfunction.
 - Securely insert the Motion control board into the slot following the board installation instruction of the personal computer. Incorrect insertion of the Motion control board may cause malfunction, failure, or drop of the board.
 - When installing the Motion control board, take care not to contact with other boards.
 - When installing the Motion control board, take care not to get injured by an implemented component or a surrounding member.
 - Handle the Motion control board in a place where static electricity will not be generated. Failure to do so may cause a failure or malfunction.
 - The Motion control board is included in an antistatic envelope. When storing or transporting it, be sure to put it in the antistatic envelope. Failure to do so may cause a failure or malfunction.
 - Do not drop or apply a strong impact to the Motion control board. Doing so may cause a failure or malfunction.
-

[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 damage to the Motion control board.
 - After installation and wiring, attach the cover of the equipment the Motion control board is installed to before turning it on for operation. Failure to do so may result in electric shock.
-

[Wiring Precautions]

CAUTION

- Individually ground the FG terminals, the controllers, servo amplifiers and servo motors embedded with a Motion control board with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction. Do not use a common grounding with other equipment.
- 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 Motion control board, 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 Motion control board. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Doing so may result in malfunction due to noise. Keep a distance of 100 mm or more between those cables.
- Place the wires and the cables to connect the Motion control board in a duct or clamp them. If not, dangling cables may swing or inadvertently be pulled, resulting in malfunction or damage to the Motion control board or cables.

In addition, the weight of the wires and the cables may put stress on the Motion control board in an environment of strong vibrations and shocks.

- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the Motion control board and the 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 the Motion control board, resulting in drop, short circuit, fire, or malfunction.
 - When disconnecting the cable from the Motion control board, do not pull the cable by the cable part. For the cable with the 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 Motion control board may result in malfunction or damage to the Motion control board or the cable.
 - Prevent foreign matter such as dust or wire chips from entering the personal computer embedded with a Motion control board. Such foreign matter can cause a fire, failure, or malfunction.
 - For Ethernet cables to be used in the system, select the ones that meet the specifications in the Motion Control Board User's Manual (Motion Control). 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 Motion control board or an intelligent function module to modify data of a running Motion control board, configure an interlock 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 Motion control board, 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 Motion control board is controlled by an external device, immediate action cannot be taken if a problem occurs in the Motion control board due to a communication failure. To prevent this, configure an interlock in the program, and determine corrective actions to be taken between the external device and Motion control board 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) 25cm or more away in all directions from the Motion control board. 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.
 - 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 mount/remove the Motion control board more than 50 times. Exceeding the limit may cause malfunction.
 - 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 Motion control board, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Wearing a grounded antistatic wrist strap is recommended. Failure to discharge the static electricity may cause the module to fail or malfunction.
 - Use a clean and dry cloth to wipe off dirt on the Motion control board.
 - 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.
-

[Startup and Maintenance Precautions]

CAUTION

- When using the absolute position system function, on starting up, and when the Motion control board or absolute position motor has been replaced, always perform a home position return.
 - 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.
 - The Motion control board is included in an antistatic envelope. When storing or transporting it, be sure to put it in the antistatic envelope. Failure to do so may cause a failure or malfunction.
 - The microprocessor built in the Motion control board will reach a high temperature during operation. Do not touch the heat sink directly when replacing the Motion control board. Doing so may result in a burn.
-

[Operating Precautions]

CAUTION

- When changing data and operating status, and modifying program of the running Motion control board from an external device such as a personal computer connected to an intelligent function module, read the 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 Motion control board or reboot the software while the setting values in the buffer memory are being written to the flash ROM in the Motion control board. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so also may cause malfunction or failure of the Motion control board.
 - 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.
-

[Computer Connection Precautions]

CAUTION

- For Ethernet cables to be used in the system, select the ones that meet the specifications in the Motion Control Board User's Manual (Motion Control). If not, normal data transmission is not guaranteed.
-

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.
-

[Transportation Precautions]

CAUTION

- 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.
 - The Motion control board is a precision machine, so do not drop or apply strong impacts on it.
-

INTRODUCTION

Thank you for purchasing the personal computer embedded type servo system controllers.

This manual describes the functions, programming, and troubleshooting.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the personal computer embedded type servo system 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 product

MR-EM441G

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
Motion Control Board User's Manual (Network) [IB-0300600ENG] (This manual)	Functions, parameter settings, troubleshooting, and buffer memory of CC-Link IE TSN	Print book e-Manual PDF
Motion Control Board User's Manual (Motion Control) [IB-0300599ENG]	Specifications, procedures before operation, system configuration, wiring, functions, table maps, parameters, and troubleshooting of the Motion control board	Print book e-Manual PDF
Motion Control Board User's Manual (Motion API) [IB-0300601ENG]	API functions to control the Motion control board from the host personal computer	Print book e-Manual PDF



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
Axis	A motion control target, referring to a station with axis No. allocation. The Motion control board exchanges the data of cyclic transmission.
Buffer memory	Memory to store data such as setting values and monitor values. The Motion control board also uses it for data communication with the user program. The buffer memory No. (indicating the buffer memory address) given in this manual is prefixed with "G". The buffer memory No. is given on a 1-word basis.
CC-Link IE TSN Class	A group of devices and switching hubs compatible with CC-Link IE TSN, classified according to the functions and performance by the CC-Link Partner Association. For CC-Link IE TSN Class, refer to the CC-Link IE TSN Installation Manual (BAP-C3007ENG-001) published by the CC-Link Partner Association.
Conformance test	Test performed for communications of a CC-Link or CC-Link IE product to ensure their high reliability. For details, refer to the CC-Link Partner Association website. (www.cc-link.org)
Cyclic data	Data that are sent by cyclic transmission.
Cyclic data transfer processing	Processing from the start to completion of a sequence of cyclic transmission by all the stations in a single network. It is performed "asynchronously" with the sequence scan of the CPU module.
Cyclic transmission	A function by which data is periodically exchanged among stations on the same network.
Device station	A station (local or remote station) that is connected on CC-Link IE TSN excluding the master station.
Disconnection	A process of stopping data link if a data link error occurs.
Event history	Event data groups which are saved in a Motion control board.
General-purpose hub	A CC-Link IE TSN Class A switching hub authorized by CC-Link Partner Association.
Grandmaster	A source device or station to synchronize clocks in the time synchronization via PTP (Precision Time Protocol).
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.
Link device	An internal device (RX/RX/RWr/RWw/LB/LW) of the Motion control board and the device station. The station set to the motion control station uses the I/O device (RX/RX/RWr/RWw) on the dual port memory as a link device.
Link refresh	Processing of data transfer between link device of the Motion control board and CPU module devices. Link refresh is performed in "END processing" of the sequence scan of the CPU module.
Local station	A station that performs cyclic transmission and transient transmission with the master station and other local stations. The local station can receive cyclic data of other stations in the multicast mode.
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 control board	Another term for MR-EM441G.
Motion control station	A device station that exchanges cyclic data by an I/O device and motion control.
Motion system monitor	A monitor tool to confirm the Motion control board status, such as LED display or error codes.
MR Configurator2	A product name of servo setup software.
MR-EM441G	Another term for the Motion control board connectable to CC-Link IE TSN.
MR-J5-_G_-LL	Servo amplifier model MR-J5-_G_ that enables the pressure control using a pressure sensor (load cell).
MR-J5W-G	Servo amplifier model MR-J5W-_G_.
Multicast filter	A filter function that selects whether to send cyclic data of multicast mode received by the own station to the subsequent stations. Parameter setting for this function is not required because the master station automatically sets the parameters according to the system configuration.
Multicast mode	A communication mode used to send cyclic data to multiple stations.
Necessary objects	Necessary objects in order to operate the function of a Motion control board without limit. If the necessary objects are not set at the PDO mapping, limited functions are operated.
Network diagnosis (CC-Link IE TSN diagnosis)	[Tool] of "Setting Network Parameter". The display is shown when selecting the Network Diagnosis.
Network parameter setting	Settings of device station, communication cycle, IP filter, IP address, cyclic, and device parameter, etc.
Object	Various data of a device station compatible with CANopen.
Remote I/O	An I/O device or a link device control target, referring to a station without axis No. allocation (a station not used as an axis). The Motion control board exchanges the data of cyclic transmission.
Remote station	A station that exchanges I/O signals (bit data) and I/O data (word data) with another station by cyclic transmission. This station can perform transient transmission.
Reserved address	An IP address reserved for special purposes, defined by RFC 6890. This IP address cannot be used when the programmable controller is connected via the global IP network.

Term	Description
Reserved station	A station which is not actually connected. It is included as a station in the network when its all number is counted.
Return	A process of restarting data link when a faulty station recovers from an error.
SLMP	A SeamLess Message Protocol. This protocol is used to access an SLMP-compatible device or a programmable controller connected to an SLMP-compatible device from an external device.
Standard station	A device station other than the motion control station.
Transient transmission	A function of data communication unperiodically among nodes (station) on network.
TSN hub	A CC-Link IE TSN Class B switching hub authorized by CC-Link Partner Association.
Unicast mode	A communication mode used to send cyclic data to one station.
User program	A user created program (by using the Motion API) which is operated by the host personal computer.

GENERIC TERMS AND ABBREVIATIONS

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

Generic term/abbreviation	Description
CPU module	An abbreviation for the MELSEC iQ-R series CPU module.
Data link	A generic term for cyclic transmission and transient transmission.
Drive unit	A generic term for motor drive devices such as a servo amplifier.
Dual port memory	A generic term for a communication area in order to execute especially the motion control in the buffer memory. The dual port memory address is the offset value from the start address of the dual port memory (buffer memory No.G12000000). Also, the dual port memory address is noted in byte unit.
Engineering tool	A generic term for the motion test tool 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).
Host personal computer	A generic term for the personal computer mounted with the Motion control board on which the user program for controlling the Motion control board operates.
I/O device	A generic term for the link device on the dual port memory. It is used at the station set as the motion control station.
LB	An abbreviation for a link relay of a link device. Bit data sent from each station of the network.
LW	An abbreviation for a link register of a link device. 16-bit (1-word) data sent from each station of the network.
Module	A generic term for devices of the master station (Motion control board) and device stations.
Motion API	A generic term for library functions to control the Motion control board from the host personal computer.
Motion test tool	An abbreviation for the start-up and examination tool for Motion control board.
MR-J5(W)-G	A generic term for servo amplifier models MR-J5-_G_(-RJ)/MR-J5W_-_G_/MR-J5-_G_-LL.
P1	An abbreviation for the CC-Link IE TSN connector (line 1).
P2	An abbreviation for the CC-Link IE TSN connector (line 2).
PDO	An abbreviation for Process Data Object. It is a group of application objects that are periodically transferred among multiple CANopen nodes.
PTP	An abbreviation for Precision Time Protocol. A predefined protocol for time synchronization between devices on a network.
RAS	An abbreviation for Reliability, Availability, and Serviceability. This term refers to the overall usability of automated equipment.
RW _r	An abbreviation for a remote register of the link device. 16-bit (1-word) data input from a device station to the master station. (Not applicable to some local stations.)
RW _w	An abbreviation for a remote register of the link device. 16-bit (1-word) data output from the master station to a device station. (Not applicable to some local stations.)
RX	An abbreviation for a remote input of the link device. Bit data input from a device station to the master station. (Not applicable to some local stations.)
RY	An abbreviation for a remote output of the link device. Bit data output from the master station to a device station. (Not applicable to some local stations.)
SB	An abbreviation for a link special relay. Bit data that indicates the operating status and data link status of a module on CC-Link IE.
SDO	An abbreviation for Service Data Object. It is a message to access object entries in the object dictionary of any CANopen node. This message is non-periodically exchanged between stations.
Servo amplifier	A generic term for servo amplifiers connectable to CC-Link IE TSN.
SW	An abbreviation for a link special register. 16-bit (1-word) data that indicates the operating status and data link status of a module on CC-Link IE.

1 FUNCTIONS

1.1 Cyclic Transmission



Restriction

When the basic system software version is "03" or earlier, the standard station connection, the local station connection, the multicast mode, and communications using LB and LW are not supported. When "Standard station", "Multicast", "LB setting", and "LW setting" are set in "Setting Network Parameter", "Out of Parameter Range (Network) (error code: 3211H)" will occur.


This section describes periodic data communications among stations on the network using link devices.

- The link devices can be assigned in "Cyclic Settings". ( Page 67 Cyclic Settings)

The cyclic transmission operates as follows with the communication mode set by the network parameter of the master station.

Communication mode	Description
Unicast mode	<ul style="list-style-type: none">• Cyclic data is sent to one station.• When this communication mode is used, the local station cannot receive cyclic data from another station. Use this mode when there is no local station or when it is not required for the local station to receive cyclic data from another station.• The cyclic transmission time of this mode is shorter than the cyclic transmission time of multicast mode. ( Page 110 Communication cycle interval)
Multicast mode	<ul style="list-style-type: none">• Cyclic data is sent to multiple stations.• When this mode is used, the local station can receive cyclic data from another station. Use this mode when it is required for the local station to receive cyclic data from another station.• The cyclic transmission time of this mode is longer than the cyclic transmission time of unicast mode. ( Page 110 Communication cycle interval)

Assign RX, RY, RW_r, and RW_w of standard stations to the link device area according to the parameter setting. For the access to the link device area, refer to the following.

 Page 18 Master station and remote stations (standard stations)

For RX, RY, RW_r, and RW_w of the motion control stations, refer to the following.

 Page 19 Master station and remote stations (motion control stations)

Point

- If a data link error occurs in multicast mode, ERR LED at the local station flashes.
- In multicast mode, 'Data link error status of each station' (SB00B0) and 'Total number of device stations present value' (SW0059) at the local station can be checked by SB and SW.

Precautions

- The Motion control board provides the following CPU operating status notifications for device stations.

Master station status			CPU operating status notification for device stations			
System start status	System error (moderate/major) detection status	User watchdog detection status	Motion control stations			Standard stations
			For the basic system software version "02" or earlier	For the basic system software version "03"	For the basic system software version "05" or later	
System startup	Error not detected	User watchdog not detected	CPU RUN	CPU RUN	CPU RUN	CPU RUN
		User watchdog detected	CPU error stop (CPU RUN when not set to an axis)	CPU error stop (CPU RUN when not set to an axis)	CPU error stop	CPU error stop
	Error detected	User watchdog not detected		CPU error stop		
		User watchdog detected				
Before system startup	Error not detected	—*1	CPU RUN	CPU STOP	CPU STOP	CPU STOP
	Error detected					CPU error stop

*1 User watchdog function does not work before system startup.

- CPU operating status shows the master station status. Operation of the device station changes depending on CPU operating status. For details, refer to the manual of the module being used for the device station.

Communications using RX, RY, RWr, and RWw

This allows data to be exchanged in units of bits and in units of words between the master station and device station.

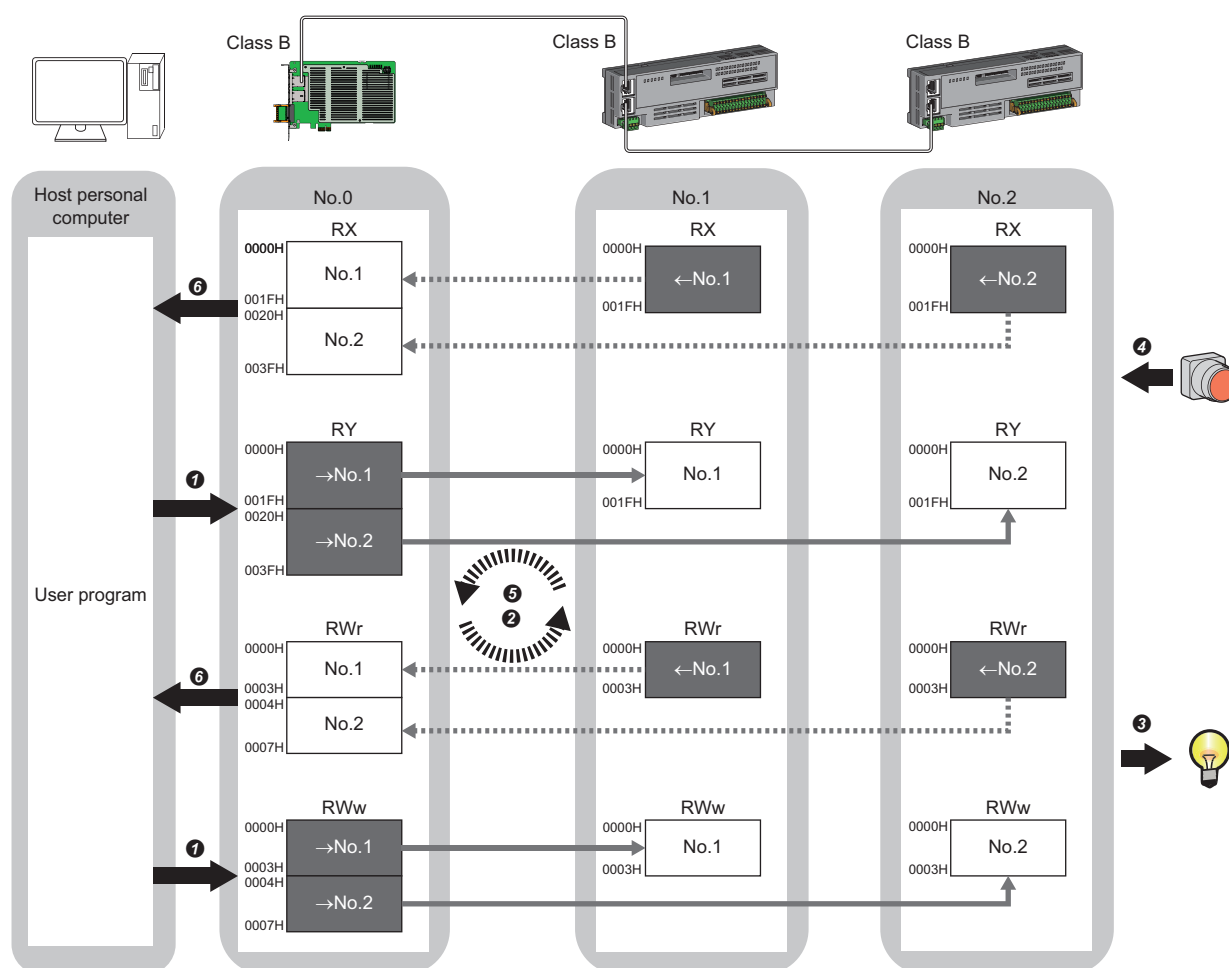
Restriction

- The remote station of the motion control station does not communicate data with the link device (RX, RY, RWr, and RWw) of the master station, and the motion function of the Motion control board controls output and acquires the input status.
- When the basic system software version is "03" or earlier, standard stations do not support communications using RX, RY, RWr, and RWw. If "Standard station" is set in "Network Configuration Settings", "Out of Parameter Range (Network) (error code: 3211H)" occurs.
- The remote station of the motion control station can use the I/O device to change output, and obtain input status.

Master station and remote stations (standard stations)

■Unicast mode

1:1 communications between the master station and each remote station (standard station). Remote stations do not communicate with each other.



No. 0, No. 1, No. 2: Station No. 0 (master station), station No. 1, station No. 2

→No. 1, →No. 2: Send range: to station No. 1, send range: to station No. 2

←No. 1, ←No. 2: Send range: from station No. 1, send range: from station No. 2

Class B: CC-Link IE TSN Class B device

• Output from the master station

- 1 The link devices (RY, RWw) of the master station turn ON by the user program.
- 2 The status of the link devices (RY, RWw) of the master station is stored in the link devices (RY, RWw) of each remote station by cyclic data transfer processing.
- 3 The status of the link devices (RY, RWw) of the remote station is output to the external device.

- Input from the remote station

- ④ The status of the external device is stored in the link devices (RX, RWr) of the remote station.
- ⑤ The status of the link devices (RX, RWr) of the remote station is stored in the link devices (RX, RWr) of the master station by cyclic data transfer processing.
- ⑥ The status of the link devices (RX, RWr) of the master station is read by user program.

■Multicast mode

- The master station and each remote station send data on the line in multicast mode in each send range.
- The master station receives all data, but the remote station discards the data of another remote station. Therefore, communication at each station is performed in the same manner as unicast mode. (☞ Page 18 Unicast mode)

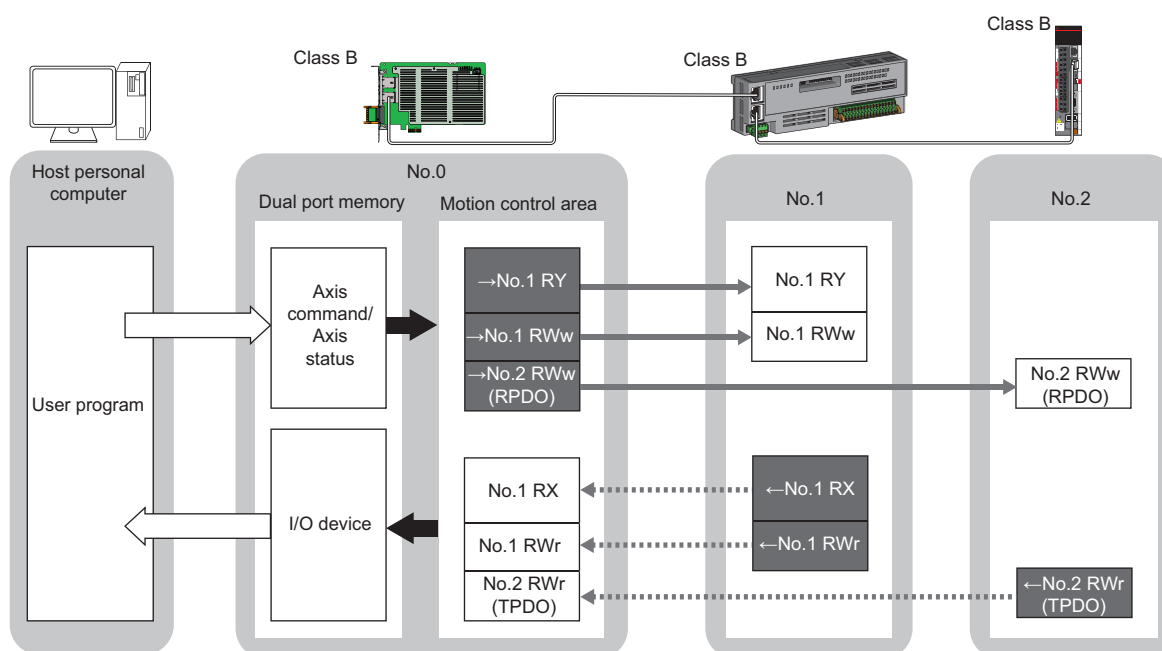
Master station and remote stations (motion control stations)

■Unicast mode

Devices of a motion control station (RX, RY, RWr, and RWw) are assigned to the I/O device area of the dual port memory instead of the link device area of the Motion control board. 1:1 communications between the Motion control board and the motion control station. The motion control output status is output to the remote station of the motion control station, and the input status is not stored in the link device (RX, RWr) of the master station.

The Motion control board operates the cyclic data in the motion control area with the motion calculation or the I/O device. The I/O device can be operated from the user program in the host personal computer. For the I/O device, refer to "I/O Device" in the following manual.

📖 Motion Control Board User's Manual (Motion Control)



No.0, No.1, No.2: Station No.0 (master station), station No.1, station No.2

→No.1, →No.2: Send range: to station No.1, send range: to station No.2

←No.1, ←No.2: Send range: from station No.1, send range: from station No.2

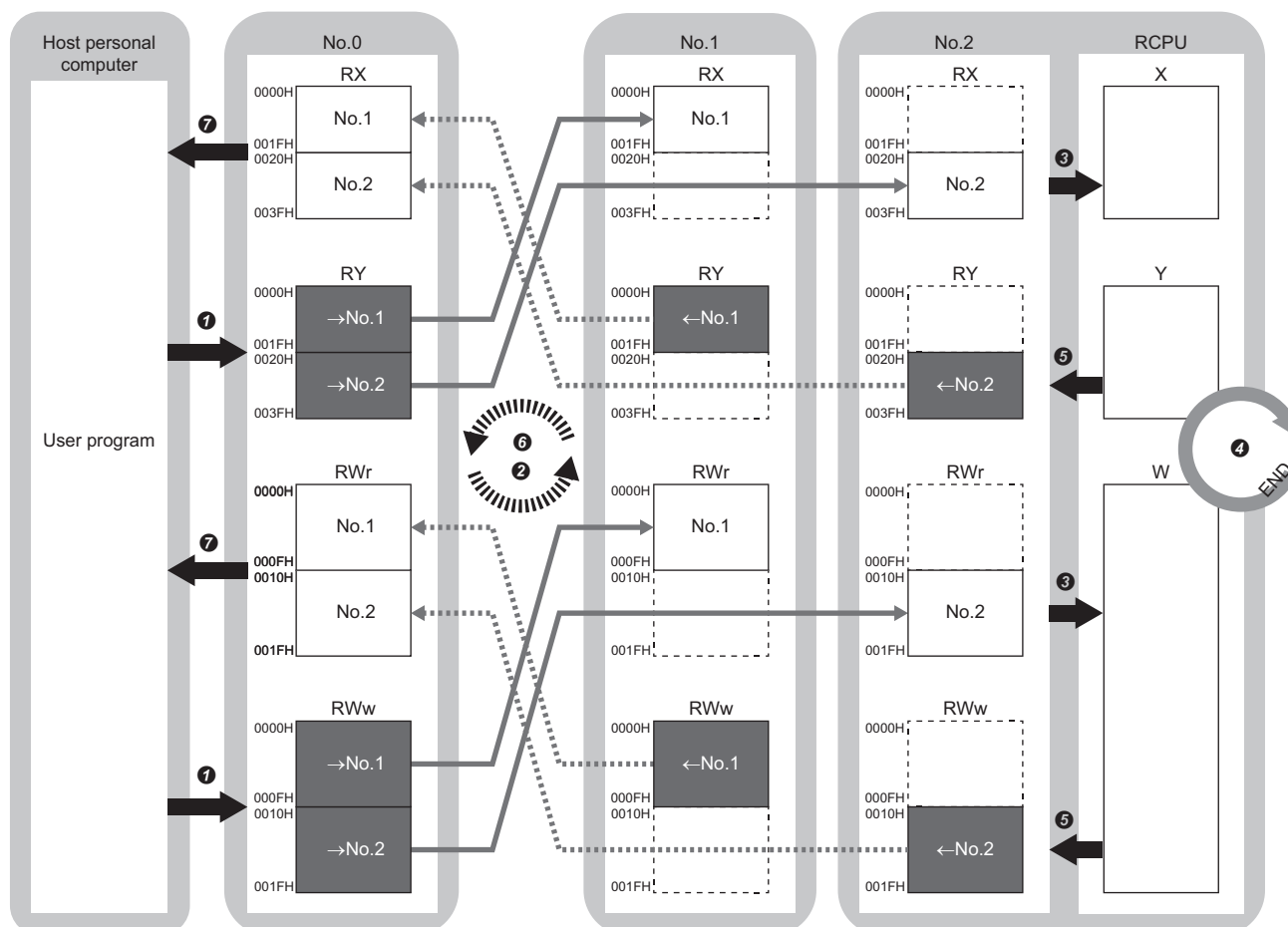
➡ : Data refresh by operation cycle

⇄ : Read/Write of dual port memory (axis command/axis status, I/O device) by Motion API

■Multicast mode

- The master station and each remote station send data on the line in multicast mode in each send range.
- The master station receives all data, but the remote station discards the data of another remote station. Therefore, communication at each station is performed in the same manner as unicast mode. (☞ Page 19 Unicast mode)

■ Unicast mode



←No.1, ←No.2: Send range: from station No.1, send range: from station No.2

① The link devices (RY, RWw) of the master station turn ON by the user program.

③ The status of the link devices (RX, RWr) of the local station is stored in the devices of the CPU module by link refresh.

④ The device is turned ON by the sequence scan of the CPU module in the local station, and END processing is performed.

⑤ The device status of the CPU module is stored in the link devices (RY, RWw) of the local station by link refresh.

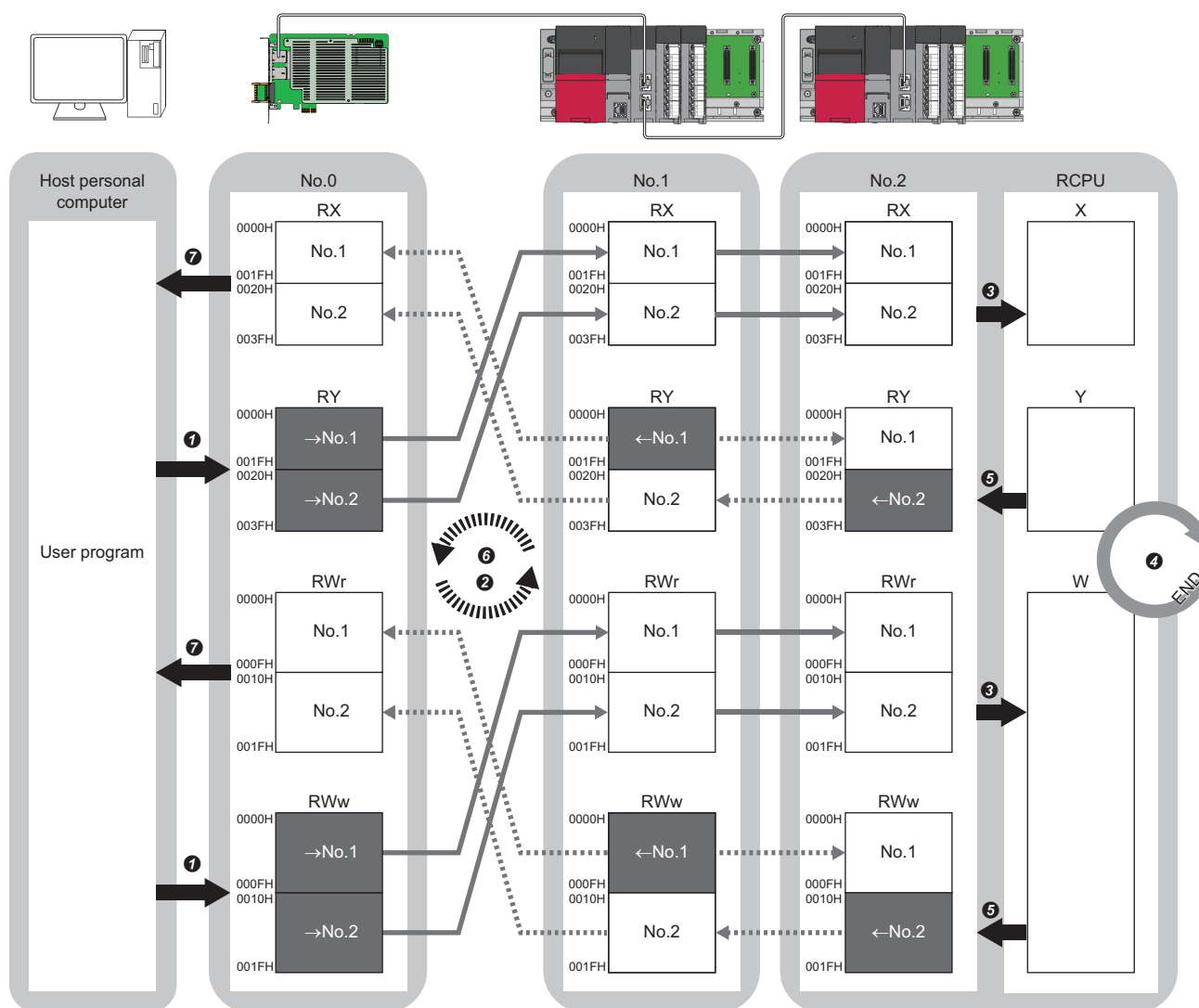
⑥ The status of the link devices (RY, RWw) of the local station is stored in the link devices (RX, RWr) of the master station by cyclic data transfer processing.

⑦ The status of the link devices (RX, RWr) of the master station is read by the user program.

■Multicast mode

The master station and local station send data on the line in multicast mode in each send range.

1



No.0, No.1, No.2: Station No.0 (master station), station No.1, station No.2

→No.1, →No.2: Send range: to station No.1, send range: to station No.2

←No.1, ←No.2: Send range: from station No.1, send range: from station No.2

• Output from the master station

- ① The link devices (RY, RWw) of the master station turn ON by the user program.
- ② The status of the link devices (RY, RWw) of the master station is stored in the link devices (RX, RWr) of the local station on the same network by cyclic data transfer processing.
- ③ The status of the link devices (RX, RWr) of the local station is stored in the devices of the CPU module by link refresh.

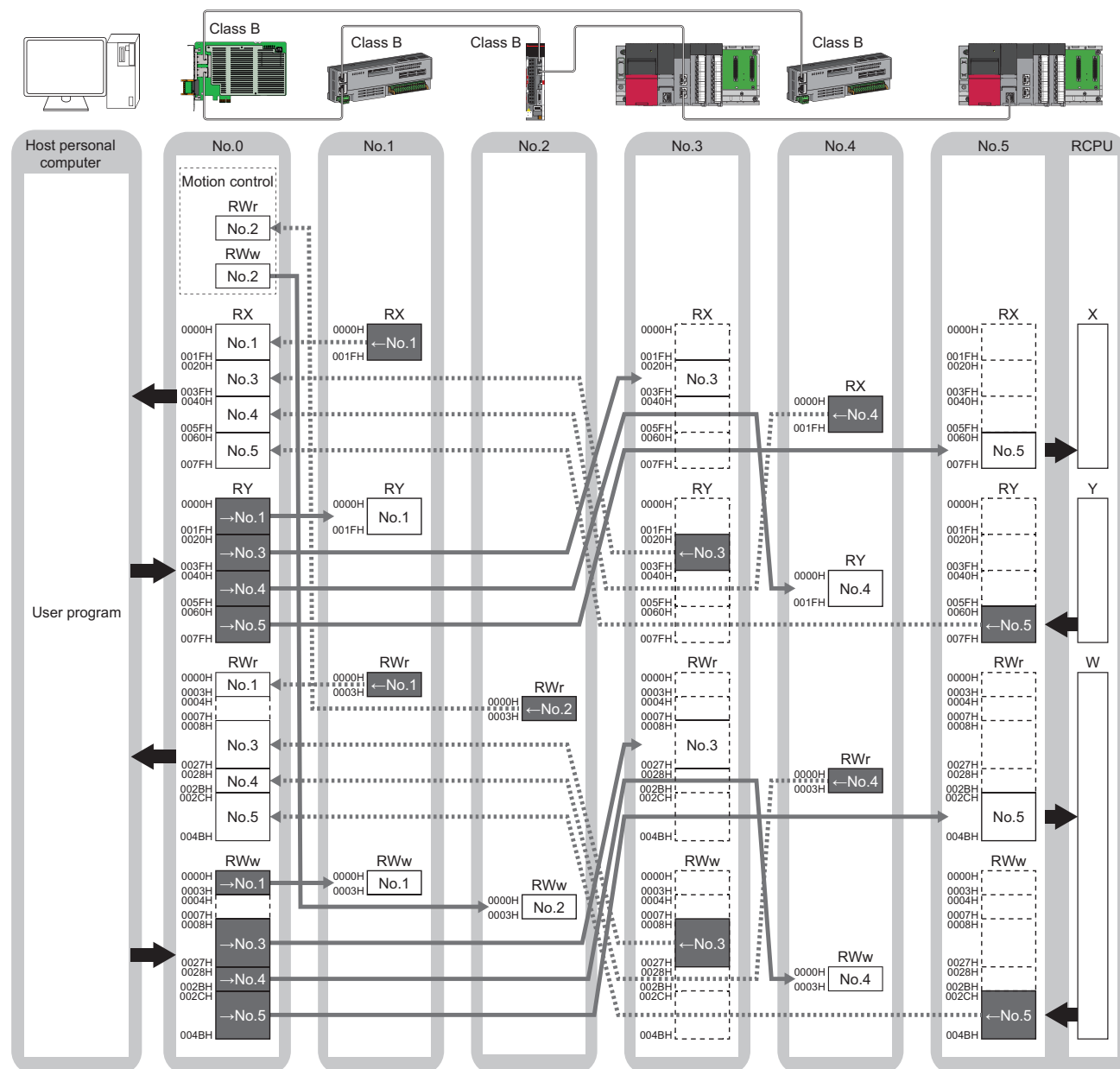
• Input from the local station

- ④ The device is turned ON by the sequence scan of the CPU module in the local station, and END processing is performed.
- ⑤ The status of the device of the CPU module is stored in the link devices (RY, RWw) of the local station by link refresh.
- ⑥ The status of the link devices (RY, RWw) of the local station (station No.2) is stored in the link devices (RX, RWr) of the master station on the same network and the link devices (RY, RWw) of the local station (station No.1) by cyclic data transfer processing.
- ⑦ The status of the link devices (RX, RWr) of the master station is read by the user program.

Coexistence of remote stations and local stations

■ Unicast mode

- 1:1 communications between the master station and each remote station, and between the master station and each local station.
- Communications are not performed between remote stations, between local stations, and between a remote station and a local station.



No.0, No.1, No.2, No.3, No.4, No.5: station No.0 (master station), station No.1, station No.2, station No.3, station No.4, station No.5

→No.1, →No.2, →No.3, →No.4, →No.5: Send range: to station No.1, send range: to station No.2, send range: to station No.3, send range: to station No.4, send range: to station No.5

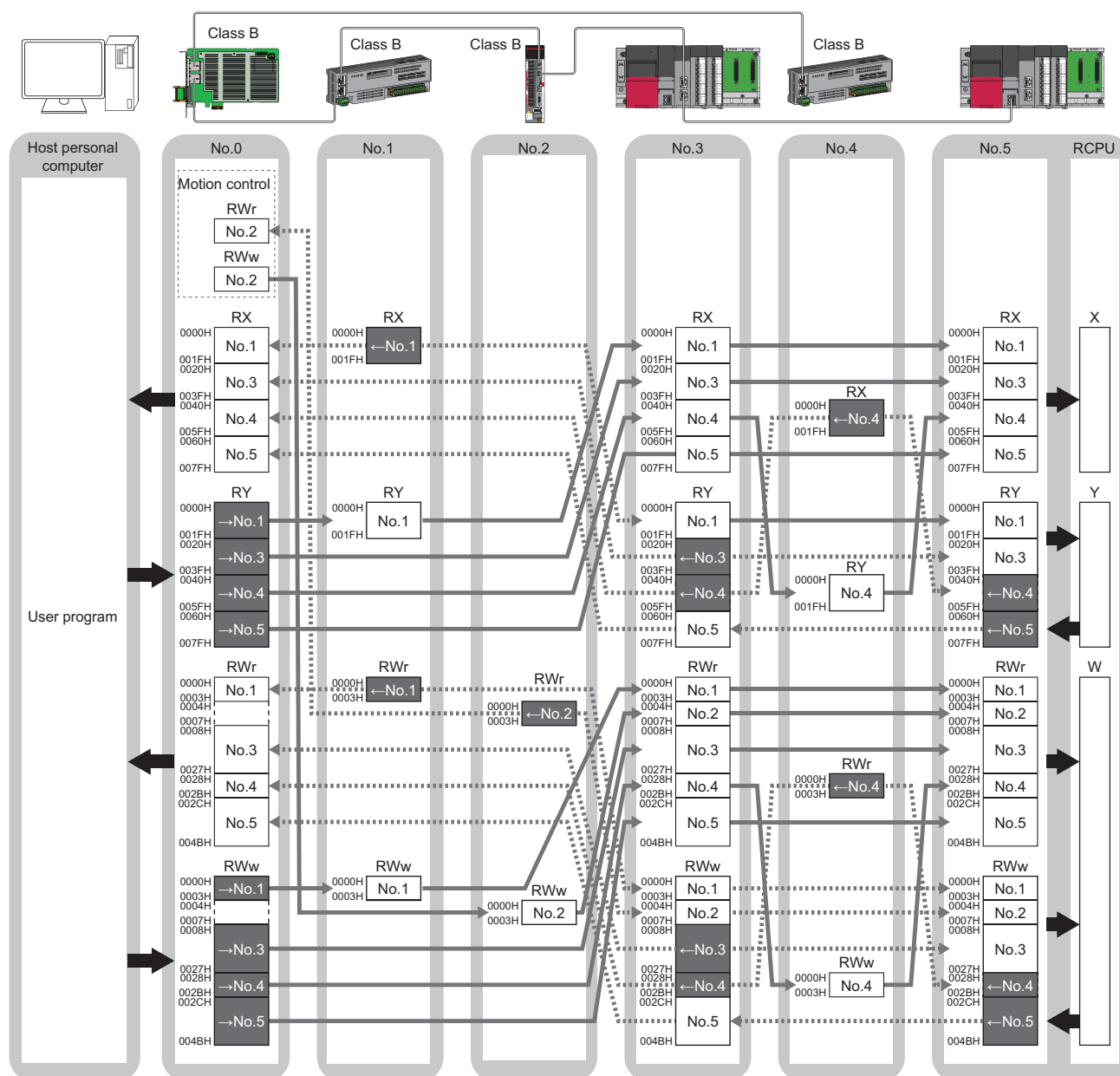
←No.1, ←No.2, ←No.3, ←No.4, ←No.5: Send range: from station No.1, send range: from station No.2, send range: from station No.3, send range: from station No.4, send range: from station No.5

Class B: CC-Link IE TSN Class B device

■ Multicast mode

Each local station can obtain data of all device stations.

1



No.0, No.1, No.2, No.3, No.4: station No.0 (master station), station No.1, station No.2, station No.3, station No.4, station No.5

→No.1, →No.2, →No.3, →No.4, →No.5: Send range: to station No.1, send range: to station No.2, send range: to station No.3, send range: to station No.4, send range: to station No.5

←No.1, ←No.2, ←No.3, ←No.4, ←No.5: Send range: from station No.1, send range: from station No.2, send range: from station No.3, send range: from station No.4, send range: from station No.5

Class B: CC-Link IE TSN Class B device

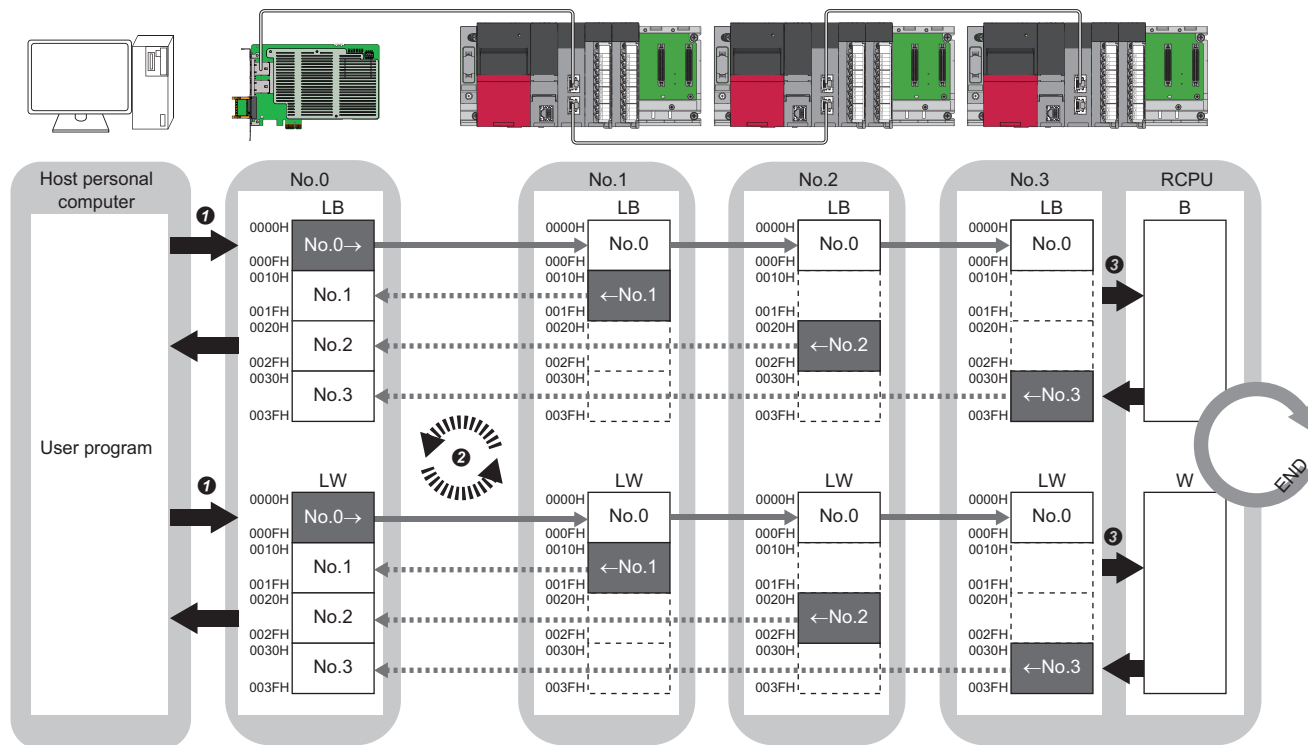
Communications using LB and LW

This allows data to be exchanged in units of bits and words between the master station and local stations.

Master station and local stations, or between local stations

■ Unicast mode

1:1 communications between the master station and each local station. Local stations do not communicate with each other.



No.0, No.1, No.2, No.3: Station No.0 (master station), station No.1, station No.2, station No.3

No.0→: Send range: to station No.1, station No.2, and station No.3

←No.1, ←No.2, ←No.3: Send range: from station No.1, send range: from station No.2, send range: from station No.3

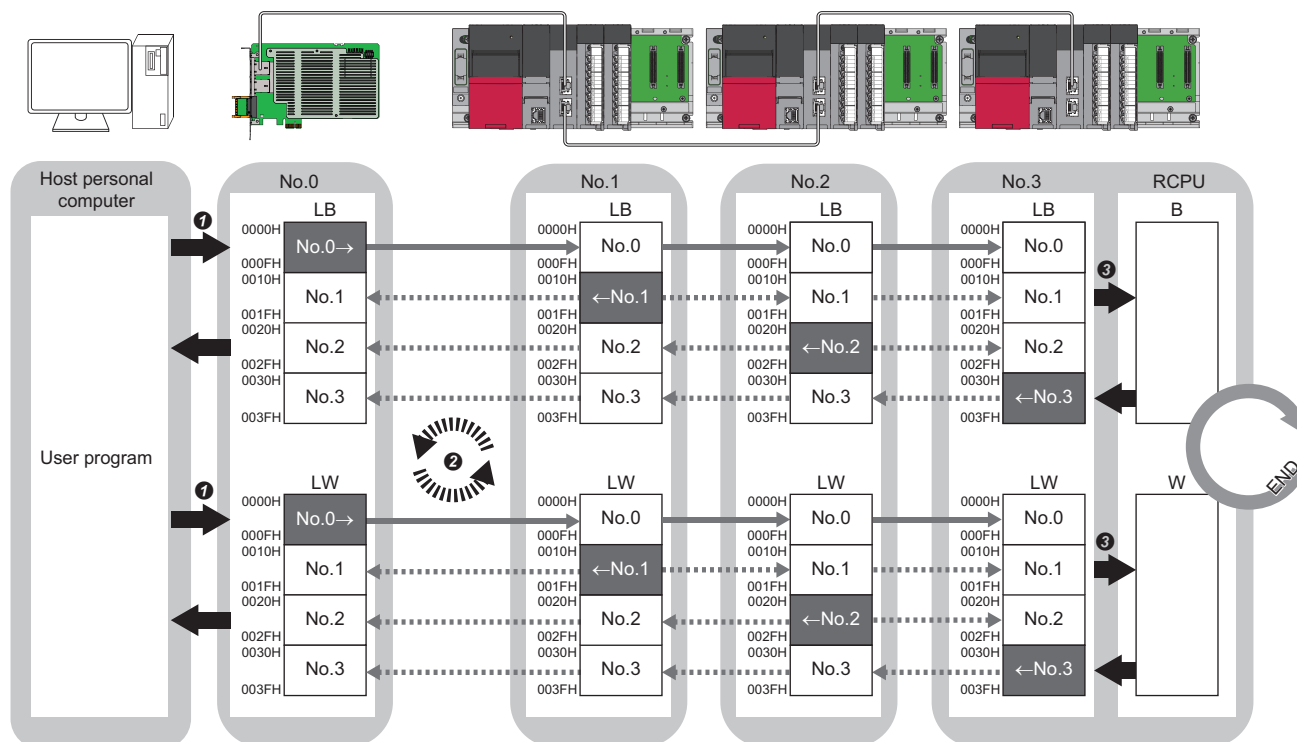
❶ The link devices (LB, LW) of the master station turn ON by the user program.

❷ The status of the link devices (LB, LW) is stored in the link devices (LB, LW) of the local station on the receiving side by cyclic data transfer processing.

❸ The status of the link devices (LB, LW) is stored in the devices of the CPU module on the receiving side.

■Multicast mode

This allows link device data to be exchanged between local stations as well as between the master station and local stations.



No.0, No.1, No.2, No.3: Station No.0 (master station), station No.1, station No.2, station No.3

No.0→: Send range: to station No.1, station No.2, and station No.3

←No.1, ←No.2, ←No.3: Send range: from station No.1, send range: from station No.2, send range: from station No.3

❶ The link devices (LB, LW) of the master station turn ON by the user program.

❷ The status of the link devices (LB, LW) is stored in the link devices (LB, LW) of each local station on the receiving side by cyclic data transfer processing.

❸ The status of the link devices (LB, LW) is stored in the devices of the CPU module on the receiving side.

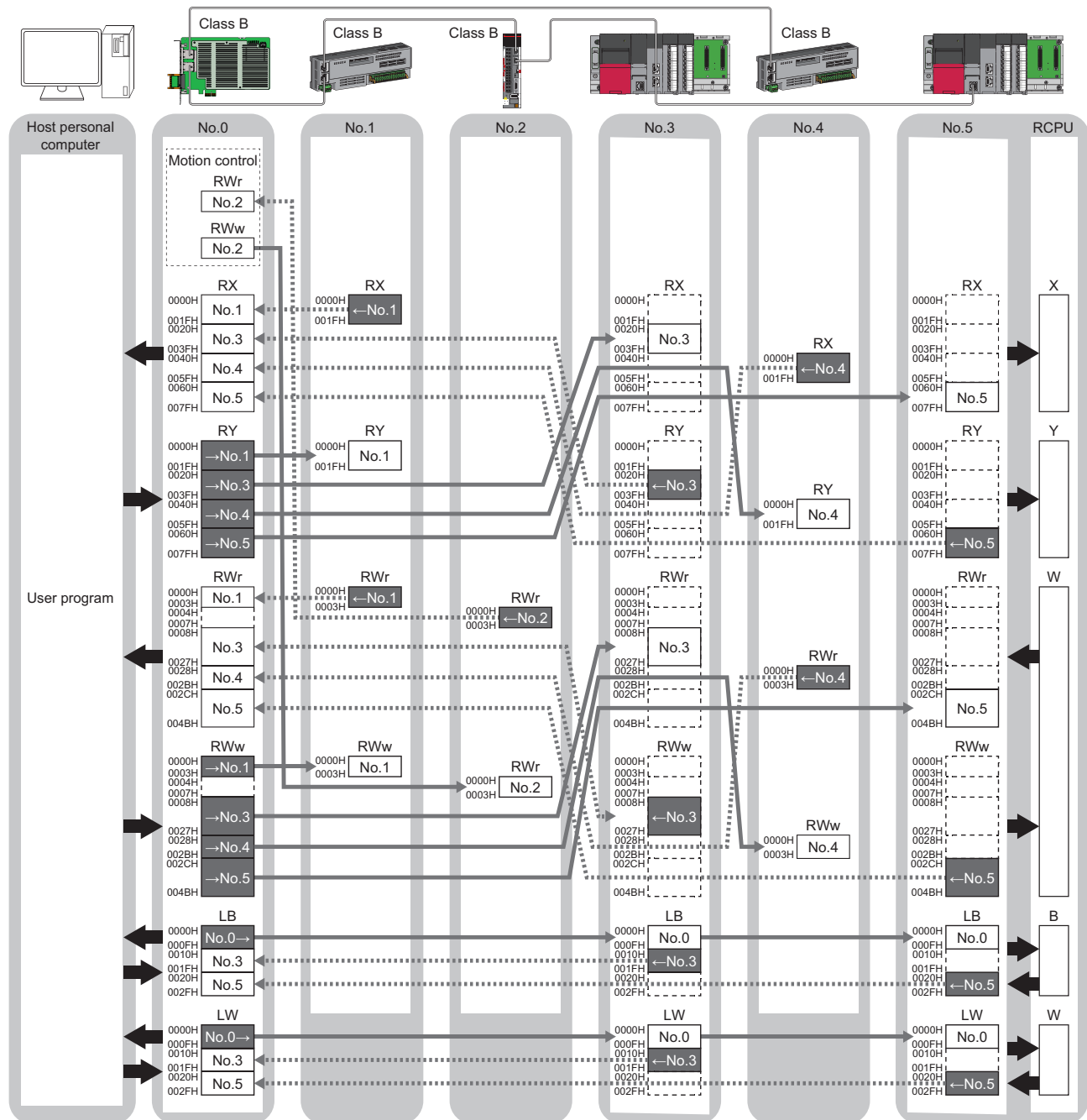
Communications using RX, RY, RWr, RWw, LB, and LW

This allows data to be exchanged in units of bits and in units of words between the master station and device station.

Coexistence of the master station and device stations

■Unicast mode

The module on CC-Link IE TSN performs communications using RX, RY, RWr, and RWw and communications using LB and LW simultaneously.



No.0, No.1, No.2, No.3, No.4, No.5: station No.0 (master station), station No.1, station No.2, station No.3, station No.4, station No.5

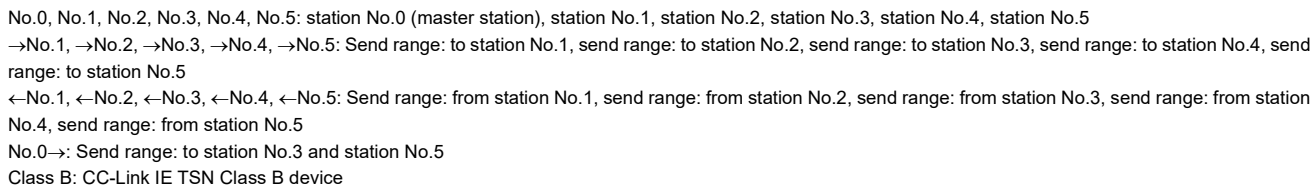
→No.1, →No.2, →No.3, →No.4, →No.5: Send range: to station No.1, send range: to station No.2, send range: to station No.3, send range: to station No.4, send range: to station No.5

←No.1, ←No.2, ←No.3, ←No.4, ←No.5: Send range: from station No.1, send range: from station No.2, send range: from station No.3, send range: from station No.4, send range: from station No.5

No.0→: Send range: to station No.3 and station No.5

Class B: CC-Link IE TSN Class B device

1



Direct access to link devices

This function directly reads/writes data from/to the link devices of the Motion control board from the program.
For the link devices to direct access, use the Motion API.

Specification method

The Motion API to be used differs depending on the link devices and the I/O device.

■Link device specification method

Specify the link device to read/write by using the Motion API shown in the table below.

Type	Range	Motion API
Remote input (RX)	RX0000 to RX3FFF	• sscGetBitLinkDevice
Remote output (RY)	RY0000 to RY3FFF	• sscGetBitLinkDevice • sscSetBitLinkDevice
Remote register (RWr)	RWr0000 to RWr1FFF	• sscGetWordLinkDevice
Remote register (RWw)	RWw0000 to RWw1FFF	• sscGetWordLinkDevice • sscSetWordLinkDevice
Link relay (LB)	LB0000 to LB7FFF	• sscGetBitLinkDevice • sscSetBitLinkDevice
Link register (LW)	LW0000 to LW3FFF	• sscGetWordLinkDevice • sscSetWordLinkDevice
Link special relay (SB)	SB0000 to SB0FFF	• sscGetBitLinkDevice • sscSetBitLinkDevice
Link special register (SW)	SW0000 to SW0FFF	• sscGetWordLinkDevice • sscSetWordLinkDevice

■I/O device specification method


Specify the I/O device for reading or writing by using the Motion API shown in the table below.

Type	Range	Motion API
Input bit device (remote input (RX))	RX0000 to RX3FFF	• sscGetInputDeviceBit
Output bit device (remote output (RY))	RY0000 to RY3FFF	• sscSetOutputDeviceBit • sscSetOutputDeviceBitNonExclusively • sscGetOutputDeviceBit
Input word device (remote register (RWr))	RWr0000 to RWr1FFF	• sscGetInputDeviceWord • sscGetInputDeviceDword
Output word device (remote register (RWw))	RWw0000 to RWw1FFF	• sscSetOutputDeviceWord • sscSetOutputDeviceDword • sscChangeOutputDeviceWord • sscChangeOutputDeviceDword • sscGetOutputDeviceWord • sscGetOutputDeviceDword

Readable/writable range

Data can be read or written from/to the Motion control board mounted on the host personal computer.

■Read

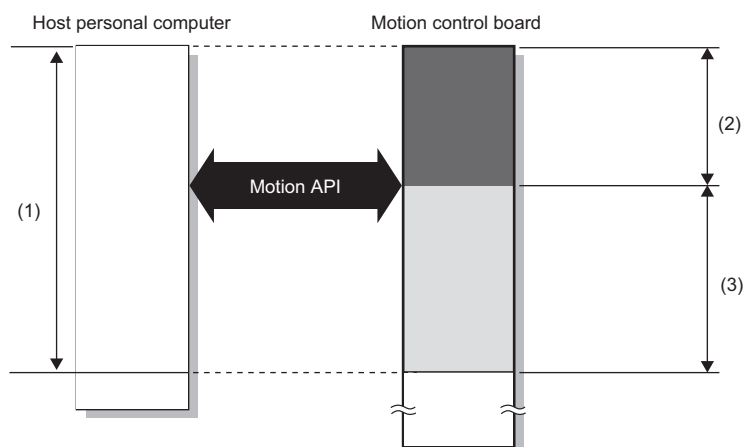
All link devices of the Motion control board can be specified. ( Page 28 Specification method)

■Write

The range that satisfies all of the following conditions can be specified.

- Area where data is sent to other stations
- Within the link device range of the Motion control board ( Page 28 Specification method)

Ex.



- (1) Link device range which can read/write by using Motion API
 (2) Area where data is sent to other stations (This area is writable)
 (3) Area for receiving data from other stations

Precautions

■Cyclic data assurance

The direct access to link devices does not provide station-based block data assurance. ( Page 30 Cyclic data assurance)

■When conducting a link direct access to a link device (buffer memory) assigned to the motion control stations

- The value written to RY/RWw assigned to the motion control station is not reflected in the output to the motion control station. Additionally, when operating in multicast mode, the value written to RY/RWw assigned to the motion control station is not stored in the local station link device (RX/RWr).
- When reading RX/RWr assigned to the motion control station, the value (initial value 0) written last by direct access, etc. of the link device is read.

Cyclic data assurance

This function assures the cyclic data assurance in units of 32 bits.

○: Assured

Method	Description	Direct access to link devices
32-bit data assurance	Assures data in 32-bit units. Data is automatically assured by satisfying assignment conditions of link devices.	○
Interlock program	Assures data that exceeds 32 bits. Data is assured by configuring interlocks on programs.	○

Point

When handling multiple data as a set within each link device, allocate the data that needs to be set first to the upper device, and the data that needs to be set later to the lower device. For example, if data A to be set first and data B to be set later are assigned to RWw5 and RWwA, assign data A to RWwA and data B to RWw5. If each data is assigned to the opposite device, the device station may not be controlled correctly depending on the operation timing of the user program.

32-bit data assurance

The RWr and RWw data can be assured in 32-bit units.

■Data assurance at the time of direct access to link devices

When refresh target devices are accessed, the 32-bit data can be assured by satisfying the following conditions:

- The start device No. of RWr, RWw, and LW is multiples of 2.
- The number of points assigned to RWr, RWw, and LW is multiples of 2.

Interlock program

Data of more than 32 bits can be assured. Use either of the following methods.

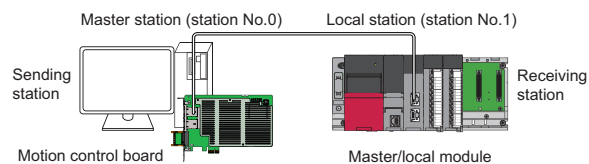
Method	Reference
Data assurance by handshake of the remote I/O	Page 31 Data assurance by handshake of the remote I/O
Data assurance by handshake of the remote register	Page 33 Data assurance by handshake of the remote register
Data assurance by handshake of the link relay	Page 35 Data assurance by handshake of the link relay

For details of the Motion API, refer to the following manual.

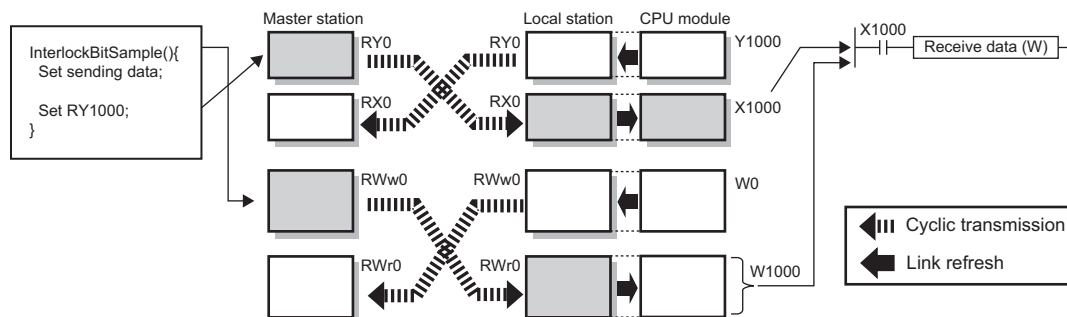
📖 Motion Control Board User's Manual (Motion API)

■ Data assurance by handshake of the remote I/O

An example of sending data in "Data 1 to 4" of the master station (station No.0) to W1000 to W1003 of the local station (station No.1) is shown below. (X1000 and Y1000 are used for a handshake to the CPU module.)



• Data flow



• Program

Sending station: Master station (station No.0)

C++

```
void InterlockBitSample()
{
    int RY1000 = 0;
    int RX1000 = 0;
    unsigned short RWw0_3[4] = {};

    /* Get RY1000 */
    sscGetBitLinkDevice(0, 1, SSC_RY, 0x1000, 1, &RY1000);

    /* Get RX1000 */
    sscGetBitLinkDevice(0, 1, SSC_RX, 0x1000, 1, &RX1000);

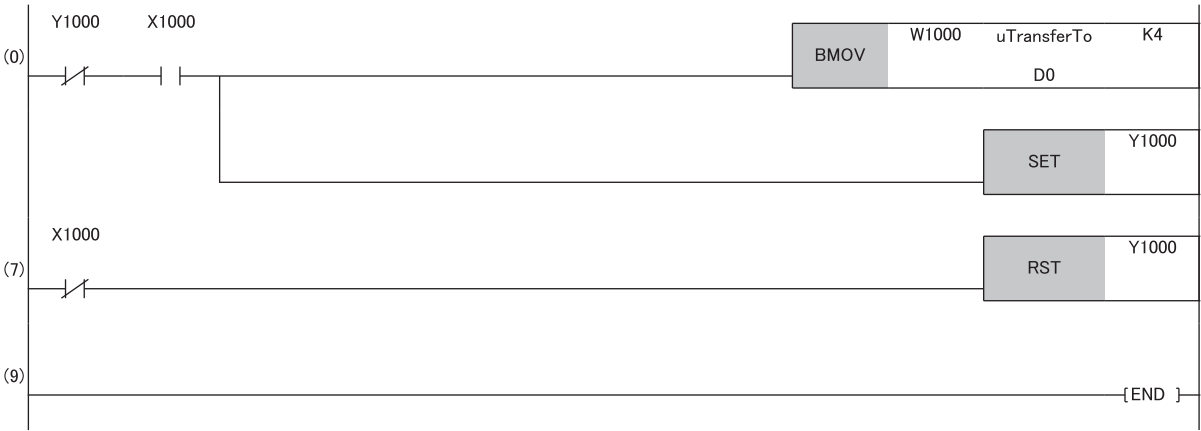
    if( (RY1000 == 0) && (RX1000 == 0) )
    { /* RY1000 and RX1000 are OFF */
        /* "Data 1 to 4" are stored in RWw0 to RWw3 */
        RWw0_3[0] = 1000;
        RWw0_3[1] = 2000;
        RWw0_3[2] = 3000;
        RWw0_3[3] = 4000;
        sscSetWordLinkDevice(0, 1, SSC_RWw, 0x0000, 4, &RWw0_3[0]);

        /* RY1000 turns ON */
        RY1000 = 1;
        sscSetBitLinkDevice(0, 1, SSC_RY, 0x1000, 1, &RY1000);
    }

    if(RX1000 == 1)
    { /* RX1000 is ON */
        /* RY1000 turns OFF */
        RY1000 = 0;
        sscSetBitLinkDevice(0, 1, SSC_RY, 0x1000, 1, &RY1000);
    }
}
```

Receiving station: Local station (station No.1)

Classification	Setting details												
Label to be defined	<div>Define global labels as shown below:</div> <table><tr><th></th><th>Label Name</th><th>Data Type</th><th></th><th>Class</th><th>Assign (Device/Label)</th></tr><tr><td>1</td><td>uTransferTo</td><td>Word [Signed]</td><td>...</td><td>VAR_GLOBAL</td><td>D0</td></tr></table>		Label Name	Data Type		Class	Assign (Device/Label)	1	uTransferTo	Word [Signed]	...	VAR_GLOBAL	D0
	Label Name	Data Type		Class	Assign (Device/Label)								
1	uTransferTo	Word [Signed]	...	VAR_GLOBAL	D0								

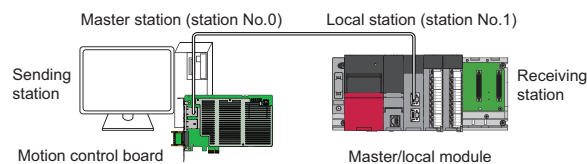


• Program flow

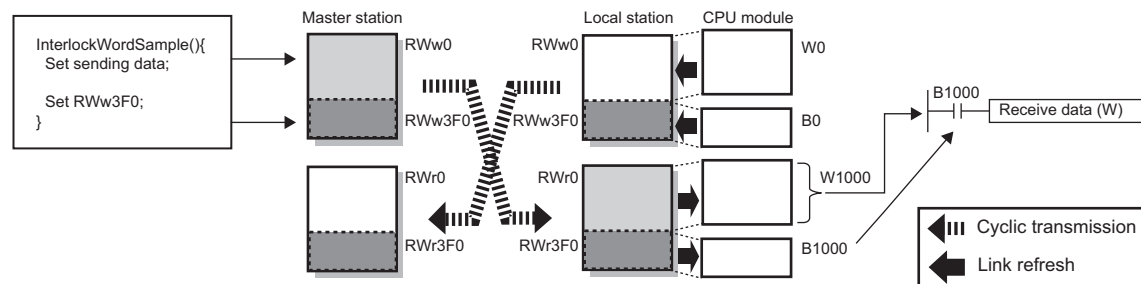
- ❶ The master station stores "Data 1 to 4" in RWw0 to RWw3.
- ❷ After "Data 1 to 4" are stored, the master station turns ON RY1000.
- ❸ The local station checks that X1000 is turned ON, and transfers contents of the receive data W1000 to W1003 to uTransferTo [0] to [3] (D0 to D3).
- ❹ When the transfer is completed, the local station turns ON Y1000.
- ❺ The master station checks that RX1000 is turned ON, and turns OFF RY1000.
- ❻ The local station checks that X1000 is turned OFF, and turns OFF the reception complete signal Y1000.

■Data assurance by handshake of the remote register

An example of sending data in "Data 1 to 4" of the master station (station No.0) to W1000 to W1003 of the local station (station No.1) is shown below. (RWw3F0 and RWr3F0 are used for a handshake to the CPU module.)



• Data flow



• Program

Sending station: Master station (station No.0)

C++

```
void InterlockWordSample()
{
    unsigned short RWw3F0 = 0;
    unsigned short RWr3F0 = 0;
    unsigned short RWw0_3[4] = {};

    /* Get RWw3F0 */
    sscGetWordLinkDevice(0, 1, SSC_RWw, 0x03F0, 1, &RWw3F0);

    /* Get RWr3F0 */
    sscGetWordLinkDevice(0, 1, SSC_RWr, 0x03F0, 1, &RWr3F0);

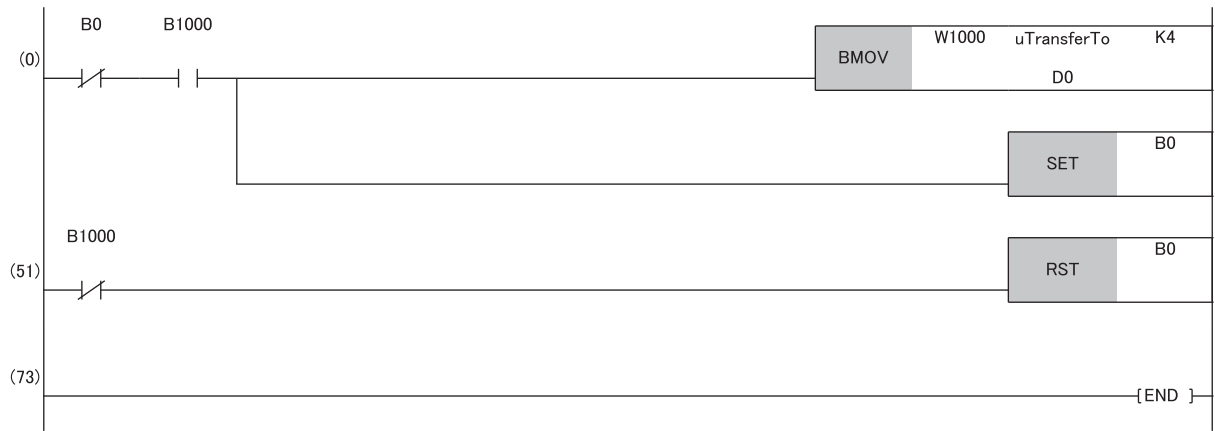
    if( (RWw3F0 == 0) && (RWr3F0 == 0) )
    { /* RWw3F0 and RWr3F0 are OFF */
        /* "Data 1 to 4" are stored in RWw0 to 3 */
        RWw0_3[0] = 1000;
        RWw0_3[1] = 2000;
        RWw0_3[2] = 3000;
        RWw0_3[3] = 4000;
        sscSetWordLinkDevice(0, 1, SSC_RWw, 0x0000, 4, &RWw0_3[0]);

        /* RWw3F0 turns ON */
        RWw3F0 = 1;
        sscSetWordLinkDevice(0, 1, SSC_RWw, 0x03F0, 1, &RWw3F0);
    }

    if(RWr3F0 == 1)
    { /* RWr3F0 is ON */
        /* RWw3F0 turns OFF */
        RWw3F0 = 0;
        sscSetWordLinkDevice(0, 1, SSC_RWw, 0x03F0, 1, &RWw3F0);
    }
}
```

Receiving station: Local station (station No.1)

Classification	Setting details				
Label to be defined	Define global labels as shown below:				
	Label Name	Data Type		Class	Assign (Device/Label)
1	uTransferTo	Word [Signed]	...	VAR_GLOBAL	D0



• Program flow

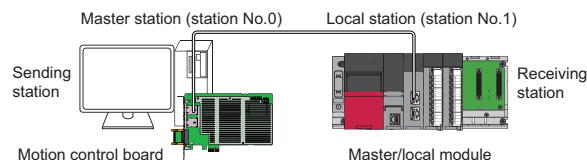
- 1 The master station stores "Data 1 to 4" in RWw0 to RWw3.
- 2 After "Data 1 to 4" are stored, the master station turns ON RWw3F0.
- 3 The local station checks that B1000 is turned ON, and transfers contents of the receive data W1000 to W1003 to uTransferTo [0] to [3] (D0 to D3).
- 4 When the transfer is completed, the local station turns ON B0.
- 5 The master station checks that B1000 is turned ON, and turns OFF B0.
- 6 The local station checks that B1000 is turned OFF, and turns OFF B0.

■Data assurance by handshake of the link relay

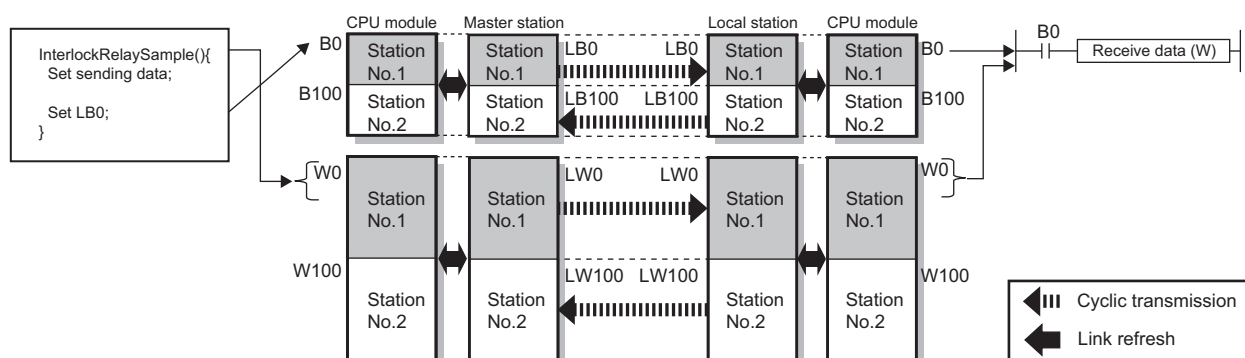
In communications using LB and LW, the link relay (LB) is sent after the link register (LW). Therefore, data inconsistency of the link register (LW) can be prevented by handshake in the data of the link relay (LB).

The following shows the program example when 'Cyclic data (station No.0)' (LW0 to LW3) of the master station is sent to 'Cyclic data (station No.1)' (W0 to W3) of the local station.

A handshake is established by turning ON 'Handshake (station No.0)' (LB0) of the master station and turning ON 'Handshake (station No.1)' (B100) of the local station after the send data has been stored.



• Data flow



• Program

Sending station: Master station (station No.0)

C++

```
void InterlockRelaySample()
{
    int LB0 = 0;
    int LB100 = 0;
    unsigned short RWw0_3[4] = {};

    /* Get LB0 */
    sscGetBitLinkDevice(0, 1, SSC_LB, 0x0000, 1, &LB0);

    /* Get LB100 */
    sscGetBitLinkDevice(0, 1, SSC_LB, 0x0100, 1, &LB100);

    if( (LB0 == 0) && (LB100 == 0) )
    { /* LB0 and LB100 are OFF */
        /* "Data 1 to 4" are stored in RWw0 to 3 */
        RWw0_3[0] = 1000;
        RWw0_3[1] = 2000;
        RWw0_3[2] = 3000;
        RWw0_3[3] = 4000;
        sscSetWordLinkDevice(0, 1, SSC_RWw, 0x0000, 4, &RWw0_3[0]);

        /* LB0 turns ON */
        LB0 = 1;
        sscSetBitLinkDevice(0, 1, SSC_LB, 0x0000, 1, &LB0);
    }

    if(LB100 == 1)
    { /* LB100 is ON */
        /* LB0 turns OFF */
        LB0 = 0;
        sscSetBitLinkDevice(0, 1, SSC_LB, 0x0000, 1, &LB0);
    }
}
```

Receiving station: Local station (station No.1)

Classification	Setting details												
Label to be defined	Define global labels as shown below: <table><tr><th></th><th>Label Name</th><th>Data Type</th><th></th><th>Class</th><th>Assign (Device/Label)</th></tr><tr><td>1</td><td>uInputData</td><td>Word [Signed]</td><td>...</td><td>VAR_GLOBAL</td><td>D100</td></tr></table>		Label Name	Data Type		Class	Assign (Device/Label)	1	uInputData	Word [Signed]	...	VAR_GLOBAL	D100
	Label Name	Data Type		Class	Assign (Device/Label)								
1	uInputData	Word [Signed]	...	VAR_GLOBAL	D100								



• Program flow

- 1 The master station stores "Data 1 to 4" in LW0 to LW3.
- 2 After "Data 1 to 4" are stored, the master station turns ON LB0.
- 3 The local station checks that B0 is turned ON, and transfers contents of the receive data W0 to W3 to uInputData [0] to [3] (D100 to D103).
- 4 When the transfer is completed, the local station turns ON B100.
- 5 The master station checks that LB100 is turned ON, and turns OFF LB0.
- 6 The local station checks that B0 is turned OFF, and turns OFF B100.

I/O Maintenance Settings

When using cyclic transmission, set whether to hold or clear output or input by using the following settings. (📖 Page 64 Application Settings)

- "Data Link Error Station Setting" when disconnected

🔗 "Application Settings" ⇨ "I/O Maintenance Settings" ⇨ "Data Link Error Station Setting"

Restriction

- For "Output Mode upon Error", only "Hold" can be selected.
- For "Data Link Error Station Setting", only "Hold" can be selected.

Precautions

When a motion control station is used, the operation is performed with the setting of "Hold" regardless of the parameter setting.

Input data hold/clear operation

■ If the device station disconnected

- If "Data Link Error Station Setting" is "Hold", input data from device station is held.

Devices where the hold/clear settings are enabled

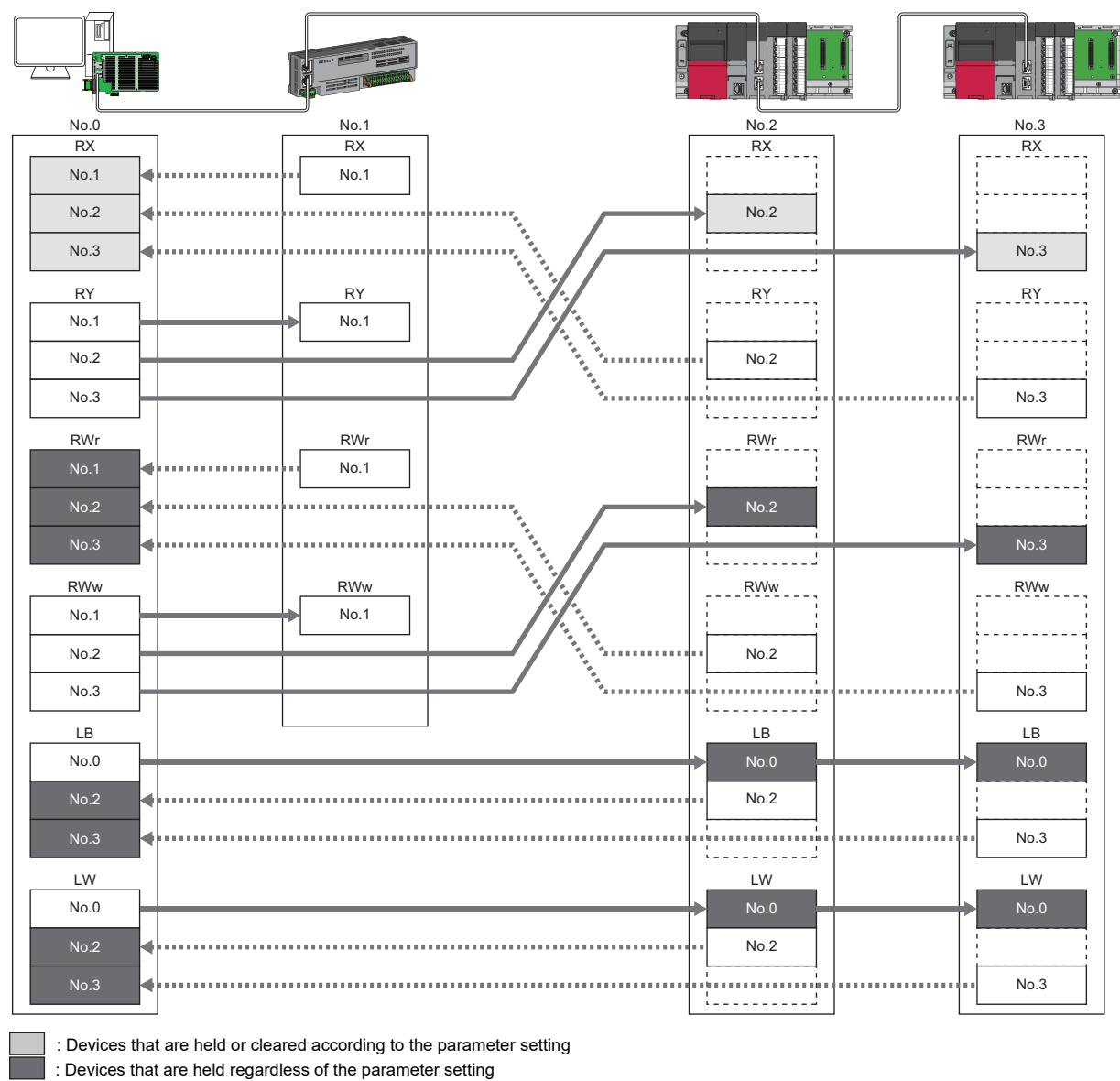
The following table shows devices for which the hold/clear settings are enabled.

Setting items	Hold/clear settings are enabled	Hold regardless of setting	Clear regardless of setting
Output Mode upon Error	Master station RY	—	—
Data Link Error Station Setting	RX	<ul style="list-style-type: none"> • RWr • LB (only the input data from other stations) • LW (only the input data from other stations) 	—

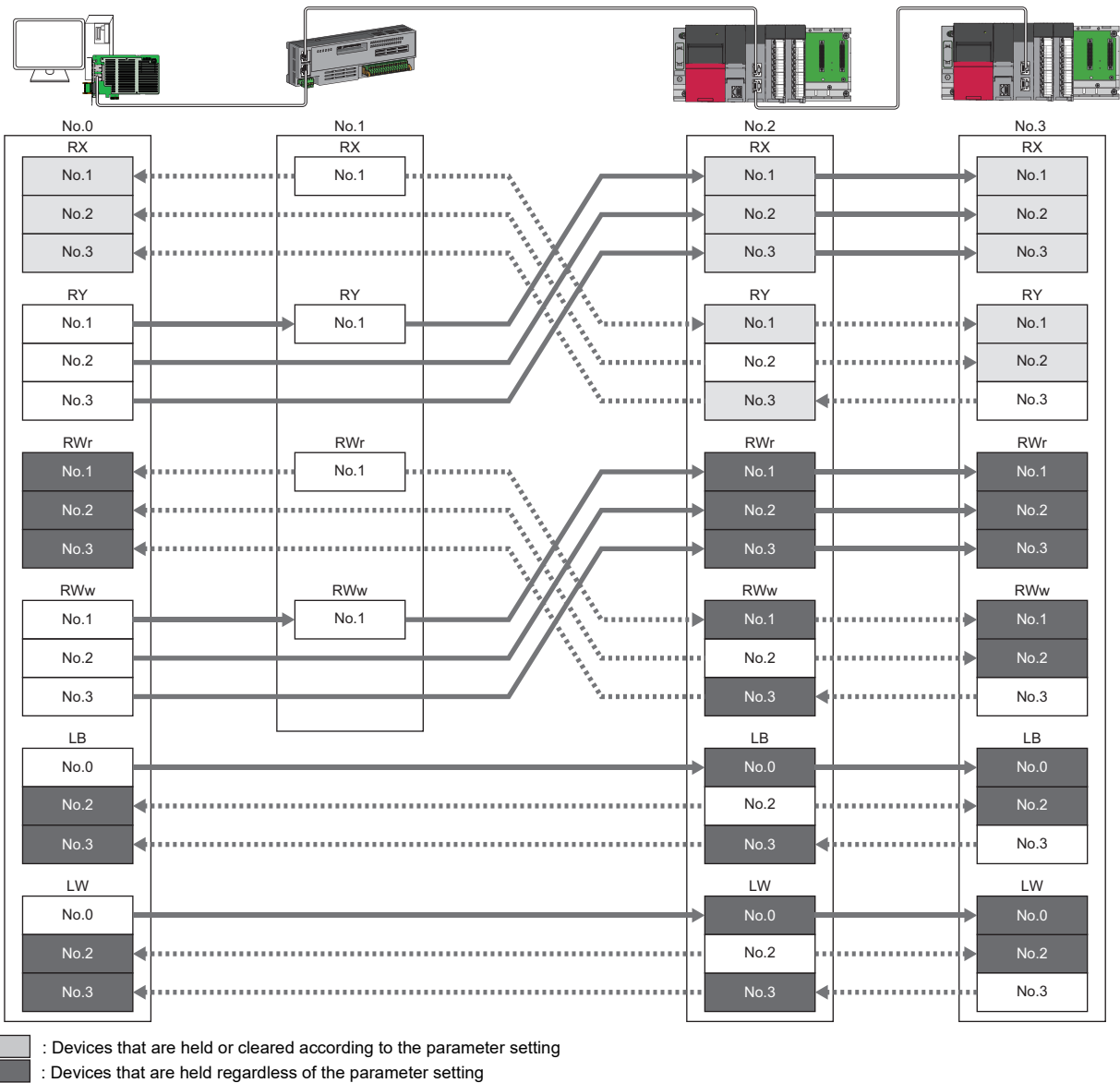
Input data hold/clear operation from the data link faulty station

The following figure shows the devices where "Data Link Error Station Setting" is enabled when each station becomes faulty.

■Unicast mode



■Multicast mode



CANopen communication

The CANopen communication is used for controlling a device that supports the CANopen profile.

The CANopen communication can control a device that supports the CANopen profile with the SDO communication by transient transmission and the PDO communication by cyclic transmission. The SDO communication reads/writes objects non-periodically by using the Motion API to send a command for accessing the CAN application object to the target device station.

Point

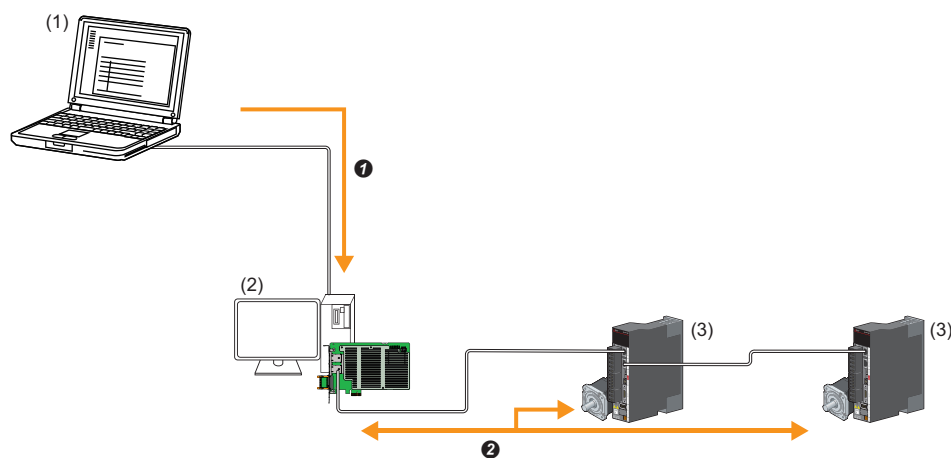
[Motion API]

To perform the Motion API, use the `sscSmpReadSlaveObject` function or the `sscSmpWriteSlaveObject` function.

The PDO communication reads/writes objects defined with the PDO mapping by using the cyclic transmission.

PDO mapping settings are configured in "Cyclic Settings".

The contents of the PDO mapping setting are sent to device stations when the cyclic transmission with device stations starts.



(1) Motion test tool

(2) Host personal computer and Motion control board

(3) Drive unit

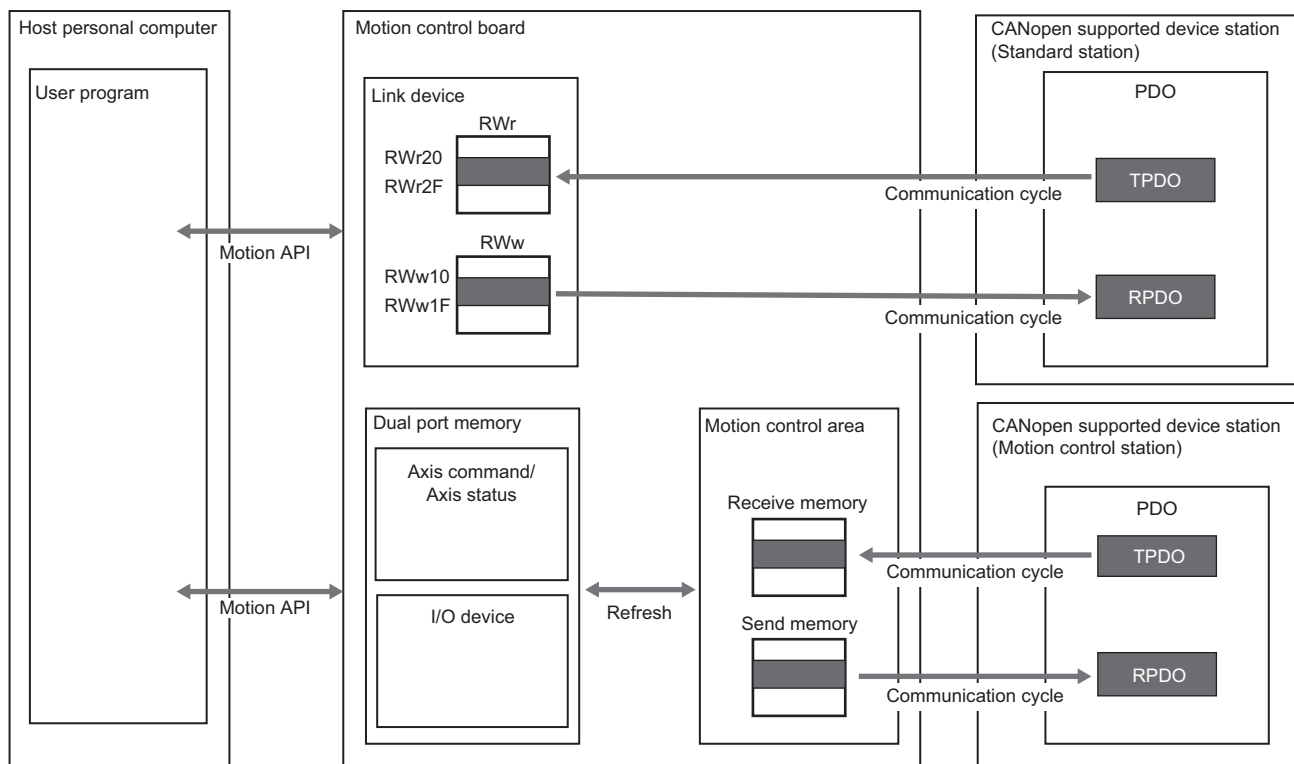
① Writing of the PDO mapping setting

② PDO communication

The PDO (RPDO) output from the master station and the PDO (TPDO) input from the device stations are assigned as follows.

- Motion control station: Dual port memory (Axis command/Axis status, I/O device)
- Standard station: Within link device RWr/RWw

PDO of the standard station and PDO of the motion control station can be controlled from the user program by the Motion API.



Setting method

Set "TPDO Setting" and "RPDO Setting" in "Cyclic Settings". (👉 Page 68 TPDO/RPDO setting)

Precautions

■Multi-axis servo amplifier

When a multi-axis servo amplifier to "Network Configuration Settings" is added, a single device station can use up to eight axes.

■Error code

If the PDO mapping settings are incorrect, the device station responds "PDO mapping setting error" at the initial communication and the data link does not start. Correct the PDO mapping settings.

1.2 Transient Transmission

The transient transmission is used for communications at any timing and has the following two types.

- Communications using the Motion API
- Communications using the engineering tool

Communications using the Motion API

Data is read/written from the master station to a remote station using the Motion API.

Point

[Motion API]

- To read the data, use the `sscSmpReadSlaveObject` function.
 - To write the data, use the `sscSmpWriteSlaveObject` function.
-

Communications using the engineering tool

Each station is set or monitored using the engineering tool.

1.3 Ethernet Connection

This type of connection allows one Motion control board to be connected to an Ethernet device without interfering with CC-Link IE TSN.

CAUTION

When the Ethernet device (such as a personal computer) which is using antivirus/security software performs the Ethernet communication via the CC-Link IE TSN Class B device, "Watchdog Counter Error (error code: 1C41H)" may be occurred. In that case, remove the software performing the Ethernet communication from monitoring by antivirus/security software. However, our company is not responsible for any problems that occur in the Motion control board and in the system caused by excluding the software from monitoring.

Connection with MELSOFT products

Monitoring with the engineering tool is performed via Ethernet. This function enables remote control using Ethernet's long-distance connectivity and high-speed communications.

This section describes the methods of connecting the Motion control board and MELSOFT products (such as the engineering tool).

○: Connection available

Connection method	Purpose	Availability	Reference
		MELSOFT product	
Connection via HUB (Connection by specifying the IP address)	To connect multiple MELSOFT products ^{*1}	○	Page 44 Connection via HUB

^{*1} The condition that only one motion test tool is executed for one personal computer is included.

Connection to use

The system dedicated connection used is a MELSOFT communications port (TCP/IP).

For the number of simultaneous open connections (maximum number of connections), refer to "Specifications of Network Function" in the following manual.

 Motion Control Board User's Manual (Motion Control)

Connection via HUB

■Settings on the Motion control board side

- For connection by specifying the IP address, set the IP address using "IP Address Settings". (📖 Page 66 IP Address Settings)
- Settings by "Network Configuration Settings" are not required.

■Settings on the motion test tool side

Set in the "Project Setting" window.

🖱️ [Project] ⇒ [Project Setting]

Project Setting

Project

Controller

Model: MR-EM441G

Connect Setting

Connection Method: Ethernet Connection via HUB

BUS

Board ID: BoardID 0

Channel: Channel 1

Ethernet

IP Address: 192 168 3 253

Protocol: TCP

Timeout: 10 [s]

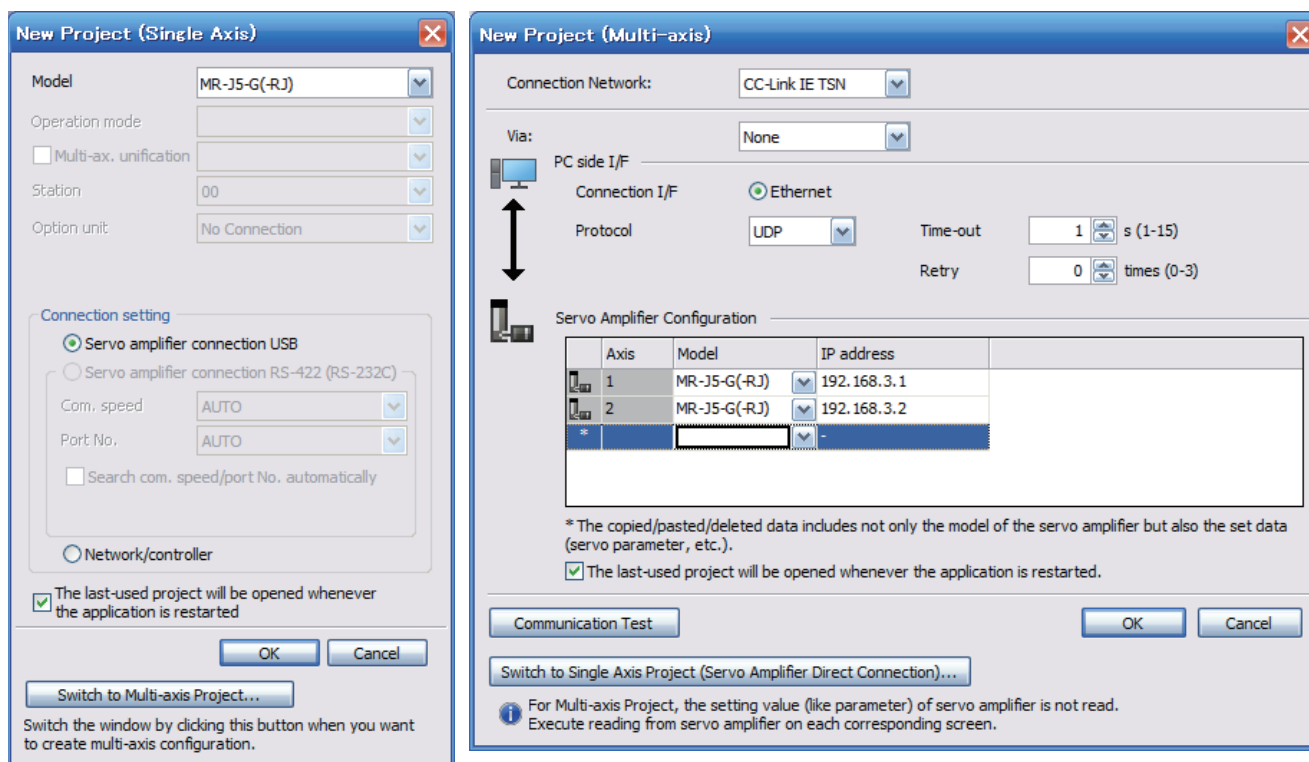
OK Cancel

1. Select "Ethernet Connection via HUB" for the "Connection Method", and enter the IP address of the Motion control board.
2. Set the "Protocol". (Fixed to "TCP")
TCP: A connection is established during communication. Since data is exchanged while confirming that the data has correctly reached the communication destination, the data reliability can be ensured. Note that the line load is larger than UDP/IP communications.

■Connection with MR Configurator2

Set in the "New Project (Multi-axis)" window.

 [Project] ⇒ [New Project] ⇒ Click [Switch to Multi-axis Project] in the "New Project (Single Axis)" window.



New Project (Single Axis)

Model: MR-J5-G(-RJ)

Operation mode: [dropdown]

☐ Multi-ax. unification [dropdown]

Station: 00

Option unit: No Connection

Connection setting

☒ Servo amplifier connection USB

☐ Servo amplifier connection RS-422 (RS-232C)

Com. speed: AUTO

Port No.: AUTO

☐ Search com. speed/port No. automatically

☐ Network/controller

☒ The last-used project will be opened whenever the application is restarted

OK Cancel

Switch to Multi-axis Project...

Switch the window by clicking this button when you want to create multi-axis configuration.

New Project (Multi-axis)

Connection Network: CC-Link IE TSN

Via: None

PC side I/F: [dropdown]

Connection I/F: ☒ Ethernet

Protocol: UDP

Time-out: 1 s (1-15)

Retry: 0 times (0-3)

Servo Amplifier Configuration

Axis	Model	IP address
1	MR-J5-G(-RJ)	192.168.3.1
2	MR-J5-G(-RJ)	192.168.3.2
*	[dropdown]	-

* The copied/pasted/deleted data includes not only the model of the servo amplifier but also the set data (servo parameter, etc.).

☒ The last-used project will be opened whenever the application is restarted.

Communication Test OK Cancel

Switch to Single Axis Project (Servo Amplifier Direct Connection)...

For Multi-axis Project, the setting value (like parameter) of servo amplifier is not read. Execute reading from servo amplifier on each corresponding screen.

1. Select "CC-Link IE TSN" in "Connection Network".

2. Select "None" in "Via".


3. Set the "Protocol". (Fixed to "UDP")

UDP: Since a connection is not established during communication and whether the communication destination has correctly received the data is not confirmed, the line load is lower. Note that the data reliability is lower than TCP/IP communications.

4. Select the Model, input the IP address in the "Servo Amplifier Configuration" and click the [OK] button.



For the specification of MR Configurator2, refer to the following installation guide.

 MR Configurator2 SW1DNC-MRC2-_ INSTALLATION GUIDE

1.4 Security

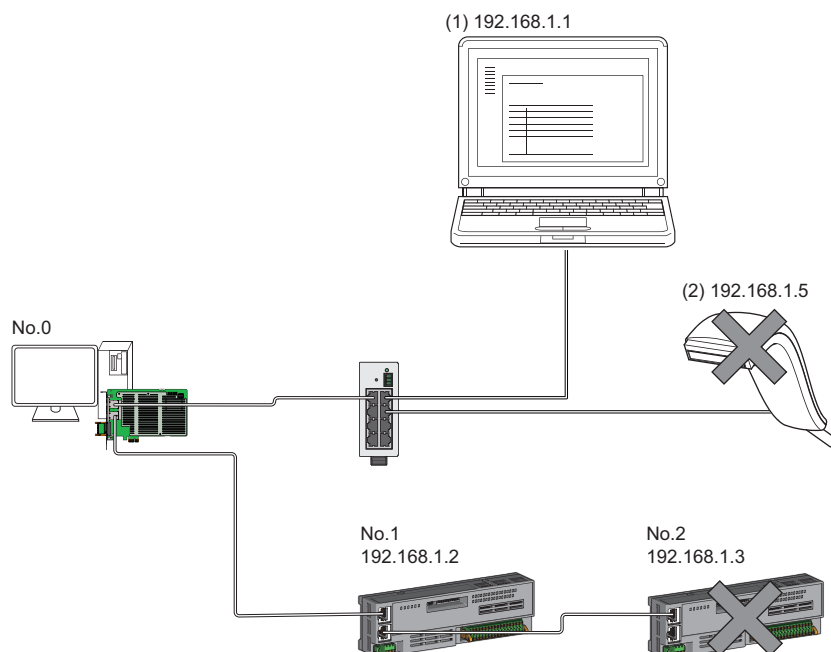
Security for the network environment is structured by restricting access by each communication path to the Motion control board. "IP filter" can be used for access restriction.

IP filter

Identifies the IP address of the access source, and prevents unauthorized access.

By setting the IP address of the access source using the motion test tool, IP packets are allowed or blocked. (Allows or blocks the IP packets received from the access source. IP packets sent from the own station are ignored.)

Use of this function is recommended when using in an environment connected to a LAN line.



When the allowed IP addresses are set to 192.168.1.1 and 192.168.1.2 using the IP filter of the master station No.0:

Only the Ethernet device (1) and device station No.1 can access the master station, and the Ethernet device (2) and device station No.2 cannot access the master station.




The IP filter is one method of preventing unauthorized access (such as a program or data destruction) from an external device. It does not completely prevent unauthorized access. To maintain the security (confidentiality, integrity, and availability) of the Motion control board and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

Our company is not responsible for any problems that occur in the Motion control board and system due to a DoS attack, unauthorized access, computer virus, or other cyberattacks.

Examples of measures for unauthorized access are given below.

- Install a firewall or VPN.
- Install a personal computer as a relay station, and control the relay of send/receive data with an application program.
- Install an external device for which the access rights can be controlled as a relay station. (Contact the network service provider or equipment dealer for details on the external devices for which access rights can be controlled.)

Setting method

1. Set the IP address to be allowed or blocked in the "IP Filter Settings" window under "Application Settings". ( Page 65 IP Filter Settings)
A warning is displayed in the following cases.
 - Blocking the IP address of the device station set in "Network Configuration Settings"
 - A device station is not set in "Network Configuration Settings" and the allowed target IP address is not set in the "IP Filter Settings" window (because the IP filter blocks every IP address)
2. Write the network parameters to the Motion control board.
3. The IP filter is enabled when power is turned OFF and ON or the software is rebooted.

Point


Even if the connection was specified in "Network Configuration Settings", access from the external device is either allowed or blocked according to the setting in the "IP Filter Settings" window.

Setting Target

Allow or block should be set to all IP addresses that connect to the same network. Also, set allow or block to the IP address of the device station that is registered in "Network Configuration Settings".

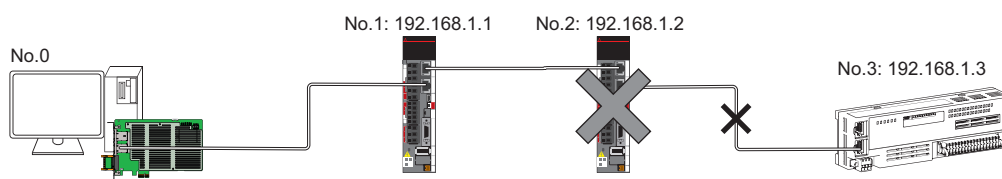
The setting can be registered to the master station, and the IP packets received from the device station of the registered IP address are allowed or blocked according to the setting details.

Operation

Even for the device station registered in "Network Configuration Settings", a station with an IP address set as blocked can become a disconnected station. As a result, cyclic transmission and transient transmission are not performed. Such a station is displayed as "Not executed" in the Cyclic status on the "Network Diagnosis (CC-Link IE TSN Diagnosis)" window. However, Ethernet devices are not displayed on the "Network Diagnosis (CC-Link IE TSN Diagnosis)" window. ( Page 79 Network Diagnosis (CC-Link IE TSN Diagnosis))

Precautions

- Do not set the IP addresses of the master station or device stations as blocked. When a device station using the line topology is set as blocked, cyclic and transient transmissions cannot be performed on the device stations that are connected after the device station set as blocked.



When the blocked IP address is set to 192.168.1.2 using the IP filter of the master station No.0:

Only the device station No.1 can access the master station, and the device station No.2 and the device station No.3 cannot access the master station.

- If there is a proxy server in the LAN line, block the IP address for the proxy server. If the IP address is allowed, it will not be possible to prevent access from personal computers that access the proxy server.
- To block access from an external device to another station, block access to the connected station (station connected directly to an external device) by using the IP filter.

1.5 RAS

This acronym stands for Reliability, Availability, and Serviceability. This function improves overall usability of automated equipment.

Device station disconnection


Data link of the station where the error occurred is stopped, and the data link continues only for stations that are operating normally.

Automatic return

When the disconnected device station recovers from an error, the data link is automatically resumed.

Precautions

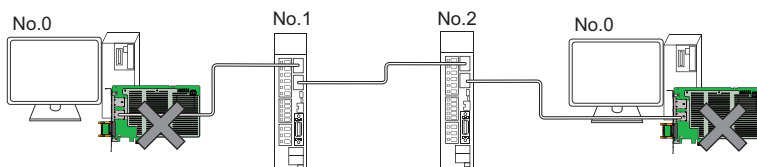
- When removing a device station while the system is operating, check that the device station is performing cyclic transmission or has been disconnected.
- The following are the operations depending on the version of the basic system software version.

The basic system software version	Description
"02" or earlier	Automatic return is not supported.
"03" or later	<ul style="list-style-type: none">• When a device station with a model name different from the disconnected device station is returned, "Configuration mismatch on return (error code: 1C49H)" occurs. For details, refer to "System Error" in the following manual.  Motion Control Board User's Manual (Motion Control)• For MR-J5(W)-G with axis No. allocation, automatic return is not supported.

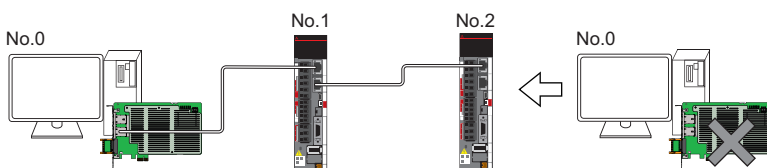
Master station duplication detection

If one network has multiple master stations, an overlap is detected.

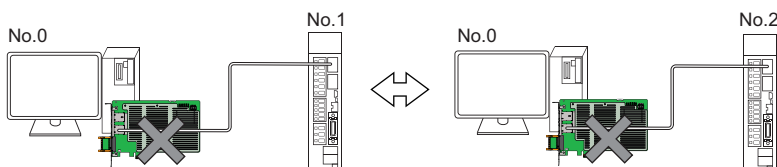
- When multiple master stations are simultaneously powered ON, or when multiple master stations are simultaneously connected, "Master Station Duplication Detected (error code: 300FH)" is detected in all master stations and cyclic transmission cannot be performed in all stations. (Transient transmission available)



- If another master station is added to the network during data link, "Master Station Duplication Detected (error code: 300FH)" is detected in the added master station and cyclic transmission cannot be performed. (Transient transmission available) Other stations continue data link.



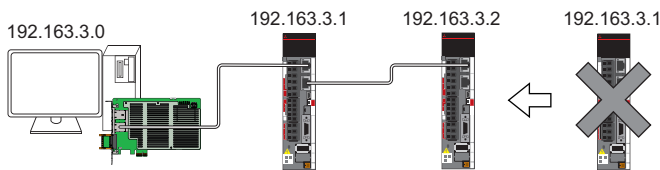
- If two networks are connected during data link, "Master Station Duplication Detected (error code: 300FH)" is detected in master stations on both networks and cyclic transmission cannot be performed in all stations. (Transient transmission with IP address specification is available.)



IP address duplication detection

If one network has stations with the same IP address, an overlap is detected.

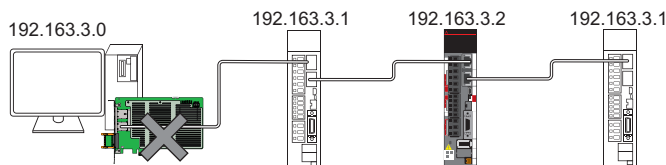
- When adding a device station, if a station with the same IP address already exists, "IP Address Duplication Detected (error code: 2160H)" is detected in a station to be added and data link cannot be performed. (Other stations continue data link.)



Precautions

When adding a device station, which has already been connected (linked up) with a TSN hub and the TSN hub is added to the network, an overlapping IP address is not detected in a station to be added. If "IP Address Duplication Detected (error code: 1802H)" is detected in the master station, disconnect the relevant device station from the network. Otherwise, multiple stations with the same IP address will exist on the same network, possibly leading to transient transmission being sent to an unintended station.

- If the startup processing of cyclic transmission is executed by powering OFF and ON the master station, when a station with the same IP address is in the network, "IP Address Duplication at Device Station Detected (error code: 3021H)" is detected in the master station and data link cannot be performed.



- During cyclic transmission, an overlapping IP address is regularly confirmed in the master station. When there are overlapping IP addresses, "IP Address Duplication Detected (error code: 1802H)" is detected in the master station and cyclic transmission cannot be performed with the relevant device station. (Other stations continue data link.)

Restriction

- An overlapping IP address between an Ethernet device and a CC-Link IE TSN device, and an overlapping IP address between Ethernet devices are not detected at cyclic transmission startup of the master station.
- Station No. duplication is not detected.

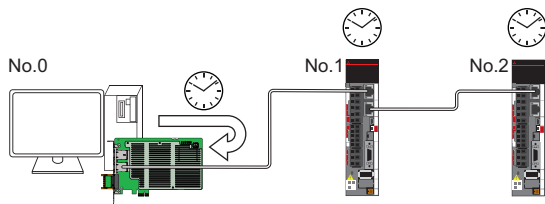
Methods of recovery from an overlapping IP address

If "IP Address Duplication Detected (error codes: 1802H)" or "IP Address Duplication at Device Station Detected (error code: 3021H)" is detected in the master station, the Motion control board changes the indication (such as LEDs) of the stations with overlapping IP addresses. Remove the corresponding station or change its IP address, and power OFF and ON or reboot the software.

Time synchronization

This synchronizes the time of device stations with the time synchronization source (the master station).

1



Setting method

The time synchronization is set automatically by using the time of starting the host personal computer and rebooting the software of the Motion control board.

Point

Since periodic time correction is not supported after starting the host personal computer and rebooting the software, there is a time deviation from the time of the host personal computer.

1.6 CC-Link IE TSN Network Synchronous Communication Function

This section describes the CC-Link IE TSN Network synchronous communication function.

Restriction

When the basic system software version is "03" or earlier, standard stations do not support the CC-Link IE TSN Network synchronous communication function. If "Standard station" is set in "Network Configuration Settings", an error "Network parameter error (error code: 2221H)" occurs.

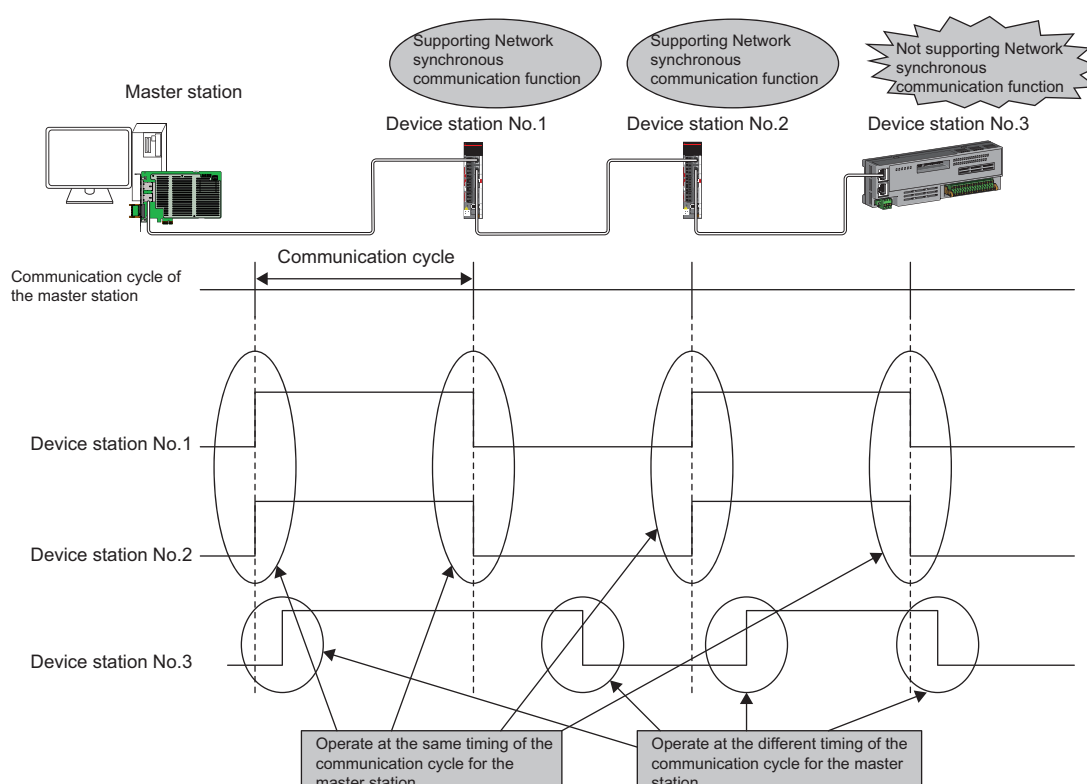
Overview

■Standard station

This function synchronizes the control cycle of a device station according to the communication cycle of the master station.

Point

- The following device stations can be connected: device stations not supporting the CC-Link IE TSN Network synchronous communication function and device stations in which the network synchronous communication setting is not set. However, they cannot synchronize with the inter-module synchronization cycle.
- For the availability of the CC-Link IE TSN Network synchronous communication function for each device station, refer to the manual of each device station.

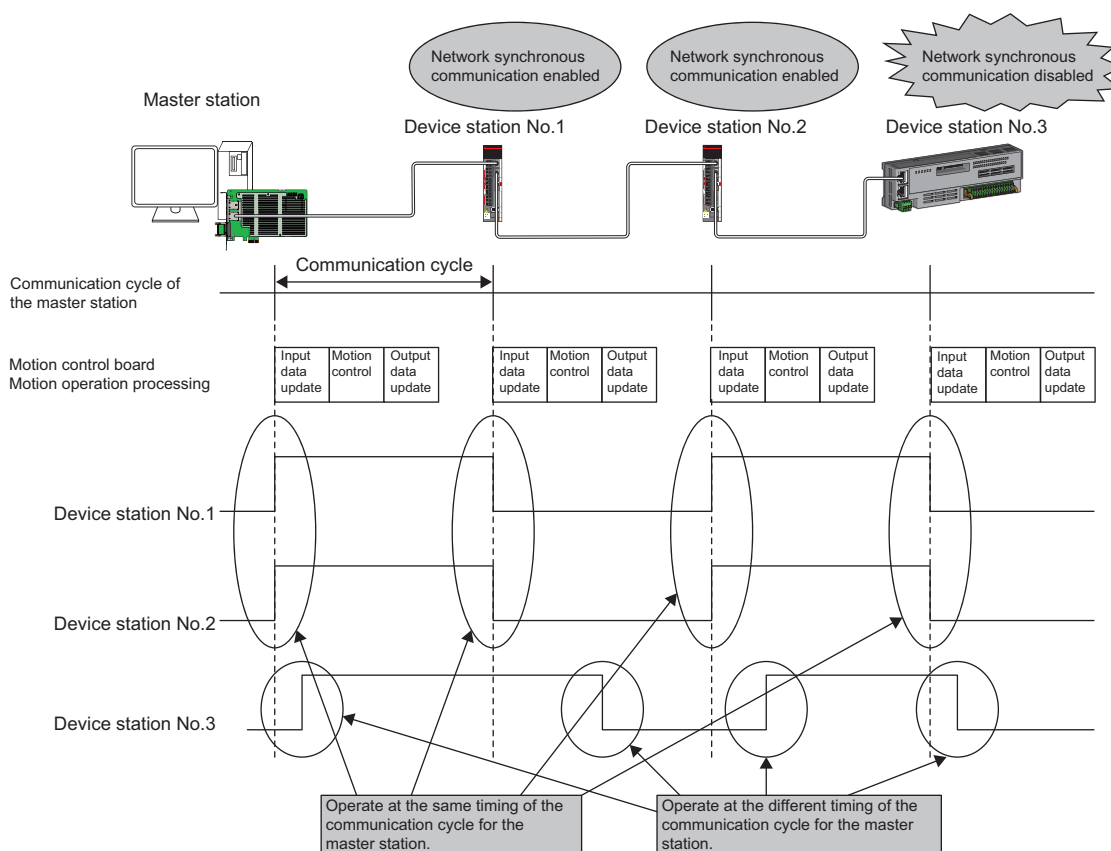


■Motion control station

This function synchronizes the control cycle of a device station according to the communication cycle of the master station. This adjusts the operation timing of the motion calculation of the Motion control board with a device station set as the motion control station.

Point

The following device stations can be connected: device stations not supporting the CC-Link IE TSN Network synchronous communication function and device stations in which the network synchronous communication setting is not set. However, they cannot synchronize with the motion calculation of the Motion control board. Whether the connected device station is compatible with the CC-Link IE TSN Network synchronous communication function can be confirmed with 'Information of CC-Link IE TSN Network synchronous communication function of each station' (SW01C0 to SW01C7). For the availability of the CC-Link IE TSN Network synchronous communication function for each device station, refer to the manual of each device station.



Setting method

In "Cyclic Settings", set "NetworkSync" of the device station to enable the network synchronous communication to "Do".

Applicable device

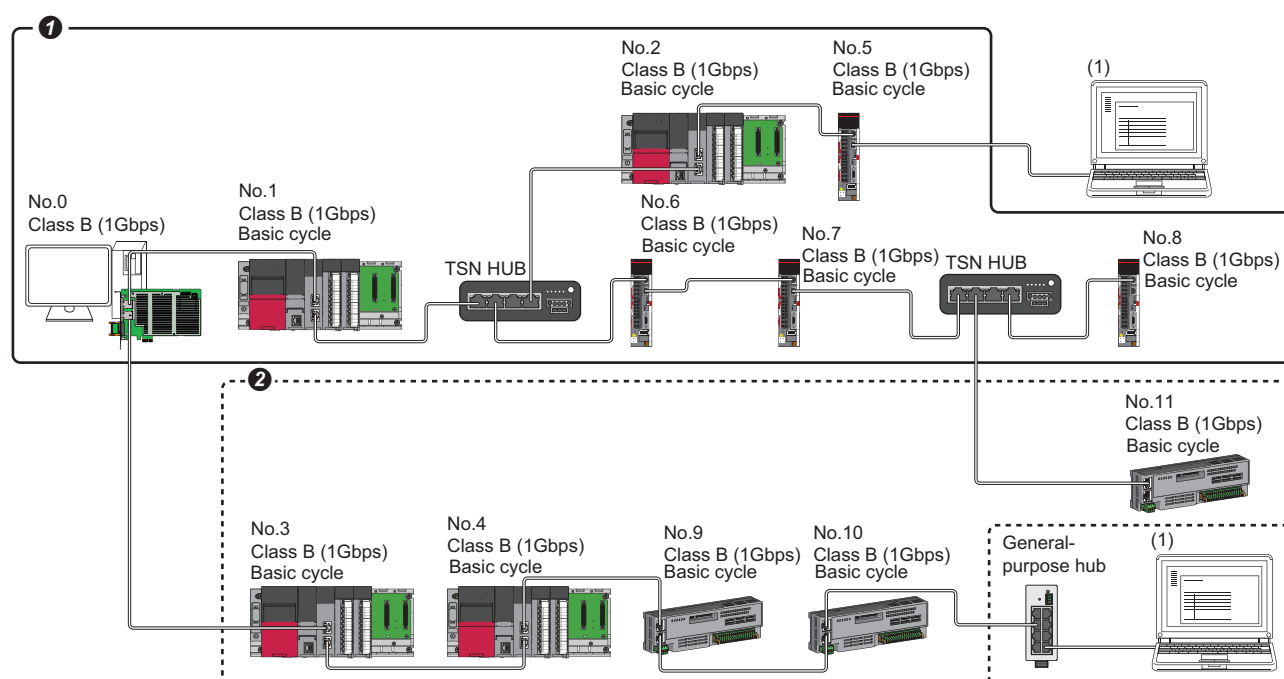
The following table shows the devices that can be synchronized by the CC-Link IE TSN Network synchronous communication function.

○: Synchronizable, ×: Not synchronizable

CC-Link IE TSN Network synchronous communication function	CC-Link IE TSN Class	Communication speed	Communication cycle setting	Synchronization
Not supported	—	—	—	×
Supported	CC-Link IE TSN Class A device	—	—	×
	CC-Link IE TSN Class B device	1Gbps	Basic cycle	○

Available range of network synchronous communication

■ Configuration with CC-Link IE TSN Class B only



Class B: CC-Link IE TSN Class B device

No.0: Master station

No.1 and No.2: Local station (device where "NetworkSync" is set to "Do")

No.3 and No.4: Local station (device where "NetworkSync" is set to "Do not")

No.5, No.6, No.7, and No.8: Remote station (device where "NetworkSync" is set to "Do")

No.9, No.10 and No.11: Remote station (device where "NetworkSync" is set to "Do not")

(1) Ethernet device (1Gbps)

① The synchronization can be performed using the network synchronous communication.

② Even for a CC-Link IE TSN Class B device, synchronization is not possible if "NetworkSync" is set to "Do not".

Cyclic transmission assurance by watchdog counter

The watchdog counter is a function used to assure normal cyclic transmission between stations on CC-Link IE TSN. Using the watchdog counter, the master station and a device station mutually monitor the data to be updated every communication cycle; the master station monitors data received from a device station and a device station monitors data received from the master station.

If "Synchronous Watchdog Counter Error (error code: 1D20H)" has occurred, data of that station will not be received even after the watchdog counter returns to normal. To restart, power OFF and ON of the Motion control board, reboot the software, or disconnect the device station and return it.

Point

- Whether the device stations performing data link with the master station is using the watchdog counter can be confirmed with 'Watchdog counter operating status information for each station' (SW01D0 to SW01D7).
- "Synchronous Watchdog Counter Error (error code: 1D20H)" will be detected for device stations without axis setting with the motion control setting function. For device stations with axis setting, "Watchdog Counter Error (error code: 1C41H)" will be detected instead.
- If "WDT error (error code: 1C41H)" has occurred, operation can be resumed by performing error reset.

Restriction

Before using this function, confirm the basic system software version of the Motion control board. For details, refer to "Restrictions by The Software's Version" in the following manual.


 Motion Control Board User's Manual (Motion Control)

■Operation

When the master station is powered OFF and ON, the software is rebooted, or a device station is disconnected and returned, the master station stores insufficient time for the transient transmission time in 'Transient transmission addition time (calculation value)' (SW007A).

If a value has been stored in 'Transient transmission addition time (calculation value)' (SW007A), add the value to the setting values for "Communication Period Interval Setting" and "Transient Transmission Time" of "Communication Period Setting" under "Basic Settings" of the master station.


■Setting method

The settings of the master station are not required to use the watchdog counter. However, the settings may be required depending on a device station used. ( Manual for the device station used)

Precautions

When the Motion control board with the basic system software version "01" or a device station does not perform the watchdog counter, 0 is stored in 'Transient transmission addition time (calculation value)' (SW007A).

Precautions

- For the number of connectable stations of CC-Link IE TSN-compatible devices and their connection order, refer to "SPECIFICATIONS" and "SYSTEM CONFIGURATION" in the following manual.
 Motion Control Board User's Manual (Motion Control)
- To use a switching hub, refer to the CC-Link Partner Association website (www.cc-link.org) for the models and usage methods of supported switching hubs.
- When a switching hub is used, the local station may detect an error at the time of system startup. In such a case, take corrective actions according to the error code.

1.7 Others

Device station parameter automatic setting

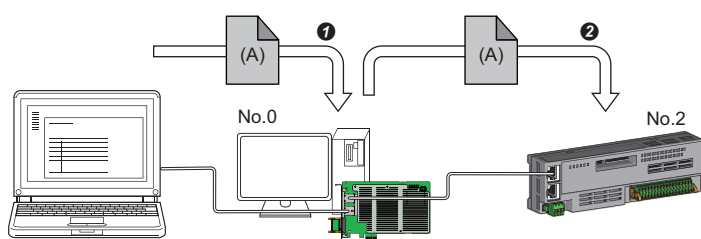
Parameters of the device station are saved in the master station, and the parameters will be automatically set when the device station is returned/connected.

Restriction

When the basic system software version is "03" or earlier, standard stations do not support the device station parameter automatic setting. When "Standard station" is set in "Setting Network Parameter", "Out of Parameter Range (Network) (error code: 3211H)" will occur.

Device station parameter automatic setting from the master station

1. Parameters of the device station set using the motion test tool are saved in the master station by writing.
2. When the device station is returned/connected, saved parameters are automatically set from the master station.




- ① Save the parameter (A) of the device station set by using the motion test tool to the rom drive on the master station (Motion control board).
- ② When the device station is returned/connected, the saved parameter (A) is automatically set from the master station to the device station.

- The master station automatically sets the parameters of the device station and then starts data link with the device station.
- If an error occurred by the device station parameter automatic setting, disconnect the device station and try to connect again. If the error is not eliminated, disconnection and connection are repeated. The cause of the error can be confirmed with 'Detailed execution result of device station parameter automatic setting' (SW0194).
- The execution result of the device station parameter automatic setting can be confirmed with the following link special register (SW).
 - Execution result of the device station parameter automatic setting function (SW0160 to SW0167)
 - Detailed execution result of device station parameter automatic setting (SW0194)

For details, refer to the following.

 Page 100 List of Link Special Register (SW)

- The file name of the device station parameter is "SLAVE□□□□□□□□□□.NSP". For the writing destination of the parameter file, refer to "File Control" in the following manual.
 -  Motion Control Board User's Manual (Motion Control)
- The parameter file is saved in the rom drive in the Motion control board. When the writing destination is incorrect, "No Target Station Parameter (error code: 0C48H)" is output in 'Detailed execution result of device station parameter automatic setting' (SW0194), and the device station fails to start up normally.
- For using MR-J5(W)-G, after the automatic setting of the parameter (A) of the device station by using the motion test tool, and changing the parameter for each axis separately by MR Configurator2, the automatic setting of the parameter (A) is not performed at next return/connection. For writing the destination of the parameter file again, execute the operation referring to the following procedures.
 - (1) Set the parameter (B) of the device station temporarily by using the motion test tool.
 - (2) Write the saved parameter (B) and reboot the software.
 - (3) Set the parameter (A) of the device station by using the motion test tool.
 - (4) Write the saved parameter (A) and reboot the software.

Setting method

Set in the "Network Configuration Setting" window. ( Page 71 Network Configuration Settings)


Precautions

- A device station whose device station parameter automatic setting abnormally ended does not start data link, and 'Execution result of device station parameter automatic setting function' (SW0160 to SW0167) turns ON. Confirm with 'Detailed execution result of device station parameter automatic setting' (SW0194) and the event history and perform corrective actions according to Action of the error codes list.
- Confirm if the checkbox of "Parameter Automatic Setting" of the device station is selected in "Network Configuration Settings" under "Setting Network Parameter"
- Confirm if the IP address of the device station in "Network Configuration settings" under "Setting Network Parameter" matches the actual IP address of the device station.
- If the parameter of the device station is directly changed from the engineering tool while being connected with the Motion control board, the parameter of the device station saved in the project may not match with the parameter of the master station.

Point

- When the servo parameter "Parameter automatic backup update interval (PN20)" is set by MR-J5(W)-G, a drive unit alarm [AL.19E.1_Parameter automatic backup setting warning] may occur. Therefore, be sure not to set the parameter.
- Executing the following operation may corrupt the parameter of the device station in the master station. If the parameter of the device station in the master station is corrupted, data link with the device station is not started.
 - (1) Execute "Parameter Write" from the motion test tool while the device station that is selected in the checkbox of "Parameter Automatic Setting" is being set.
 - (2) After executing "Parameter Write", power OFF the Motion control board or reboot the software before starting data link with the device station.

For details in case of not starting data link, refer to the following.

 Page 81 Cyclic transmission failed

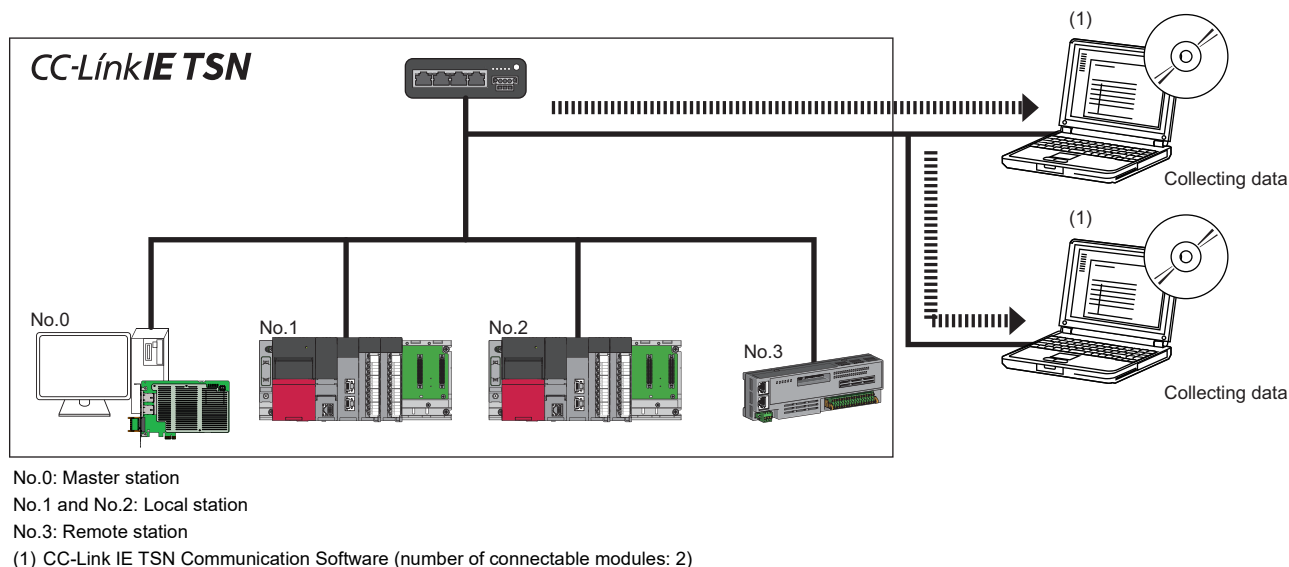
- If the following operations are executed, the parameter of the device station in the master station may not match with the parameter of the device station saved in the project. (The target station is the device station that is selected in the checkbox of "Parameter Automatic Setting" of the device station in "Network Configuration Settings" under "Setting Network Parameter".)
 - Change the parameter of the device station from the engineering tool during communication with the drive unit while being connected with Motion control board.
 - Connect to the drive unit in which the parameter of the device station was changed from the engineering tool and start communication while being connected with the Motion control board.

In addition, in case of reading the parameter of the device station from the motion test tool, the parameter of the device station saved in the project is read, so the displayed contents may not match with the actual setting contents as well.

Data collection using the CC-Link IE TSN Communication Software

The cyclic data of each CC-Link IE TSN station is received using the CC-Link IE TSN Communication Software. For details on the CC-Link IE TSN Communication Software, refer to the following.

 CC-Link IE TSN Communication Software for Windows User's Manual



Restriction

This function is supported by the basic system software version "05" or later.


System configuration

For details of the system configuration, refer to "SYSTEM CONFIGURATION" of the following manual.

 Motion Control Board User's Manual (Motion Control)

Setting method

When connecting the CC-Link IE TSN Communication Software, set multicast mode.

 "Setting Network Parameter" ⇒ "Application Settings" ⇒ "Communication Mode" ⇒ "Mode" ⇒ "Multicast"

Precautions


■About "Network Diagnosis (CC-Link IE TSN Diagnosis)"

The CC-Link IE TSN Communication Software information cannot be displayed using "Network Diagnosis (CC-Link IE TSN Diagnosis)".


2 PARAMETER SETTINGS

This chapter describes the parameter settings required for communication between the Motion control board and other stations.

2.1 Setting Parameters

1. Create a new project using the motion test tool.
2. Open "Network Parameter" window.
 Project Tree ⇒ "Network Parameter" ⇒ "CC-Link IE TSN"
3. Select [Edit] in the "Network Parameter" window and start the "Setting Network Parameter".
4. Set the Required Settings, Basic Settings, Application Settings, IP Address Settings, Cyclic Settings, and Network Configuration Settings.
5. After setting the parameters, click [Project] and select [Close With Saving].
6. Select [Write] in the "Network Parameter" window and write the parameters to the Motion control board.
(At that time, select [Project] ⇒ [Open Connection] and connect to the Motion control board.)
7. The parameters are reflected by powering OFF and ON the Motion control board or rebooting the software.

Point

- The "initial values" described on the Required Settings, Basic Settings, Application Settings, IP Address Settings, Cyclic Settings, and Network Configuration Settings pages (initial value) are the values that are displayed when the [Set Default Value] button on the "Network Parameter" window of the motion test tool is clicked.
- Because the parameters do not exist at factory shipment, "Network Parameter File Not Found (error code: 3210H)" will occur.
- If writing the parameter file is failed, "Out of Parameter Range (Network) (error code: 3211H)" will occur.
- To control MR-J5(W)-G as an axis, refer to "Parameter Setting" in the following manual.
 Motion Control Board User's Manual (Motion Control)

2.2 Required Settings

Set the time synchronization method of the Motion control board.

Parameter Settings X

▼ Required Settings	
Time synchronization setting	
CC-Link IE TSN Class Setting	CC-Link IE TSN Class B Only ▼
▶ Basic Settings	
▶ Application Settings	

2

Time synchronization setting

Item	Description	Setting range	Initial value
CC-Link IE TSN Class Setting	Set the time synchronization method of the CC-Link IE TSN Network. <ul style="list-style-type: none">When connected device is CC-Link IE TSN Class B Only: IEEE802.1AS	Fixed to [CC-Link IE TSN Class B Only]	CC-Link IE TSN Class B Only



The Motion control board performs the time synchronization automatically by using the time of powering on the host personal computer or rebooting the software.

2.3 Basic Settings

Set the communication cycle and other parameters for the Motion control board.

Parameter Settings X

▸ Required Settings

▼ Basic Settings

Transmission Path Method Setting

Transmission Path Method Setting

Line/Star ▾

Communication Period Setting

Communication Period Setting

Detail Setting...

▸ Application Settings

Transmission Path Method Setting

Item	Description	Setting range	Initial value
Transmission Path Method Setting	Set the connection method with the connection module.	Fixed to [Line/Star]	Line/Star



Communication Period Setting

Set the basic cycle setting.

Basic Period Setting

Item	Description	Setting range	Initial value
Communication Period Interval Setting	Set the communication cycle interval. When the version of basic system software is "02" or earlier, it is unusable except 125.00μs to 500.00μs.	<ul style="list-style-type: none"> • 62.50μs • 125.00μs • 250.00μs • 500.00μs • 1000.00μs • 2000.00μs 	1000.00μs
System Reservation Time	Set the system reservation time. Necessary time for the system to guarantee the communication cycle interval. It is unusable except 20.00μs.	20.00μs	20.00μs
Cyclic Transmission Time	Set the cyclic transmission time. Input the calculation result according to the link points of the CC-Link IE TSN configuration.	5.00μs to 1966.00μs	500.00μs
Transient Transmission Time	Set the transient transmission time. The value of "Communication Period Interval Setting" minus "Cyclic Transmission Time" and "System Reservation Time" is displayed.	14.00μs to 1975.00μs	480.00μs

Point

- Some communication cycles do not correspond to some device stations. Confirm the specifications of each device.
- Display "Cyclic Transmission Time (Min.)" on the "Cyclic Settings" window. For "Cyclic Transmission Time (Min.)", refer to the following.
 Page 67 Cyclic Settings
- For the calculation method of "Cyclic Transmission Time", refer to the following.
 Page 107 Processing Time

Restriction

When the communication cycle is set to 62.50μs, only the line topology is compatible. When connecting with star topology or star and line mixed, set the communication cycle to 125.00μs or more.

2.4 Application Settings

Set the IP filter and other settings for the Motion control board.

Parameter Settings X	
▶ Required Settings	
▶ Basic Settings	
▼ Application Settings	
Supplementary Cyclic Settings	
Block Data Assurance per Station	Disable ▼
I/O Maintenance Settings	
Data Link Error Station Setting	Hold ▼
Output Mode upon Error	Hold ▼
Setting of number of Error Detection for Cyclic	
Setting of number of Error Detection	4 times ▼
Communication Mode	
Mode	Unicast ▼
Acquisition Setting of event in other stations	
Acquisition Setting of event in other stations	Disable ▼
IP Filter Settings	
IP Filter	Not Use ▼
IP Filter Settings	Detail Setting...

Supplementary Cyclic Settings

Item		Description	Setting range	Initial value
Block Data Assurance per Station		Set whether to assure the data. Regardless of the setting, the motion control station is operated with "Disable".	Fixed to [Disable]	Disable
I/O Maintenance Settings	Data Link Error Station Setting	Select whether to hold or clear the input data from the device station which was disconnected.	Fixed to [Hold]	Hold
	Output Mode upon Error	Select whether to hold or clear the output setting when the user program and the Motion control board completed with an error.	Fixed to [Hold]	Hold

Setting of number of Error Detection for Cyclic

Item	Description	Setting range	Initial value
Setting of number of Error Detection	Set the number of consecutive communication failures until the device station is considered disconnected.	• 2 times • 4 times • 8 times	4 times

Communication Mode

Item	Description	Setting range	Initial value
Mode	Set the communication mode suitable for the intended purpose.	• Unicast • Multicast	Unicast

Acquisition Setting of event in other stations

Item	Description	Setting range	Initial value
Acquisition Setting of event in other stations	Set whether to obtain the events occurring in the other stations.	Fixed to [Disable]	Disable

IP Filter Settings

Item	Description	Setting range	Initial value
IP Filter	Select whether to use the IP filter function.	<ul style="list-style-type: none"> • Not Use • Use 	Not Use
IP Filter Settings	Set the IP addresses to be allowed or denied.	Page 65 IP Filter Settings	

IP Filter Settings

Up to 32 IP addresses can be set as an IP address to be allowed or denied by the IP filter.

Also, a single setting can specify a range of IP addresses and can set IP addresses to be excluded from the specified range.

Item	Description	Setting range	Initial value
Access from IP addresses below	Set whether to allow or deny the access from the specified IP addresses.	<ul style="list-style-type: none"> • Allow • Deny 	Allow
Range Setting	Check this item when specifying the IP addresses by range.	—	Clear
IP Address	Set the IP addresses to be allowed or denied. When "Range Setting" is checked, enter the start IP address (left field) and the end IP address (right field) of the range.	1.0.0.1 to 223.255.255.254	Empty
IP Address Excluded from Range	When "Range Setting" is checked, set the IP address to be excluded from the range of "IP Address". For "IP Address Excluded from Range", up to 32 IP addresses can be set.	1.0.0.1 to 223.255.255.254	Empty

Point

When the CC-Link IE TSN device station in which the IP filter is set to "Deny", is connected, the CC Link IE TSN device station of the denied IP filter repeats the initial communication of the CC Link IE TSN.

2.5 IP Address Settings

Set IP addresses of the Motion control board and the device station.

IP Address Settings X

Check

IP address assignment...

StaNo.	No.	Instance Name	Model Name	IP Address	Subnet Mask
		▼ Motion Control Board	MR-EM441G	192.168.3.253	255.255.255.0
1	1	RJ71GN11-T2	RJ71GN11-T2	192.168.3.1	
2	2	MR-J5-G	MR-J5-G	192.168.3.2	
3	3	MR-J5W2-G	MR-J5W2-G	192.168.3.3	
4	5	MR-J5W3-G	MR-J5W3-G	192.168.3.4	
5	8	NZ2GN2S1-32TE	NZ2GN2S1-32TE	192.168.3.5	
6	9	NZ2GN2S1-32D	NZ2GN2S1-32D	192.168.3.6	

IP address setting of the own station

Item	Description	Setting range	Initial value
IP Address	Set the IP address of the own station (Motion control board).	1.0.0.1 to 223.255.255.254	192.168.3.253
Subnet Mask	Set the subnet mask of the own station (Motion control board).	<ul style="list-style-type: none"> 255.0.0.0 (Class A) 255.255.0.0 (Class B) 255.255.255.0 (Class C) 	255.255.255.0

IP address setting of other stations

Item	Description	Setting range	Initial value
IP Address	Set the IP address of the connection module.	1.0.0.1 to 223.255.255.254	192.168.3.1



Since the own station and other stations are on the same network, match the network part of the IP address of the other stations and the network part of the IP address of the own station.

2.6 Cyclic Settings

Set the cyclic transmission of the Motion control board.

Cyclic Settings X

Simple view

Assignment Method: Points/Start

Check

Reallocate address

Cyclic Transmission Time (Min.): 32.00 us
Communication Period Interval (Min.): 125.00 us

StaNo.	No.	Instance Name	Model Name	IP Address	Station Type	Multidrop Number	Link Device																CANopen		Network Sync	Communication Period			
							RX Setting		RY Setting		RWr Setting		RWw Setting		LB Setting		LW Setting		TPDO Setting	RPDO Setting									
							Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End	Size(Byte)	Size(Byte)			
1	1	Motion Control Board	MR-EM441G	192.168.3.253	Master station		32	0000	001F	32	0000	001F	16	0078	0087	16	0064	0073	64	0000	003F	32	0000	001F				Do not	Basic Period
2	2	RJ71GN11-T2	RJ71GN11-T2	192.168.3.1	Local station								24	0000	0017	20	0000	0013										Do not	Basic Period
3	3	MR-J5-G	MR-J5-G	192.168.3.2	Remote station	0							24	0018	002F	20	0014	0027										Do not	Basic Period
4	4	MR-J5W2-G	MR-J5W2-G	192.168.3.3	Remote station	1							24	0030	0047	20	0028	003B										Do not	Basic Period
5	5	MR-J5W2-G_B_Axis	MR-J5W2-G_B_Axis	192.168.3.4	Remote station	0							24	0030	0047	20	0028	003B										Do not	Basic Period
6	6	MR-J5W3-G	MR-J5W3-G	192.168.3.4	Remote station	1							24	0048	005F	20	003C	004F										Do not	Basic Period
7	7	MR-J5W3-G_BC_Axis	MR-J5W3-G_BC_Axis	192.168.3.5	Remote station	2							24	0060	0077	20	0050	0063										Do not	Basic Period
8	8	NZ2GN251-32TE	NZ2GN251-32TE	192.168.3.5	Remote station		32	0020	003F	32	0020	003F	4	0088	008B	4	0074	0077										Do not	Basic Period
9	9	NZ2GN251-32D	NZ2GN251-32D	192.168.3.6	Remote station		32	0040	005F	32	0040	005F	4	008C	008F	4	0078	007B										Do not	Basic Period

Link device

Item	Description	Setting range	Initial value
RX Setting Points	Set the points of the remote input to receive.	No Setting, 16 to 16384	Follows the profile
RX Setting Start/End	Set the start and end offset of the remote input to receive.	<ul style="list-style-type: none"> Start: 0000h to 3FF0h End: 000Fh to 3FFFh 	0000h
RY Setting Points	Set the points of the remote output to send.	No Setting, 16 to 16384	Follows the profile
RY Setting Start/End	Set the start and end offset of the remote output to send.	<ul style="list-style-type: none"> Start: 0000h to 3FF0h End: 000Fh to 3FFFh 	0000h
RWr Setting Points	Set the points of the remote register to receive.	No Setting, 4 to 8192	Follows the profile
RWr Setting Start/End	Set the start and end offset of the remote register to receive.	<ul style="list-style-type: none"> Start: 0000h to 1FFCh End: 0003h to 1FFFh 	0000h
RWw Setting Points	Set the points of the remote register to send.	No Setting, 4 to 8192	Follows the profile
RWw Setting Start/End	Set the start and end offset of the remote register to send.	<ul style="list-style-type: none"> Start: 0000h to 1FFCh End: 0003h to 1FFFh 	0000h
LB Setting Points	Set the points of the link relay to send from each station of the network.	No Setting, 16 to 32768	Follows the profile
LB Setting Start/End	Set the start and end offset of the link relay to send from each station of the network.	<ul style="list-style-type: none"> Start: 0000h to 7FF0h End: 000Fh to 7FFFh 	0000h
LW Setting Points	Set the points of the link register to send from each station of the network.	No Setting, 1 to 16384	Follows the profile
LW Setting Start/End	Set the start and end offset of the link register to send from each station of the network.	<ul style="list-style-type: none"> Start: 0000h to 3FFFh End: 0000h to 3FFFh 	0000h

CANopen

Item	Description	Setting range	Initial value
TPDO Setting	Set the PDO mapping of TPDO and RPDO. Assign the object within the points of RWr setting and RWw setting.	PDO mapping of TPDO and RPDO (Follows the profile)	Follows the profile
RPDO Setting	Set only the connection module which compatible with CANopen.		

TPDO/RPDO setting

Set the PDO mapping of TPDO and RPDO.

TPDO Setting

No. 1Instance Name MR-J5-GMultidrop No. 0

1.Determine The Index

Sel...	Index	PDO Name
<input checked="" type="radio"/>	0x1A00	1st Transmit PDO Mapping
<input type="radio"/>	0x1A01	2nd Transmit PDO Mapping
<input type="radio"/>	0x1A02	3rd Transmit PDO Mapping
<input type="radio"/>	0x1A03	4th Transmit PDO Mapping

Decision

2.Set PDO Mapping Entry

Confirmed PDO	Index	PDO Name
	0x1A00	1st Transmit PDO Mapping

42 / 48[byte]

No.	Offset[...]	Index	Subin...	Size...	Data Type	PDO Entry Name	Comment
1	0	1D02h	01h	16	UNSIGNED16	Watchdog counte...	
2	2	6061h	00h	8	INTEGER8	Modes of operati...	
4	4	6064h	00h	32	INTEGER32	Position actual va...	
5	8	606Ch	00h	32	INTEGER32	Velocity actual val...	
6	12	60F4h	00h	32	INTEGER32	Following error a...	
7	16	6041h	00h	16	UNSIGNED16	Statusword	
8	18	0000h	00h	16	-	-	
9	20	6077h	00h	16	INTEGER16	Torque actual value	
10	22	2D11h	00h	16	UNSIGNED16	Status DO 1	
11	24	2D12h	00h	16	UNSIGNED16	Status DO 2	
12	26	2D13h	00h	16	UNSIGNED16	Status DO 3	
13	28	2D14h	00h	16	UNSIGNED16	Status DO 4	
14	30	2D15h	00h	16	UNSIGNED16	Status DO 5	
15	32	2A41h	00h	32	UNSIGNED32	Current alarm	

Add PDO Entry...Delete PDO Entry

OKCancel

RPDO Setting

No. 1Instance Name MR-J5-GMultidrop No. 0

1.Determine The Index

Sel...	Index	PDO Name
<input checked="" type="radio"/>	0x1600	1st Receive PDO Mapping
<input type="radio"/>	0x1601	2nd Receive PDO Mapping
<input type="radio"/>	0x1602	3rd Receive PDO Mapping
<input type="radio"/>	0x1603	4th Receive PDO Mapping

Decision

2.Set PDO Mapping Entry

Confirmed PDO	Index	PDO Name
	0x1600	1st Receive PDO Mapping

36 / 40[byte]

No.	Offset[...]	Index	Subin...	Size...	Data Type	PDO Entry Name	Comment
1	0	1D01h	01h	16	UNSIGNED16	Watchdog counte...	
2	2	6060h	00h	8	INTEGER8	Modes of operati...	
4	4	607Ah	00h	32	INTEGER32	Target position	
5	8	60Ffh	00h	32	INTEGER32	Target velocity	
6	12	6040h	00h	16	UNSIGNED16	Controlword	
7	14	60E0h	00h	16	UNSIGNED16	Positive torque li...	
8	16	60E1h	00h	16	UNSIGNED16	Negative torque L...	
9	18	6071h	00h	16	INTEGER16	Target torque	
10	20	2D20h	00h	32	UNSIGNED32	Velocity limit value	
11	24	2D01h	00h	16	UNSIGNED16	Control DI 1	
12	26	2D02h	00h	16	UNSIGNED16	Control DI 2	
13	28	2D03h	00h	16	UNSIGNED16	Control DI 3	
14	30	2D04h	00h	16	UNSIGNED16	Control DI 4	
15	32	2D05h	00h	16	UNSIGNED16	Control DI 5	

Add PDO Entry...Delete PDO Entry


OKCancel

Add Entry:1st Transmit PDO Mapping




Index	Subindex	Size[bit]	Data Type	PDO Entry Name
2C11h	01h	32	UNSIGNED32	External output pin display1
2C37h	01h	16	INTEGER16	U phase current
2C37h	02h	16	INTEGER16	V phase current
2C37h	03h	16	INTEGER16	W phase current
2D11h	00h	16	UNSIGNED16	Status DO 1
2D12h	00h	16	UNSIGNED16	Status DO 2
2D13h	00h	16	UNSIGNED16	Status DO 3
2D14h	00h	16	UNSIGNED16	Status DO 4
2D15h	00h	16	UNSIGNED16	Status DO 5
2D16h	00h	16	UNSIGNED16	Status DO 6
2D17h	00h	16	UNSIGNED16	Status DO 7
2D18h	00h	16	UNSIGNED16	For manufacturer's use

OKCancel

The procedure for mapping the TPDO object [Status DO 6 (Obj. 2D16)] is described as follows.

1. Click [TPDO Setting].
-  "Cyclic Settings" ⇒ [TPDO Setting]
2. Click the line to assign [Status DO 6 (Obj. 2D16)]. (The clicked line is displayed in blue.)
3. Select [Status DO 6 (Obj. 2D16)] from [Add PDO Entry].
4. [Status DO 6 (Obj. 2D16)] is inserted in the clicked line.
5. Click [OK].

Point

- When the 8 bits sized object is added, an 8 bits sized object for alignment adjustment is automatically added after the 8 bits sized object. Because the alignment adjustment object is not displayed in the TPDO/RPDO setting window, one No. after the 8 bits sized object is skipped.
- If the PDO mapping size becomes larger such as by adding objects, the operation load becomes higher. If "Cycle Over (error code: 320CH)" has occurred, confirm the operation load by the operation cycle monitor. For details, refer to "Operation Cycle Monitor Function" in the following manual.
 Motion Control Board User's Manual (Motion Control)
- The operation cycle monitor can be easily confirmed by using the motion test tool. The operation can be confirmed by Memory Map [System.adr4] on the Project Tree.
- Do not delete the objects listed in "Necessary objects" under "Operational Function Mode" in the following manual. For the other objects, add/delete them depending on whether the related functions are used or not.
 Motion Control Board User's Manual (Motion Control)
- The maximum number of settable TPDO/RPDO objects are depending on the drive unit to be used.
- For MR-J5(W)-G, the total bytes (per station) of objects that can be assigned to PDO are set depending on the communication cycle. For detail, refer to "CC-Link IE TSN" in the following manual.
 MR-J5-G/MR-J5W-G User's Manual (Communication Function)

NetworkSync Setting

Item	Description	Setting range	Initial value
NetworkSync	Set whether to synchronize the connection module by using the network synchronous communication function.	<ul style="list-style-type: none"> Do not Do 	Do not

Item	Description
Cyclic Transmission Time (Min.)	<p>The cyclic transmission time that are calculated by the number of device stations and the number of link device points is displayed. Use the displayed value as a guide.*¹</p> <p>The displayed value can be used for "Cyclic Transmission Time" in "Communication Period Setting" under "Basic Settings".</p> <p>If cyclic transmission is not performed by setting the displayed value, set a value again by adding the larger of the following.</p> <ul style="list-style-type: none"> 10% of the minimum value of the calculated cyclic transmission time When the communication speed for the master station is set to 1 Gbps: The number of device stations × 2 μs
Communication Period Interval (Min.)* ²	<p>The communication cycle intervals that are calculated by the number of device stations and the number of link device points are displayed. Use the displayed value as a guide.*¹</p> <p>The displayed value can be used for "Communication Period Interval Setting" in "Communication Period Setting" under "Basic Settings".</p> <p>If cyclic transmission is not performed by configuring the setting with the displayed value, set a value again by adding 10% as follows.</p> <p>Calculation formula: $B + A \times 0.1$</p> <p>A: Cyclic transmission time (minimum value)</p> <p>B: Communication cycle interval (minimum value)</p>

*¹ If the setting cannot be confirmed in "Network Configuration Settings", a hyphen may be displayed or the correct calculation result may not be displayed.

*² When the communication cycle is set to 62.50μs, the following restrictions are applied.

- Ignore the value displayed in "Communication Period Interval (Min.)" in "Cyclic Settings" when setting it.
- 0 is stored in 'Communication cycle intervals (calculation value)' (SW0072) and 'Cyclic transmission time (calculation value)' (SW0073).


Point

- In case of the allocation method of the link device is "Points/Start", when Points and Start are set, End will be set automatically. In case of the allocation method of the link device is "Start/End", when Start and End are set, Points will be set automatically.
- Specify "Motion Control Station" in "Network Configuration Settings" to assign each device (RX/RX/RWr/RWw) to the I/O device.

2.7 Network Configuration Settings

Set the device station to connect to the Motion control board.

Network Configuration Settings X										
StaNo.	No.	Instance Name	Model Name	IP Address	Station Type	Multidrop Number	Motion Control Station	Parameter Automatic Setting	Reserved Station	Station-specific mode setting
		▼ Motion Control Board	MR-EM441G	192.168.3.253	Master station					
1	1	RJ71GN11-T2	RJ71GN11-T2	192.168.3.1	Local station		<input checked="" type="checkbox"/>		<input type="checkbox"/>	master/local module
2	2	MR-J5-G	MR-J5-G	192.168.3.2	Remote station		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Motion Mode ▼ General-Purpose AC Servo
3	3	▼ MR-J5W2-G	MR-J5W2-G	192.168.3.3	Remote station	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Motion Mode General-Purpose AC Servo
4	4	MR-J5W2-G_B_Axis	MR-J5W2-G_B_Axis			1				General-Purpose AC Servo
4	5	▼ MR-J5W3-G	MR-J5W3-G	192.168.3.4	Remote station	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Motion Mode General-Purpose AC Servo
6	6	MR-J5W3-G_BC_Axis	MR-J5W3-G_BC_Axis			1				General-Purpose AC Servo
7	7	MR-J5W3-G_BC_Axis_2	MR-J5W3-G_BC_Axis_2			2				General-Purpose AC Servo
5	8	NZ2GN251-32TE	NZ2GN251-32TE	192.168.3.5	Remote station		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Transistor Output
6	9	NZ2GN251-32D	NZ2GN251-32D	192.168.3.6	Remote station		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DC Input

Item	Description	Setting range	Initial value
StaNo.	Set the number of stations (serial No. in order of addition) of the connection module. The StaNo. is the same value as the station No. described in the buffer memory and the link special register (SW). Example: StaNo.1 = station No.1 StaNo.2 = station No.2	(Automatic setting)	
No.	Set the number of the connection module (serial No. in order of addition).	(Automatic setting)	
Instance Name	Set the instance name of the connection module.	(Option)	
Model Name	Set the model name of the connection module.	(Automatic setting following the profile)	
IP Address	Refer to the following.  Page 66 IP Address Settings	—	
Station Type	Set the station type of the connection module.	(Automatic setting following the profile)	
Multidrop Number	Set the multidrop No. of the connection module.	(Automatic setting followed the profile)	
Motion Control Station	Set whether the connection module is the motion control station.	<ul style="list-style-type: none"> Not checked: standard station Checked: Motion Control Station 	Checked: Motion Control Station
Parameter Automatic Setting	Automatically set the saved parameters from the master station when the connection module is connected/returned.	<ul style="list-style-type: none"> Not checked: No setting Checked: Set 	Not checked: No setting
Reserved Station	Set the device station to the reserved station.	Fixed to [Not checked: No setting]	Not checked: No setting
Station-specific mode setting	Set the station-specific mode setting of the connection module.	Varies depending on the set device station.	
Comment	Set the comment of the connection module.	(Option)	



When using the station of the network configuration as an axis, refer to "Axis No. assignment" in the following manual for the axis setting.

 Motion Control Board User's Manual (Motion Control)

3 TROUBLESHOOTING

3.1 Confirmation with LED

This section describes troubleshooting with the LEDs of the Motion control board.

When the RUN LED turns off

When the RUN LED turns off after powering on the Motion control board, confirm the following.

Confirmation item	Action
Is the Motion control board mounted correctly?	Securely mount the Motion control board on the PCI Express system if it is not mounted correctly.

When the ERR LED turns on or is flashing




When the ERR LED turns on or is flashing, confirm the following.

Confirmation item	Action
Does any error occur in the motion system monitor or the motion test tool?	Take action according to the procedure for errors displayed in the motion system monitor or the motion test tool.
Is a data unlinked station displayed on the "Network Diagnosis (CC-Link IE TSN Diagnosis)" window?	<ul style="list-style-type: none">• Connect the data unlinked device station.• Correct "Network Configuration Settings" of the master station in accordance with the device station actually connected.
Is a data link faulty station displayed on the "Network Diagnosis (CC-Link IE TSN Diagnosis)" window?	<ul style="list-style-type: none">• Correct "Network Configuration Settings" of the master station and "Communication Period Setting" under "Basic Settings" in accordance with the device station actually connected.• Perform troubleshooting for when the D LINK LED turns off or is flashing in the data link faulty station. (☞ Page 72 When the D LINK LED turns off or is flashing)

When the D LINK LED turns off or is flashing




When the D LINK LED turns off or is flashing, confirm the following.

Confirmation item	Action
Is the master station operating normally?	If an error occurs in the Motion control board, take action according to the motion system monitor or the motion test tool procedure.
Does the IP address of each station match "IP Address Settings" of the master station?	Correct the setting of the IP address in "IP Address Settings" of the master station.
In "IP Address Settings", are the third and fourth octets of the IP address of the master station overlapped with those of any other stations?	<ul style="list-style-type: none">• Set IP addresses in a way that does not overlap the third to fourth octets of the IP address in all stations.• Set the IP address and subnet mask to match the network addresses of all stations.• Set the third and fourth octets of the IP address to values other than all 0 or all 1.• Set the host address of the IP address to values other than all 0 or all 1.• Set an IP address other than a reserved address.
In "IP Address Settings", does the network address (subnet mask part) of the IP address of the master station match that of other stations?	
Are the third and fourth octets of the IP address set to all 0 or all 1?	
Is the host address of the IP address set to all 0 or all 1?	
Is a reserved address set to the IP address?	
Do the used Ethernet cables conform to the Ethernet standard?	Replace the cables with Ethernet cables which conform to the standard. For details, refer to "Wiring" in the following manual. ☞ Motion control board User's Manual (Motion Control)
Is the switching hub used operating normally?	<ul style="list-style-type: none">• Use a switching hub that conforms to the standard. For details, refer to "Wiring" in the following manual. ☞ Motion control board User's Manual (Motion Control)• Power OFF and ON the switching hub.
Does the station-to-station distance meet the specifications?	Set the station-to-station distance within range. For details, refer to "Wiring" in the following manual. ☞ Motion control board User's Manual (Motion Control)
Does the cabling condition (bending radius) meet the specifications?	Refer to the manual for the Ethernet cable, and correct the bending radius.
Is any Ethernet cable disconnected?	Replace the Ethernet cable.
Has any other station been reset?	<ul style="list-style-type: none">• Avoid unnecessary reset, since a station is disconnected while resetting.• Start other stations.

Confirmation item	Action
Are other stations turned OFF?	Power on other stations.
Are other stations connected to the Motion control board operating normally?	<ul style="list-style-type: none"> • Confirm if the modules on the other stations are performing data link using "Network Diagnosis (CC-Link IE TSN Diagnosis)". A device station that has connected once can be confirmed by Cyclic status of Detailed Information. ( Page 79 Confirming the Network Status) • Confirm the operating status of modules on other stations.
Is there any other station that has not set an IP address?	Set the IP address for the device station for which the IP address is not set.
Is there any other station that is not set in "Network Configuration Settings" of the master station?	Set the connected device station to "Network Configuration Settings" of the master station.
Is a network topology with restrictions used for connection?	Correct the wiring. For details, refer to "SYSTEM CONFIGURATION" in the following manual.  Motion Control Board User's Manual (Motion Control)
Are station Nos. unique?	Change the overlapped station No.
Is the IP address overlapped with another station?	Change the IP address of the overlapped station.
Are more than the total number of device stations connected?	Change the connection of the device stations to the total number or less.
Are Ethernet devices properly connected to a network line?	Correct the mixed structure of the Ethernet device. For details, refer to "SYSTEM CONFIGURATION" in the following manual.  Motion Control Board User's Manual (Motion Control)
Is the IP address of the device station blocked by the IP filter setting of the master station?	Correct "IP Filter Settings" under "Application Settings".
Is the IP address of the master station blocked by the IP filter setting of the device station?	
Is the TSN hub connected normally?	<p>Power off and on the TSN hub.</p> <p>Set the TSN hub parameters as follows.</p> <ul style="list-style-type: none"> • Enable each port of the TSN hub. • Set the communication speed and port type to Auto. • Match the settings of the time synchronization and communication cycle of the TSN hub to those of the master station. • Match the VLAN setting of the master station to the VLAN setting of the device station. <p>For the setting method, refer to the manual for the TSN hub used.</p>




When the L ER LED turns on

When the L ER LED turns on, confirm the following.

Confirmation item	Action
Are the Ethernet cables used normally?	<ul style="list-style-type: none"> • Use an Ethernet cable that conforms to the standard. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control) • Set the station-to-station distance within range. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control) • If the Ethernet cable is disconnected, reconnect it.
Is the switching hub used operating normally?	<ul style="list-style-type: none"> • Use a switching hub that conforms to the standard. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control) • Power OFF and ON the switching hub.
Is there any source of noise near the module or cables?	Change the location of the module or cables.

When the LINK LED turns off

When the LINK LED turns off, confirm the following.

Confirmation item	Action
Do the used Ethernet cables conform to the Ethernet standard?	Use an Ethernet cable that conforms to the standard. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control)
Does the station-to-station distance meet the specifications?	Set the station-to-station distance within range. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control)
Does the cabling condition (bending radius) meet the specifications?	Refer to the manual for the Ethernet cable, and correct the bending radius.
Is any Ethernet cable disconnected?	Replace the Ethernet cable.
Is the switching hub used operating normally?	<ul style="list-style-type: none"> • Use a switching hub that conforms to the standard. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control) • Power OFF and ON the switching hub.

Confirmation item	Action
Are other stations connected to the Motion control board operating normally?	Confirm the manual of the module used for the other stations and take action accordingly. (📖 User's manual for the module used)
Is the communication speed of connected devices 1Gbps?	Connect devices which support a communication speed of 1Gbps.

When the PCIe LED turns off

When the PCIe LED turns off, confirm the following.

Confirmation item	Action
Is the Motion control board mounted correctly?	Securely mount the Motion control board on the PCI Express system if it is not mounted correctly.

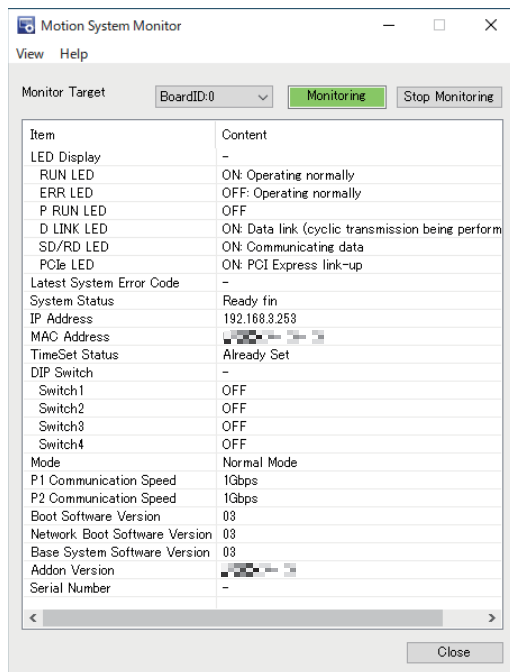
3.2 Confirming the Motion Control Board Status

This section describes how to confirm the status of the Motion control board by using the motion system monitor or the motion test tool.


- Motion system monitor: It can be confirmed only with bus connection.
- Motion test tool: It can be confirmed with bus connection or Ethernet connection.

Motion System Monitor

The following items can be confirmed by the motion system monitor.



Item		Description
LED Display	RUN LED	Displays the LED status of the Motion control board. For confirming with LED, refer to the following. ☞ Page 72 Confirmation with LED
	ERR LED	
	P RUN LED	
	D LINK LED	
	SD/RD LED	
	PCIe LED	
Latest System Error Code		Displays the latest system error code. For details about the error codes, refer to the following. ☞ Page 87 List of Error Codes (In case of a major error, a moderate or minor error code is not displayed. In case of a moderate error, a major error code is displayed but a minor error is not displayed.)
System Status		Displays the system status of the Motion control board. <ul style="list-style-type: none"> • Ready • Ready Fin • Ax Initializing 1 • Ax Initializing 2 • Start-up • Rebooting • Ax unmounted • Error(E□□□)
IP Address		Displays the IP address of the Motion control board.
MAC Address		Displays the MAC address of the Motion control board.
TimeSet Status		Displays the time setting status of the Motion control board. <ul style="list-style-type: none"> • Already Set • Not Set • Time Set Unnecessary • During Initialize


Item		Description
DIP Switch	Switch1	Displays the DIP Switch 1 to 4 of the Motion control board. For details about the DIP Switch, refer to "NAME OF EACH SECTION" in the following manual.  Motion Control Board User's Manual (Motion Control)
	Switch2	
	Switch3	
	Switch4	
Mode		Displays the Mode status of the Motion control board. • Normal mode
P1 Communication Speed		Displays the P1 communication speed. • Not Connected • 10Mbps/Half-duplex • 10Mbps/Full-duplex • 100Mbps/Half-duplex • 100Mbps/Full-duplex • 100Mbps • 1Gbps
P2 Communication Speed		Displays the P2 communication speed. (The display description is same as P1 communication speed.)
Boot Software Version		Displays the boot software version of the Motion control board.
Network Boot Software Version		Displays the network boot software version of the Motion control board.
Base System Software Version		Displays the base system software version of the Motion control board.
Addon Version		Displays the addon version of the Motion control board.
Serial Number		Displays the serial No. of the Motion control board. Displays "-" when the serial No. is not set.

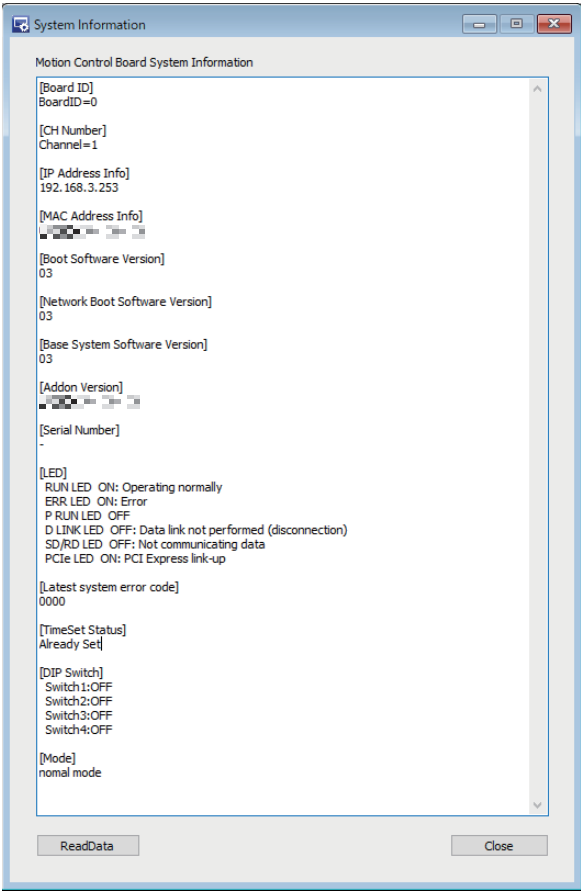




The motion system monitor can be used only when the Motion control board is bus-connected.


Motion Test Tool

The following items can be confirmed in the "System Information" window of the motion test tool.

 [Monitor] ⇒ [System Information]



Item		Description
Board ID		Displays the board ID of the Motion control board.
CH Number		Displays the channel No. of the Motion control board.
IP Address Info		Displays the IP address of the Motion control board.
MAC Address Info		Displays the MAC address of the Motion control board.
Boot Software Version		Displays each version of which installed in the Motion control board.
Network Boot Software Version		
Basic System Software Version		
Addon Version		
Serial Number		Displays the serial No. of the Motion control board.
LED	RUN LED	Displays the LED status of the Motion control board. For confirming with LED, refer to the following.  Page 72 Confirmation with LED
	ERR LED	
	P RUN LED	
	D LINK LED	
	SD/RD LED	
	PCIe LED	
Latest system error code		Displays the latest system error codes. For details about the error codes, refer to the following.  Page 87 List of Error Codes (In case of a major error, a moderate or minor error code is not displayed. In case of a moderate error, a major error code is displayed but minor error is not.)
TimeSet Status		Displays the time setting status of the Motion control board. <ul style="list-style-type: none">• Already Set• Not Set• Time Set Unnecessary• During Initialize

Item		Description
DIP Switch	Switch1	Displays the DIP Switch 1 to 4 of the Motion control board. For details about the DIP Switch, refer to "NAME OF EACH SECTION" in the following manual.  Motion Control Board User's Manual (Motion Control)
	Switch2	
	Switch3	
	Switch4	
Mode		Displays the Mode status of the Motion control board. • Normal mode

3.3 Confirming the Network Status

This section describes troubleshooting to confirm the status of the network by Network Diagnosis (CC-Link IE TSN Diagnosis) of the motion test tool.

Point The Motion control board does not support the CC-Link IE TSN/CC-Link IE Field Diagnostics of GX Works3. Use the Network Diagnosis (CC-Link IE TSN Diagnosis) of the motion test tool.

Network Diagnosis (CC-Link IE TSN Diagnosis)

For CC-Link IE TSN, perform the status monitoring.

Point Network Diagnosis (CC-Link IE TSN Diagnosis) can be used only when the motion test tool is connected by "Ethernet Connection via HUB". This function cannot be used when the Ethernet communication is unstable. Before using this function, confirm if the wiring of the Ethernet cable is correct.

How to use

The following describes how to use the Network Diagnosis (CC-Link IE TSN Diagnosis).

1. Select "Ethernet Connection via HUB" to connect the motion test tool with the Motion control board.
2. Start "Setting Network Parameter" by the motion test tool.
3. Start "Network Diagnosis (CC-Link IE TSN Diagnosis)" from "Setting Network Parameter".

[Tool] ⇄ [Network Diagnosis]

4. After starting "Network Diagnosis (CC-Link IE TSN Diagnosis)", monitoring starts automatically.

■"Network Diagnosis (CC-Link IE TSN Diagnosis)" window

CC-Link IE TSN Diagnosis (192.168.3.253)

Diagnosis Help

IP address for a master station 192.168.3.253 Start Monitoring Stop Monitoring

Monitor Monitoring

Network status

Total device numbers 6 Communication Period 1000 us Number of detected errors 0

Number of connected stations 5

IP address for ground master 192.168.3.253

Detailed Information

No.	Station Type	Module Name	IP address	Reserved station	Cyclic status	Station status
1	Master station	Motion Control Board	192.168.3.253	Normal	Transmitted	Normal
2	Local station	RJ71GN11-T2	192.168.3.1	Normal	Transmitted	Normal
3	Remote station	MR-J5W2-G	192.168.3.3	Normal	Transmitted	Normal
4	Remote station	MR-J5W3-G	192.168.3.4	Normal	Transmitted	Normal
5	Remote station	NZ2GN2S1-32TE	192.168.3.5	Normal	Transmitted	Normal
6	Remote station	NZ2GN2S1-32D	192.168.3.6	Normal	Transmitted	Normal

Network status monitor

Detailed Information monitor

Click the [...] button or right-click the Detailed Information list ⇒ [Detail window for a selected station]

Communication status monitor for the selected station	
IP address	192.168.3.5
MAC address	██-██-██-██-██-██
Model name	NZ2GN2S1-32TE
Vendor name	MITSUBISHI ELECTRIC CORP.

Function		Overview
Network Diagnosis function	Network status monitor	Function to monitor the network status such as the communication cycle and the number of connectable stations.
	Detailed information monitor	Function to monitor the detailed information of the devices that configure the network.
	Communication status monitor for the selected station	Function to monitor the detailed information of the target station selected in Detailed Information Monitor. The detailed information is as follows. <ul style="list-style-type: none">• IP address• MAC address• Model name• Vendor name

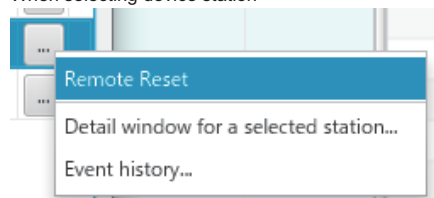
Restriction

Click [...] button or right-click the Detailed Information list and the following menu is displayed, but Remote Reset and Event history are not supported.

When executing (clicking) the unsupported functions, they operate as follows.

- Remote Reset: Remote Reset of the target station may be executed.
- Event history: Event history may be displayed on the Network Diagnosis window.

When selecting device station




Point

- The monitoring function of the network status (Event history) and the setting change function of the network status (Remote Reset) are not supported.
- If the motion test tool cannot be connected to the Motion control board, confirm the status by the motion system monitor. (🔍 Page 75 Motion System Monitor)




3.4 Troubleshooting by Symptom

This section describes troubleshooting when a data link cannot be performed with the target station regardless of no error occurring in the Motion control board.

If an error has occurred in the Motion control board, identify the error cause using the engineering tool. ( Page 79 Confirming the Network Status)

Cyclic transmission failed





The following lists the actions to be taken if cyclic transmission cannot be performed.

Confirmation item		Action
Is the D LINK LED of the Motion control board turned on?		Perform troubleshooting for when the D LINK LED turns off or is flashing. ( Page 72 When the D LINK LED turns off or is flashing)
Does the device station support the link device set in "Cyclic Settings" of the master station?		Correct the link device to be assigned to the device station in "Cyclic Settings" of the master station.
Do the station types set in "Network Configuration Settings" of the master station match those set for the connected device stations?		Confirm 'Station type match status of each station' (SB00E8) and 'Station type match status' (SW00E8 to SW00EF) to correct the station type of stations in which the station type does not match.
When "CC-Link IE TSN Class Setting" under "Required Settings" is set to "CC-Link IE TSN Class B Only", is a dedicated TSN hub used?		<ul style="list-style-type: none"> • Correct the used switching hub and the switching hub settings. For the setting method, refer to the manual for the switching hub used. • When using a TSN hub, confirm the precautions and restrictions for system configuration on the CC-Link Partner Association website (www.cc-link.org). • Correct the switching hub delay time according to the switching hub used. ( Page 110 Communication cycle interval) For the switching hub delay time, refer to the manual for the switching hub used.
When "CC-Link IE TSN Class Setting" under "Required Settings" of the master station is set to "CC-Link IE TSN Class B Only"	Are CC-Link IE TSN Class A devices connected?	Confirm the connected device and disconnect the CC-Link IE TSN Class A devices.
	Is a general-purpose hub connected between CC-Link IE TSN Class B devices?	Confirm the connected device and disconnect the general-purpose hub or replace it with a TSN hub.
In the case of line topology, do the communication speed settings of each station match?		Confirm and correct the settings on the communication speed of each station. For the setting method of the communication speed, refer to the manual for each device.
Is there any reason why cyclic transmission cannot be performed on the device station side?		<ul style="list-style-type: none"> • Confirm if an error has occurred on the device station. • Confirm if the device station settings and parameters are correct. • Refer to the manual of the device station for troubleshooting.
Is "0C44H" registered in 'Detailed execution result of device station parameter automatic setting' (SW0194)?		<ul style="list-style-type: none"> • Match the communication speed of the master station to the communication speed of the station for which the device station parameter automatic setting is to be configured. • For the target station which completed with an error, confirm with 'Execution result of device station parameter automatic setting function' (SW0160 to SW0167).
Is the minimum value for communication cycle interval set to "Communication Period Interval Setting" in "Communication Period Setting" under "Basic Settings"?		Set a value obtained by adding the larger of the following to the cyclic transmission time. <ul style="list-style-type: none"> • 10% of the minimum value of the calculated cyclic transmission time
Is the minimum value for cyclic transmission time set to "Cyclic Transmission Time" in "Communication Period Setting" under "Basic Settings"?		<ul style="list-style-type: none"> • When the communication speed for the master station is set to 1 Gbps: The number of device stations \times 2 μs For the minimum value, refer to the following.  Page 110 Communication cycle interval
In multicast mode, has an external device sent a frame to a station before data link establishment of all stations?		Ensure that the external device will not send a frame before data link establishment of all stations, and then reset the master station.

Confirmation item		Action
When the data link does not start after executing the device station parameter automatic setting	When the device station parameter automatic setting is executed, have the motion test tool and the Motion control board been connected by "Ethernet Connection via HUB"?	Disconnect the motion test tool and the Motion control board.
	When the device station parameter automatic setting is executed, have the motion test tool and the Motion control board been connected by "BUS", and read/write of the file is executed at the same time?	For read/write of the file, execute it when the device station is not connected.
	When the device station parameter automatic setting is executed, is read/write of the file executed by the Motion API at the same time?	
	Has the 'Execution result of device station parameter automatic setting function' (SW0160 to SW0167) turned ON?	Confirm 'Detailed execution result of device station parameter automatic setting' (SW0194) and perform corrective actions according to Action of the stored error codes list.
Is the IP filter set?		Confirm whether the IP address of the target CC-Link IE TSN device station is set to "Deny" at "IP Filter Settings".
Is there the ring topology using the switching hub?		Connect the switching hub to avoid the ring topology.

Transient transmission failed

The following lists the actions to be taken if transient transmission cannot be performed with the target station, and the engineering tool cannot perform monitoring.

Confirmation item		Action
Is the D LINK LED of the Motion control board turned off?		If turned off, perform troubleshooting for when the D LINK LED turns off or is flashing. ( Page 72 When the D LINK LED turns off or is flashing)
Is the data link status of the target station normal?		<ul style="list-style-type: none"> In "Network Diagnosis (CC-Link IE TSN Diagnosis)", identify the cause of the error and take action. ( Page 79 Confirming the Network Status) Confirm the device station status. <ul style="list-style-type: none">  Manual of the device station in use Confirm the ERR LED of the target station.
When "CC-Link IE TSN Class Setting" under "Required Settings" of the master station is set to "CC-Link IE TSN Class B Only"	Are CC-Link IE TSN Class A devices connected?	Confirm the connected device and disconnect the CC-Link IE TSN Class A devices.
	Is a general-purpose hub connected between CC-Link IE TSN Class B devices?	Confirm the connected device and disconnect the general-purpose hub or replace it with a TSN hub.
Is "CC-Link IE TSN Class Setting" under "Required Settings" of the master station set to "Mixture of CC-Link IE TSN Class B/A or CC-Link IE TSN Class A Only"?		For "CC-Link IE TSN Class Setting", set "CC-Link IE TSN Class B Only".
Is there any reason why cyclic transmission cannot be performed on the device station side?		<ul style="list-style-type: none"> Confirm if an error has occurred on the device station. Confirm if the device station settings and parameters are correct. Refer to the manual of the device station for troubleshooting.
Is "0C44H" registered in 'Detailed execution result of device station parameter automatic setting' (SW0194)?		<ul style="list-style-type: none"> Match the communication speed of the master station to the communication speed of the station for which the device station parameter automatic setting is to be configured. For the target station which completed with an error, confirm with 'Execution result of device station parameter automatic setting function' (SW0160 to SW0167).
Is the minimum value for communication cycle interval set to "Communication Period Interval Setting" in "Communication Period Setting" under "Basic Settings"?		Set a value obtained by adding 10% to the minimum value for cyclic transmission time for each setting. For the minimum value, refer to the following.  Page 110 Communication cycle interval
In multicast mode, has an external device sent a frame to a station before data link establishment of all stations?		Ensure that the external device will not send a frame before data link establishment of all stations, and then reset the master station.
Does a loopback occur or is a loopback not resolved?		Perform transient transmission again.
Is the communication speed of the connected module set to 1Gbps?		Connect a device that supports the communication speed of 1Gbps.
Is there the ring topology using the switching hub?		Connect the switching hub to avoid the ring topology.



Station is disconnected from the network

The following lists the action to be taken when a station in data link is disconnected.

Confirmation item	Action
Is the ambient temperature for the Motion control board and the device station outside the specified range?	Keep the ambient temperature within the specified range by taking action such as removing heat source.


Station repeats disconnection and return

The following lists the actions to be taken when a station in data link repeats disconnection and return.

Confirmation item	Action
Do the used Ethernet cables conform to the Ethernet standard?	Replace the cables with Ethernet cables which conform to the standard. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control)
Is the station-to-station distance 100m or less?	Change the station-to-station distance to 100m or less.
Does the cabling condition (bending radius) meet the specifications?	Refer to the manual for the Ethernet cable, and if the bending radius exceeds the specified range, correct the bending radius.
Is any Ethernet cable disconnected?	If an Ethernet cable is disconnected, replace the Ethernet cable.
Is the switching hub used operating normally?	<ul style="list-style-type: none"> Use a switching hub that conforms to the standard. For details, refer to "Wiring" in the following manual.  Motion Control Board User's Manual (Motion Control) Power OFF and ON the switching hub.
Are resets of other stations repeated?	Avoid unnecessary reset since a station is disconnected while resetting.
Are other stations repeatedly powering ON/OFF?	Avoid unnecessary power-off, since a station is disconnected while turned OFF.
Are the TSN hub restrictions violated?	Observe the TSN hub restrictions. For the restrictions, refer to the manual of the TSN hub to be used.

Communications are unstable

When cyclic data transfer processing time or transmission delay time is long or when a transient transmission timeout occurred, confirm the following items.

Confirmation item	Action
Is the L ER LED of the Motion control board turned on?	If turned on, perform troubleshooting for a case when the L ER LED is turned on. ( Page 73 When the L ER LED turns on)
Is the ambient temperature for the Motion control board and the device station outside the specified range?	Keep the ambient temperature within the specified range by taking action such as removing heat source.
Is there any noise affecting the system?	Change the placement and/or wiring of the modules so that the system is not affected by noise.

SLMP communications failed

When communications using the SLMP cannot be performed, confirm the following items.

Confirmation item	Action
Was an error response returned to the device that had sent the command in Motion API?	Check a return value of Motion API, and If it is an error response, take corrective actions according to the detail error code.
Is the same communication speed set for the connected device and access destination?	Change the connection destination so that the connected device and access destination have the same communication speed.
In multicast mode, is a standard Ethernet device connected to a local station or a remote station that does not support the multicast filter?	<ul style="list-style-type: none"> Connect the standard Ethernet device to a local station or a remote station that supports the multicast filter. Set unicast mode. Take actions so that the Ethernet device does not receive cyclic data in multicast mode.

Confirmation item	Action
In multicast mode, are a local station and an Ethernet device mixedly connected on the end side via a switching hub?	<ul style="list-style-type: none"> • Configure settings with the switching hub so that the multicast frame (with multicast MAC address 09:00:70:00:10:02 and 09:00:70:00:10:05) will not be transferred to the port of the standard Ethernet device. • Check the connected device and do not connect a local station and an Ethernet device mixedly on the end side of the switching hub. • Set unicast mode. • Take actions so that the Ethernet device does not receive cyclic data in multicast mode.

The control CPU of the local station fails to be synchronized in time

When the control CPU of a local station fails to be synchronized in time, check the following items.


Confirmation item	Action
Is the daylight savings time set to the CPU modules of the local stations?	Set the same daylight savings time to the CPU modules of the local stations.
Has the clock data been changed by the clock function of the CPU module?	Check whether the clock data has been changed by the clock function of the CPU module.

Communications with Ethernet devices failed

When communications with Ethernet devices cannot be performed, confirm the following items.

Confirmation item	Action
Is the firewall or proxy server setting enabled on the Ethernet device?	Confirm and correct the settings on the Ethernet device. Is a response to the PING command (ICMP echo request) disabled?
Is the antivirus software on the Ethernet device blocking the communication?	Confirm and correct the antivirus software settings on the Ethernet device. <ul style="list-style-type: none"> • Is the security setting level of the antivirus software low? • Is a response to the PING command (ICMP echo request) disabled in the firewall settings?
In multicast mode, is a standard Ethernet device connected to the master station?	<ul style="list-style-type: none"> • Connect the standard Ethernet device to a local station or a remote station that supports the multicast filter. • Set unicast mode. • Take actions so that the Ethernet device does not receive cyclic data in multicast mode.
In multicast mode, is a standard Ethernet device connected to a local station or a remote station that does not support the multicast filter?	<ul style="list-style-type: none"> • Connect the standard Ethernet device to a local station or a remote station that supports the multicast filter. • Set unicast mode. • Take actions so that the Ethernet device does not receive cyclic data in multicast mode.
In multicast mode, are a local station and an Ethernet device mixedly connected on the end side via a switching hub?	<ul style="list-style-type: none"> • Configure settings with the switching hub so that the multicast frame (with multicast MAC address 09:00:70:00:10:02 and 09:00:70:00:10:05) will not be transferred to the port of the standard Ethernet device. • Check the connected device and do not connect a local station and an Ethernet device mixedly on the end side of the switching hub. • Set unicast mode. • Take actions so that the Ethernet device does not receive cyclic data in multicast mode.

For details about when communication using the engineering tool is not allowed in the settings of Windows Firewall, refer to the following.

 [Help] of the motion test tool ⇒ [Motion Test Tool Help] ⇒ "TROUBLESHOOTING"

Data link is normal but link device communications fail

When the data link is normal (D LINK LED: On) but the link device communications fail, confirm the following items.

Confirmation item	Action
Is the input/output bit setting or input/output word setting of the device station set in "Cyclic Settings" of the master station? (Simple display)	Set a link device used in the device station correctly.
Are "RX Setting", "RY Setting", "RWw Setting", "RWr Setting", "LB Setting", and "LW Setting" of the device station set in "Cyclic Settings" of the master station? (Detailed display)	Set a link device used in the device station correctly.
Does the device station support the link devices set in "Cyclic Settings" of the master station?	Correct the link devices to be assigned to the device station in "Network Configuration Settings" of the master station.
When the local station cannot receive cyclic data from another station, is "Mode" in "Communication Mode" under "Application Settings" of the master station set to "Multicast"?	Set "Mode" in "Communication Mode" under "Application Settings" of the master station to "Multicast".

Synchronization cannot be performed with the CC-Link IE TSN Network synchronous communication function

When the synchronization cannot be performed with the CC-Link IE TSN Network synchronous communication function, confirm the following items.

Confirmation item	Action
Is the network synchronous communication set to the standard device station in "Cyclic Settings" of the master station?	Set "NetworkSync" to "Do" for the standard device station under "Cyclic Settings".
Is the network synchronous communication set in the parameter settings of the device station?	Set "NetworkSync" in the parameter settings of the device station to "Do".

Cannot be monitored using the CC-Link IE TSN Communication Software

The following lists the actions to be taken if information cannot be monitored using the CC-Link IE TSN Communication Software.


Confirmation item	Action
Are three or more modules connected to CC-Link IE TSN Communication Software?	Connect two or fewer modules.
Is "Mode" in "Communication Mode" under "Application Settings" set to "Unicast"?	Set "Mode" in "Communication Mode" under "Application Settings" to "Multicast".
Is the CC-Link IE TSN Communication Software connected to a general purpose hub?	Connect the CC-Link IE TSN Communication Software to a CC-Link IE TSN Class B device or a TSN hub.
Is the CC-Link IE TSN Communication Software reconnected within 20 seconds after disconnection?	Before reconnecting the CC-Link IE TSN Communication Software, wait 20 seconds or more.

No error is occurring but motion control cannot be started

When there is no error occurring but motion control cannot be started, confirm the following.

Confirmation item	Action
Is the PLCopen motion control FB mode set and a value less than 62.50μs set in the communication cycle interval setting?	Is the number of device stations in the network configuration settings exceeding the referential number of axes*1?
	<ul style="list-style-type: none"> Reduce the number of device stations set in the network configuration. Increase the setting value of the communication cycle interval setting.

*1 For details, refer to "Setting Network Parameter" in the following manual.


 Motion Control Board User's Manual (Motion Control)

Motion test tool and Motion control board cannot communicate

When the motion test tool and Motion control board cannot communicate.



Confirmation item		Action
Is a value less than 62.50μs set in the communication cycle interval setting?	Is the number of device stations in the network configuration settings exceeding the referential number of axes*1?	<ul style="list-style-type: none"> • Reduce the number of device stations set in the network configuration. • Increase the setting value of the communication cycle interval setting.

*1 For details, refer to "Setting Network Parameter" in the following manual.

 Motion Control Board User's Manual (Motion Control)

MR-J5(W)-G cannot be connected

When MR-J5(W)-G cannot be connected, check the following items.

Check item		Action
Has "Network parameter error (error code: 2221H)" occurred?		Write the network parameter again.
Has "Out of Parameter Range (Network) (error code: 3211H)" occurred?		Write the network parameter.
Has the MR-J5(W)-G 7-segment LED kept displaying as shown below?*1  	Has a moderate error/major error occurred in the Motion control board?	Check the event history, and execute the action found in detailed information.
	When using multi-axis servo amplifiers, has the control axis deactivation switch of the DIP switch (SW3) been set to ON?	<ul style="list-style-type: none"> • When setting a disabled axis in a multi-axis servo amplifier, set the disabled axes from the latter axis. • In Network configuration settings, change the number of extension modules that are connected to the corresponding multi-axis servo amplifier so that they match the number of axes not set to Axis Disabled minus "1". <Example> When setting only 1 axis from A to C axis of MR-J5W3-G to axis disabled.
	In network configuration settings, has the number of extension modules connected to the multi-axis servo amplifier been changed from the default settings?	<ul style="list-style-type: none"> • Control axis deactivation switch (SW3) setting: Set only C axis to axis disabled (SW3-4 to ON). • Network configuration setting: Add or delete MRJ5W3-G_BC_Axis so that there is only 1 MRJ5W3-G_BC_Axis that is connected to MR-J5W3-G.
While controlling the servo amplifier with axis No. allocation, does communication with the servo amplifier disconnect and reconnect?		The axis is not supported to automatic return. Power OFF and ON the Motion control board or rebooting the software.

*1 For MR-J5W-G, the number of characters displayed on the 7-segment LED is different.

3.5 List of Error Codes

This section describes error codes, error definitions and causes and actions for the errors that occur as follows.

- Each processing for data communication between the Motion control board and external devices
- Processing requests from the host personal computer on the own station

The error codes are displayed in the motion system monitor or the motion test tool.

☞ Page 75 Motion System Monitor

☞ Page 77 Motion Test Tool

3

Minor

Error code	Content	Cause of occurrence	Action
1802H	IP Address Duplication Detected	During data link, IP address duplication has been detected.	Change the IP address of devices with an overlapped IP address.
1803H	Network Composition Error	The number of connectable stations is exceeded.	Reduce the number of stations of CC-Link IE TSN Class B devices to eight or less for each port of the master station.
1804H	Connection Error	During data link, invalid connection structure has been detected. <ul style="list-style-type: none"> • A CC-Link IE TSN Class B station is connected further on the end side than a CC-Link IE TSN Class A station. • With the master station with a communication speed of 1Gbps, further on the end side than a station with a communication speed of 100Mbps, a station with a communication speed of 1Gbps is connected. • With the master station with a communication speed of 1Gbps, the communication cycle setting of the station with a communication speed of 100Mbps is set to basic cycle or normal speed ($\times 4$). 	Check the connection and setting on the end side of the station and take the following actions. <ul style="list-style-type: none"> • Connect a CC-Link IE TSN Class A station further on the end side than a CC-Link IE TSN Class B station. • With the master station with a communication speed of 1Gbps, connect the station with a communication speed of 1Gbps on the master station side rather than the station with a communication speed of 100Mbps. • With the master station with a communication speed of 1Gbps, set the communication cycle setting of the station with a communication speed of 100Mbps to low-speed ($\times 16$).
D247H	Response Received Twice	When the transient transmission was executed, response from the target station was received twice.	Check if the switching hub and the Ethernet cables at the request source are connected properly.
D253H	Response Timeout	A response timeout has occurred when the transient transmission was executed.	<ul style="list-style-type: none"> • Check the network status using the CC-Link IE TSN Diagnosis, and take action. • Execute the instruction again after lowering the transient transmission usage frequency. • Execute the instruction to the target station that supports the executed instruction. • Review the IP address of the target station. • Check if the Ethernet cable is connected properly. • If the error occurs again even after taking the above measure, consult your local Mitsubishi representative.

Moderate

Error code	Content	Cause of occurrence	Action
2160H	IP Address Duplication Detected ^{*1}	IP address duplication was detected.	Check and correct the IP addresses.
2220H	Parameter Error ^{*1}	The network parameter setting is corrupted.	Write the network parameter again. If the same error occurs again even after taking the above measure, the possible cause is a hardware failure. Consult your local Mitsubishi representative.
2221H	Network Parameter Error ^{*1}	<ul style="list-style-type: none"> • The set value of the network parameter is out of the range. • Parameters that are not supported by the firmware version of the Motion control board have been set. 	Write the network parameter again. If the same error occurs again even after taking the above measure, the possible cause is a hardware failure. Consult your local Mitsubishi representative.

Error code	Content	Cause of occurrence	Action
300AH	Network Parameter Error ^{*1}	<ul style="list-style-type: none"> The firmware version of the local station and the software version of the master station are in an unusable combination. The parameter values set on the master station exceeds the available range, or there is no consistency between the settings of the master station and the local station. 	Write the network parameter again. If the same error occurs again even after taking the above measure, the possible cause is a hardware failure. Consult your local Mitsubishi representative.
300BH	Communication Cycle Error ^{*1}	The Announce frame send cycle parameter error was detected.	When the Motion control board is operating as the grandmaster, restart the host personal computer. If the same error occurs again even after taking the above measure, the possible cause is a hardware failure. Consult your local Mitsubishi representative.
300CH	Communication Cycle Error ^{*1}	A propagation delay send cycle parameter error was detected.	When the Motion control board is operating as the grandmaster, restart the host personal computer. If the same error occurs again even after taking the above measure, the possible cause is a hardware failure. Consult your local Mitsubishi representative.
300DH	Communication Cycle Error ^{*1}	The Sync frame send cycle parameter error was detected.	When the Motion control board is operating as the grandmaster, restart the host personal computer. If the same error occurs again even after taking the above measure, the possible cause is a hardware failure. Consult your local Mitsubishi representative.
300FH	Master Station Duplication Detected ^{*1}	Multiple master stations were detected in the network.	<ul style="list-style-type: none"> Connect only one master station in one network. Reset or reboot systems on all stations which detected this error after the treatment above.
3010H	Communication Cycle Interval Error	The value set in "Communication Period interval Setting" in "Communication Period Setting" under "Basic Settings" of the master station is smaller than the transient transmission time calculated using the number of device stations and the points of device stations set in "Network Configuration Settings" under "Basic Settings".	Review the value of "Communication Period Interval Setting" in "Communication Period Setting" under "Basic Settings" of the master station.
3011H	Cyclic Transmit Time Error	The value set in "Cyclic Transmission Time" in "Communication Period Setting" under "Basic Settings" of the master station is smaller than the transient transmission time calculated using the number of device stations and the points of device stations set in "Network Configuration Settings" under "Basic Settings".	Review the value of "Cyclic Transmission Time" in "Communication Period Setting" under "Basic Settings" of the master station.
3013H	Transient Transmit Time Error ^{*1}	The value set in "Transient Transmission Time" in "Communication Period Setting" under "Basic Settings" of the master station is smaller than the transient transmission time calculated using the number of device stations and the points of device stations set in "Network Configuration Settings" under "Basic Settings".	Review the value of "Transient Transmission Time" in "Communication Period Setting" under "Basic Settings" of the master station.
3021H	IP Address Duplication at Device Station Detected ^{*1}	At startup of data link, an overlapping IP address among device stations has been detected.	Correct the IP addresses of the device stations.
3060H	Send/Receive Data Size Error ^{*1}	The send/receive data size exceeds the allowable range.	Check and change the send data size of the external device. If the same error occurs again even after taking the above measure, the possible cause is a hardware failure of the error module or CPU module. Consult your local Mitsubishi representative.

^{*1} System Error Reset cannot be executed.

Major

Error code	Content	Cause of occurrence	Action
3E01H	Own Station Network Type Error ^{*1}	Network type of the own station is unexpected setting.	Write the network parameter again. If the same error occurs again even after taking the above, the possible cause is a hardware failure. Consult your local Mitsubishi representative.
3E02H	Time Synchronization Error ^{*1}	A time synchronization error was detected.	Write the network parameter again. If the same error occurs again even after taking the above, the possible cause is a hardware failure. Consult your local Mitsubishi representative.
3E03H	Memory Error ^{*1}	An error was detected in the memory.	Write the network parameter again. If the same error occurs again even after taking the above, the possible cause is a hardware failure. Consult your local Mitsubishi representative.

^{*1} System Error Reset cannot be executed.

APPENDICES

Appendix 1 Buffer Memory

The buffer memory is used to exchange data between the Motion control board and the host personal computer. Buffer memory values are reset to default (initial value) by powering OFF and ON the Motion control board or rebooting the software.

List of buffer memory addresses



- Do not write data to the system areas. Because these areas are for manufacturer settings, doing so may cause malfunction of the system.
- If the value in an area of one word becomes equal to or higher than 65536, the count stops at 65535 (FFFFH).

←: Same as the address of P1

P1		P2		Name		Initial value	Read, write	Reference
Address (decimal)	Address (hexadecimal)	Address (decimal)	Address (hexadecimal)					
0 to 57343	0 to DFFFH	←		System area				—
57344 to 58367	E000H to E3FFH	←		Link device area	Remote input (RX)			Page 93 Link device area
58368 to 59391	E400H to E7FFH	←			Remote output (RY)	0	Read, write	
59392 to 67583	E800H to 107FFH	←			Remote register (RWw)			
67584 to 75775	10800H to 127FFH	←			Remote register (RWw)		Read	
75776 to 92159	12800H to 167FFH	←			Link register (LW)	Read, write		
92160 to 94207	16800H to 16FFFH	←			Link relay (LB)			
94208 to 94463	17000H to 170FFH	←			Link special relay (SB)			
94464 to 98559	17100H to 180FFH	←			Link special register (SW)			
98560 to 1252095	18100 to 131AFFH	←		System area				—

P1		P2		Name		Initial value	Read, write	Reference	
Address (decimal)	Address (hexadecimal)	Address (decimal)	Address (hexadecimal)						
1252096	131B00H	←		Own station (network card) information	Manufacturer code	0	Read	Page 94 Own station information	
1252097	131B01H	←			Model type	1			
1252098	131B02H	←			Model code (lower 2 bytes)				
1252099	131B03H	←			Model code (upper 2 bytes)				
1252100	131B04H	←			Version				
1252101 to 1252103	131B05H to 131B07H	←			MAC address				
1252104	131B08H	←		Own station (controller) information	Controller information valid/invalid flag	0	Read		
1252105	131B09H	←			Manufacturer code				
1252106	131B0AH	←			Model type				
1252107	131B0BH	←			Model code (lower 2 bytes)				
1252108	131B0CH	←			Model code (upper 2 bytes)				
1252109	131B0DH	←			Version				
1252110 to 1252119	131B0EH to 131B17H	←			Model name string				
1252120 to 1252121	131B18H to 131B19H	←			Vendor-specific device information				
1252122 to 1252127	131B1AH to 131B1FH	←		System area					—
1252128 to 1275903	131B20H to 1377FFH	←		System area					
1275904	137800H	←		Grandmaster information	Grandmaster	0	Read	Page 95 Grandmaster information	
1275905 to 1275906	137801H to 137802H	←			System area				
1275907 to 1275909	137803H to 137805H	←			Grandmaster MAC address	0	Read		
1275910 to 1275932	137806H to 13781CH	←		System area					—
1275933	13781DH	←		Time synchronization setting	PTP frame send source check enable/disable	0	Read, write	Page 95 Time synchronization setting	
1275934	13781EH	←			PTP frame send source check result (P1)	0	Read		
1275935	13781FH	←			PTP frame send source check result (P2)	0			
1275936 to 1277455	137820H to 137E0FH	←		System area					—
1277456	137E10H	←		CC-Link IE TSN Communication Software information (1st module)	Manufacturer code	0	Read	Page 96 CC-Link IE TSN Communication Software information	
1277457	137E11H	←			Model type				
1277458	137E12H	←			Model code (lower 2 bytes)				
1277459	137E13H	←			Model code (upper 2 bytes)				
1277460	137E14H	←			Model code of extension module				
1277461	137E15H	←			Version				
1277462 to 1277464	137E16H to 137E18H	←			MAC address				
1277465 to 1277466	137E19H to 137E1AH	←			IP address (IPv4)				
1277467 to 1277474	137E1BH to 137E22H	←			IP address (IPv6)				
1277475 to 1277479	137E23H to 137E27H	←			System area				

P1		P2		Name		Initial value	Read, write	Reference
Address (decimal)	Address (hexadecimal)	Address (decimal)	Address (hexadecimal)					
1277480	137E28H	←		CC-Link IE TSN Communication Software information (2nd module)	Manufacturer code	0	Read	Page 96 CC-Link IE TSN Communication Software information
1277481	137E29H	←			Model type			
1277482	137E2AH	←			Model code (lower 2 bytes)			
1277483	137E2BH	←			Model code (upper 2 bytes)			
1277484	137E2CH	←			Model code of extension module			
1277485	137E2DH	←			Version			
1277486 to 1277488	137E2EH to 137E30H	←			MAC address			
1277489 to 1277490	137E31H to 137E32H	←			IP address (IPv4)			
1277491 to 1277498	137E33H to 137E3AH	←			IP address (IPv6)			
1277499 to 1277503	137E3BH to 137E3FH	←			System area			
1277504 to 1294015	137E40H to 13BEBFH	←		System area				—
1294016	13BEC0H	←		Protocol information	Protocol operating status	0	Read	Page 96 Protocol information
1294017 to 1294031	13BEC1H to 13BECFH	←			System area			
1294032 to 2097151	13BED0H to 1FFFFFFH	←		System area				—
2097152 to 4194303	200000H to 3FFFFFFH	4194304 to 6291455	400000H to 5FFFFFFH	System area				—
6291456 to 11999999	600000H to B71AFFH	←		System area				—
12000000 to 13030143	B71B00H to C6D2FFH	←		Dual port memory area	Motion control area			Page 96 Dual port memory area
13030144 to 13031167	C6D300H to C6D6FFH	←			Input bit device (remote input (RX))			
13031168 to 13032191	C6D700H to C6DAFFH	←			Output bit device (remote output (RY))			
13032192 to 13040383	C6DB00H to C6FAFFH	←			Output word device (remote register (RWw))			
13040384 to 13048575	C6FB00H to C71AFFH	←			Input word device (remote register (RWr))			
13048576 to 16777215	C71B00H to FFFFFFFH	←		System area				—

Details of buffer memory addresses

Link device area

The RX, RY, RWw, RWr, LB, LW, SB, and SW values are stored.

■Remote input (RX) (G57344 to G58367)

The RX value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G57344	RXF	RXE	RXD	RXC	RXB	RXA	RX9	RX8	RX7	RX6	RX5	RX4	RX3	RX2	RX1	RX0
⋮																
G58367	RX 3FFF	RX 3FFE	RX 3FFD	RX 3FFC	RX 3FFB	RX 3FFA	RX 3FF9	RX 3FF8	RX 3FF7	RX 3FF6	RX 3FF5	RX 3FF4	RX 3FF3	RX 3FF2	RX 3FF1	RX 3FF0

Each bit corresponds to 1 bit of RX.

■Remote output (RY) (G58368 to G59391)

The RY value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G58368	RYF	RYE	RYD	RYC	RYB	RYA	RY9	RY8	RY7	RY6	RY5	RY4	RY3	RY2	RY1	RY0
⋮																
G59391	RY 3FFF	RY 3FFE	RY 3FFD	RY 3FFC	RY 3FFB	RY 3FFA	RY 3FF9	RY 3FF8	RY 3FF7	RY 3FF6	RY 3FF5	RY 3FF4	RY 3FF3	RY 3FF2	RY 3FF1	RY 3FF0

Each bit corresponds to 1 bit of RY.

■Remote register (RWw) (G59392 to G67583)

The RWw value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G59392	RWw0															
G59393	RWw1															
⋮																
G67583	RWw1FFF															

■Remote register (RWr) (G67584 to G75775)

The RWw value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G67584	RWr0															
G67585	RWr1															
⋮																
G75775	RWr1FFF															

■Link register (LW) (G75776 to G92159)

The LW value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G75776	LW0															
G75777	LW1															
⋮																
G92159	LW3FFF															

■Link register (LB) (G92160 to G94207)

The LB value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G92160	LB F	LB E	LB D	LB C	LB B	LB A	LB 9	LB 8	LB 7	LB 6	LB 5	LB 4	LB 3	LB 2	LB 1	LB 0
G92161	LB1 F	LB1 E	LB1 D	LB1 C	LB1 B	LB1 A	LB1 9	LB1 8	LB1 7	LB1 6	LB1 5	LB1 4	LB1 3	LB1 2	LB1 1	LB1 0
⋮																
G94207	LB 7 F F F	LB 7 F F E	LB 7 F F D	LB 7 F F C	LB 7 F F B	LB 7 F F A	LB 7 F F 9	LB 7 F F 8	LB 7 F F 7	LB 7 F F 6	LB 7 F F 5	LB 7 F F 4	LB 7 F F 3	LB 7 F F 2	LB 7 F F 1	LB 7 F F 0

■Link special relay (SB) (G94208 to G94463)

The SB value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G94208	SB F	SB E	SB D	SB C	SB B	SB A	SB 9	SB 8	SB 7	SB 6	SB 5	SB 4	SB 3	SB 2	SB 1	SB 0
⋮																
G94463	SB F F F F	SB F F F E	SB F F F D	SB F F F C	SB F F F B	SB F F F A	SB F F F 9	SB F F F 8	SB F F F 7	SB F F F 6	SB F F F 5	SB F F F 4	SB F F F 3	SB F F F 2	SB F F F 1	SB F F F 0

Each bit corresponds to 1 bit of SB.

■Link special register (SW) (G94464 to G98559)

The SW value is stored.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
G94464	SW0															
G94465	SW1															
⋮	⋮															
G98559	SW0 F F F F															

Own station information

The information of the own station on the network is stored.

■Own station (network card) information (G1252096 to G1252103)

Address	Name	Description
G1252096	Manufacturer code	The information of the own station is stored. (Also used in the CLPA conformance test.)
G1252097	Model type	
G1252098	Model code (lower 2 bytes)	
G1252099	Model code (upper 2 bytes)	
G1252100	Version	
G1252101 to G1252103	MAC address	The own station MAC address is stored. G1252101: 5th byte, 6th byte of the MAC address G1252102: 3rd byte, 4th byte of the MAC address G1252103: 1st byte, 2nd byte of the MAC address

■Own station (controller) information (G1252104 to G1252121)

Address	Name	Description
G1252104	Controller information valid/invalid flag	Whether the value stored in the own station (controller) information is valid or invalid is stored. • 0: Invalid • 1: Valid
G1252105	Manufacturer code	The information of the own station is stored.
G1252106	Model type	
G1252107	Model code (lower 2 bytes)	
G1252108	Model code (upper 2 bytes)	
G1252109	Version	
G1252110 to G1252119	Model name string	
G1252120 to G1252121	Vendor-specific device information	

Grandmaster information

The grandmaster status of the own station and MAC address are stored.

■Grandmaster (G1275904)

When the own station is the grandmaster, "1" is stored.

- 1: Own station is the grandmaster
- 0: Another station is the grandmaster

■Grandmaster MAC address (G1275907 to G1275909)

The grandmaster MAC address is stored.

- G1275907: 5th byte, 6th byte of the MAC address
- G1275908: 3rd byte, 4th byte of the MAC address
- G1275909: 1st byte, 2nd byte of the MAC address

Time synchronization setting

■PTP frame send source check enable/disable (G1275933)

- 1: Check
- 0: Do not check

■PTP frame send source check result (P1) (G1275934)

- 1: Two or more send sources
- 0: One send source

■PTP frame send source check result (P2) (G1275935)

- 1: Two or more send sources
- 0: One send source

CC-Link IE TSN Communication Software information

Information related to the CC-Link IE TSN Communication Software is stored.

■CC-Link IE TSN Communication Software information (1st module) (G1277456 to G1277479)

Address	Name	Description
G1277456	Manufacturer code	Information of the CC-Link IE TSN Communication Software in the 1st module is stored.
G1277457	Model type	
G1277458	Model code (lower 2 bytes)	
G1277459	Model code (upper 2 bytes)	
G1277460	Model code of extension module	
G1277461	Version	
G1277462 to G1277464	MAC address	
G1277465 to G1277466	IP address (IPv4)	
G1277467 to G1277474	IP address (IPv6)	
G1277475 to G1277479	System area	—

■CC-Link IE TSN Communication Software information (2nd module) (G1277480 to G1277503)

Address	Name	Description
G1277480	Manufacturer code	Information of the CC-Link IE TSN Communication Software in the 2nd module is stored.
G1277481	Model type	
G1277482	Model code (lower 2 bytes)	
G1277483	Model code (upper 2 bytes)	
G1277484	Model code of extension module	
G1277485	Version	
G1277486 to G1277488	MAC address	
G1277489 to G1277490	IP address (IPv4)	
G1277491 to G1277498	IP address (IPv6)	
G1277499 to G1277503	System area	—

Protocol information

■Protocol information (G1294016 to G1294031)

Address	Name	Description
G1294016	Protocol operating status	Stores the operating status of the protocol. 0: Operating protocol not determined or CC-Link IE TSN Class settings set to CC-Link IE TSN Class B only 1: Operating with the protocol version 1.0
G1294017 to G1294031	System area	—

Dual port memory area

For details, refer to "TABLE MAP" in the following manual.

 Motion Control Board User's Manual (Motion Control)

Appendix 2 List of Link Special Relay (SB)

The link special relay (SB) is turned ON/OFF depending on various factors during data link. Any error status of the data link can be confirmed by using or monitoring it in the program.

Point

[Motion API]

- To read the link special relay (SB), use the sscGetBitLinkDevice function.
- To write the link special relay (SB), use the sscSetBitLinkDevice function.

Application of link special relay (SB)

By using link special relay (SB), the status of CC-Link IE TSN can be confirmed.

Ranges turned ON/OFF by users and by the system

The following ranges correspond to when the link special relay areas (SB) are assigned from SB0000 to SB0FFF.

- Turned ON/OFF by users: SB0000 to SB001F
- Turned ON/OFF by the system: SB0020 to SB0FFF

List of link special relay (SB)

The following table lists the link special relay areas (SB) when they are assigned from SB0000 to SB0FFF.

Point

Do not turn ON or OFF areas whose Nos. are not on the following list or ranges turned ON/OFF by the system. Doing so may cause malfunction of the programmable controller system.

No.	Name	Description
SB0006	Clear communication error count	Clears the link special register areas (SW0074 to SW0077, SW007C to SW007F) related to communication errors to 0. OFF: Clear not requested ON: Clear requested (valid while ON)
SB0014	Cyclic data receive status clear	Clears 'Cyclic data receive status' (SB0064). While SB0014 is ON, 'Cyclic data receive status' (SB0064) does not turn ON. OFF: Clear not requested ON: Clear requested (enabled while ON)
SB0040	Network type of own station	Stores the network type of the own station. ON: CC-Link IE TSN
SB0043	Module operation mode of own station	Stores the module operation mode of the own station. OFF: Online mode ON: Other than online mode
SB0044	Station setting 1 of own station	Stores the station type of the own station. OFF: Device station (other than the master station) ON: Master station
SB0045	Station setting 2 of own station	Stores the communication mode of the own station. OFF: Unicast mode ON: Multicast mode
SB0046	Station No. setting status of own station	Stores the station No. setting status. OFF: Station No. set
SB0049	Data link error status of own station	Stores the data link error status of the own station. OFF: Normal ON: Error When this relay is turned ON, the cause of the error can be confirmed with 'Cause of data link stop' (SW0049). (Also used in the CLPA conformance test.)
SB004D	Received parameter error	Stores the status of received parameter. (For the master station, this relay stores the parameter status of the own station) OFF: Normal ON: Error

A

No.	Name	Description
SB0064	Cyclic data receive status	Shows the receive status in the communication cycle in which the cyclic data from the device station is set using "Disconnection Detection Setting" in the master station. OFF: Cyclic data received ON: Cyclic data not received consecutively ■Conditions • Turns ON when the cyclic data of one or more device stations is not received consecutively. • Stations that surpass the maximum station No. are ignored. (Also used in the CLPA conformance test.)
SB006A	PORT1 link-down status of own station	Stores the link down status of the own station at the PORT1 side. OFF: Link-up ON: Link-down The time until link-up starts after power-on or Ethernet cable connection may vary. Normally link-up takes several seconds. Depending on device status on the line, link-up processing is repeated and may increase the time. (Also used in the CLPA conformance test.)
SB006B	PORT2 link-down status of own station	Stores the link-down status of the own station P2 side. OFF: Link-up ON: Link-down The time until link-up starts after power-on or Ethernet cable connection may vary. Normally link-up takes several seconds. Depending on device status on the line, link-up processing is repeated and may increase the time. (Also used in the CLPA conformance test.)
SB0078	Network topology	Stores the setting status of "Network Topology" of the own station (master operating station). OFF: Line topology, star topology, or coexistence of star and line topologies ON: Ring topology
SB007B	Input data status of data link error station	Stores the setting status of "Data Link Error Station Setting" under "I/O Maintenance Settings" of "Application Settings" for the own station. OFF: Clear ON: Hold
SB007E	Type of IP Address	Stores the type of IP address. OFF: IPv4 ON: IPv6
SB007F	IP address setting status	Stores the status of the IP address setting by parameter. OFF: No setting ON: Set
SB00B0	Data link error status of each station	Stores the data link status of each station. OFF: All stations normal ON: Faulty station exists When this relay is turned ON, the status of each station can be confirmed with 'Data link status of each station' (SW00B0 to SW00B7).
SB00B1	Data link error status of master station	Stores the data link status of the master station. OFF: Normal ON: Error
SB00E8	Station type match status of each station	Stores the station type match status of each station. OFF: Station type match in all stations ON: Station type mismatch exists When this relay is turned ON, the status of each station can be confirmed with 'Station type match status' (SW00E8 to SW00EF).
SB00F0	CPU operating status of each station	Stores the CPU operating status of each station. OFF: All stations in RUN or PAUSE state ON: Station in STOP state, or station with a moderate/major error exists When this relay is turned ON, the status of each station can be checked with 'CPU operating status of each station' (SW00F0 to SW00F7).
SB0100	CPU moderate/major error status of each station	Stores the moderate/major error occurrence status of each station. For local stations, the moderate/major error occurrence status in the CPU module of each station are stored. OFF: No station with a moderate/major error ON: Station with a moderate/major error exists When this relay is turned ON, the status of each station can be checked with 'CPU moderate/major error status of each station' (SW0100 to SW0107). If the communication cycle interval setting is less than 125μs, this will be fixed at "OFF: No moderate/major error".

No.	Name	Description
SB0110	CPU minor error status of each station	<p>Stores the minor error occurrence status of each station.</p> <p>For local stations, the minor error occurrence status in the CPU module of each station are stored.</p> <p>OFF: All stations normal or station with a moderate/major error exists</p> <p>ON: Station with a minor error exists</p> <p>When this relay is turned ON, the status of each station can be checked with 'CPU minor error status of each station' (SW0110 to SW0117).</p> <p>If the communication cycle interval setting is less than 125μs, this will be fixed at "OFF: All stations normal or station with a moderate/major error exists".</p>
SB01E1	Setting status of CC-Link IE TSN Network synchronous communication function	<p>Stores the setting status of the CC-Link IE TSN Network synchronous communication function.</p> <p>OFF: No setting</p> <p>ON: Set</p>

Appendix 3 List of Link Special Register (SW)

The link special register (SW) stores the information during data link as a numerical value. Faulty areas and causes can be confirmed by using or monitoring the link special register (SW) in programs.



[Motion API]

To read the link special register (SW), use the sscGetWordLinkDevice function.

Application of link special register (SW)

By using link special register (SW), the status of CC-Link IE TSN can be confirmed.

Range where data is stored by users and range where data is stored by the system

The following ranges correspond to when the link special register areas (SW) are assigned from SW0000 to SW0FFF.

- Stored by users: SW0000 to SW001F
- Stored by the system: SW0020 to SW0FFF

List of link special register (SW)

The following table lists the link special register areas (SW) when they are assigned from SW0000 to SW0FFF.



Do not write any data to an area whose No. is not on the following list or ranges where data is stored by the system. Doing so may cause malfunction of the programmable controller system.

No.	Name	Description
SW0040	Network No.	Stores the network No. of the own station. Range: Fixed to 1
SW0042	Station No.	Stores the station No. of the own station. Range: • Master station: 125
SW0043	Mode status of own station	Stores the module operation mode setting or communication mode of the own station. 0: Online mode/Unicast mode 1: Online mode/Multicast mode
SW0045	Module type	Stores the hardware status of the own station. <div><div>SW0045</div><div><div>b15to</div><div>b2b1b0</div><div>0to0</div></div></div> <div>■Model type 00: Module 01: Board 10: HMI (Human Machine Interface)</div>
SW0046 to SW0047	IPv4 address	Indicates the IP address (IPv4) set in the own station. <div><div>SW0046</div><div><div>(1)</div><div>(2)</div></div></div> <div><div>SW0047</div><div><div>(3)</div><div>(4)</div></div></div> <div>(1): Third octet (2): Fourth octet (3): First octet (4): Second octet</div>
SW0049	Cause of data link stop	Stores the cause which stopped the data link of the own station. 00H: At normal communication or power-on 02H: Monitoring time timeout 05H: No device station (master station only) 11H: Outside station No. range of own station 14H: Master station duplication (master station only) 18H: Parameter error 19H: Parameter communication in progress 60H: Illegal ring connection (master station only) (Also used in the CLPA conformance test.)

No.	Name	Description
SW004C	Parameter setting status	Stores the status of parameter settings. 0: Normal 1 or greater: Error definition (Error code is stored.) ■Conditions • This register is enabled when 'Received parameter error' (SB004D) is ON.
SW0058	Total number of device stations setting value	Stores the total number of device stations that are set by the parameters. Range: 1 to 120
SW0059	Total number of device stations present value	Stores the total number of device stations that are actually connected by data link. Range: 1 to 120 (0 when own station is disconnected)
SW005B	Maximum data link station No.	Stores the maximum station No. of the station where the data link is normally performed. Range: 1 to 120 (0 when own station is disconnected) ■Conditions • This register is enabled when 'Data link error status of own station' (SB0049) is OFF.
SW0060	Communication cycle intervals	Stores the setting value of "Communication Period Interval Setting" set with "Communication Period Setting" under "Basic Settings". (Unit: μ s)
SW0061	System reserved time	Stores the setting value of "System Reservation Time" set with "Communication Period Setting" under "Basic Settings". (Unit: μ s)
SW0062	Cyclic transmission time	Stores the setting value of "Cyclic Transmission Time" set with "Communication Period Setting" under "Basic Settings". (Unit: μ s)
SW0063	Transient transmission time	Stores the setting value of "Transient Transmission Time" set with "Communication Period Setting" under "Basic Settings". (Unit: μ s)
SW0066	Connection status of own station	Stores the connection status of the own station. 00H: Normal (communication in progress on P1 and P2) 01H: Normal (communication in progress on P1, cable disconnected on P2) 10H: Normal (cable disconnected on P1, communication in progress on P2) 11H: Disconnected (cable disconnected on P1 and P2) 12H: Disconnected (cable disconnected on P1, establishing line on P2) 21H: Disconnected (establishing line on P1, cable disconnected on P2) 22H: Disconnected (establishing line on P1 and P2)
SW0072	Communication cycle intervals (calculation value)	Stores the communication cycle intervals that were calculated by the number of device stations and the points set in "Network Configuration Settings". (Unit: μ s)
SW0073	Cyclic transmission time (calculation value)	Stores the cyclic transmission time that was calculated by the number of device stations and the points set in "Network Configuration Settings". (Unit: μ s)
SW0074	PORT1 cable disconnection detection count	Stores the cumulative count of cable disconnections detected at the PORT1 side. When 'Clear communication error count' (SB0006) is turned ON, the stored count is cleared. When FFFFH (maximum value 65535) is counted, the value returns to 0 and the module continues to count.
SW0075	PORT1 receive error detection count	Stores the cumulative count of error data receptions at the PORT1 side. The count stores only error data that is not transmitted to all stations. When 'Clear communication error count' (SB0006) is turned ON, the stored count is cleared. When FFFFH (maximum value 65535) is counted, counting stops.
SW0076	PORT1 total number of received data (lower 1 word)	Stores the cumulative count of data receptions at the PORT1 side. When 'Clear communication error count' (SB0006) is turned ON, the stored count is cleared.
SW0077	PORT1 total number of received data (upper 1 word)	When FFFFFFFFH (maximum value 4294967295) is counted, counting stops.
SW0078	Transient transmission time (calculation value)	Stores the transient transmission time that are calculated by the number of device stations and the number of link device points set in "Network Configuration Settings". (Unit: μ s)
SW0079	Watch dog counter processing time (calculation value)	Stores the processing time for confirming the watch dog counter calculated from the device stations which are actually connected. (Unit: μ s)
SW007A	Transient transmission addition time (calculation value)	Stores the time which needs to be added to "Communication Period Interval Setting" and "Transient Transmission Time" set in "Communication Period Setting" under "Basic Settings". (Unit: μ s)
SW007C	PORT2 cable disconnection detection count	Stores the cumulative count of cable disconnections detected at the PORT2 side. When 'Clear communication error count' (SB0006) is turned ON, the stored count is cleared. When FFFFH (maximum value 65535) is counted, the value returns to 0 and the module continues to count.
SW007D	PORT2 receive error detection count	Stores the cumulative count of error data receptions at the PORT2 side. The count stores only error data that is not transmitted to all stations. When 'Clear communication error count' (SB0006) is turned ON, the stored count is cleared. When FFFFH (maximum value 65535) is counted, counting stops.
SW007E	PORT2 total number of received data (lower 1 word)	Stores the cumulative count of data receptions at the PORT2 side. When 'Clear communication error count' (SB0006) is turned ON, the stored count is cleared.
SW007F	PORT2 total number of received data (upper 1 word)	When FFFFFFFFH (maximum value 4294967295) is counted, counting stops.

No.	Name	Description																																																																																																																																																									
SW00B0 to SW00B7	Data link status of each station	<p>Stores the data link status of each station.</p> <p>0: Data link normally operating station</p> <p>1: Data link faulty station</p> <ul style="list-style-type: none">• If multiple stations change from faulty to normal, because they are returned to the network one by one per communication cycle, the time until the status changes to "0: Data link normally operating station" may vary by several seconds.• If no response is received for several communication cycles, the station is determined to be a data link faulty station. <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW00B0</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW00B1</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW00B2</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW00B3</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW00B4</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW00B5</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW00B6</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW00B7</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">• Stations that surpass the maximum station No. are ignored. <p>(Also used in the CLPA conformance test.)</p>		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW00B0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW00B1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW00B2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW00B3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW00B4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW00B5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW00B6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW00B7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW00B0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW00B1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW00B2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW00B3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
SW00B4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65																																																																																																																																											
SW00B5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW00B6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW00B7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW00C8 to SW00CF	Parameter setting status	<p>Stores the status of parameter settings.</p> <p>0: Station not set in the parameter</p> <p>1: Station set in the parameter</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW00C8</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW00C9</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW00CA</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW00CB</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW00CC</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW00CD</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW00CE</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW00CF</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">• Stations that surpass the maximum station No. are ignored.		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW00C8	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW00C9	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW00CA	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW00CB	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW00CC	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW00CD	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW00CE	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW00CF	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW00C8	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW00C9	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW00CA	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW00CB	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
SW00CC	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65																																																																																																																																											
SW00CD	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW00CE	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW00CF	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW00E8 to SW00EF	Station type match status	<p>Stores the match status between the station type set in the master station and that of the device station.</p> <p>0: Station type match</p> <p>1: Station type mismatch</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW00E8</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW00E9</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW00EA</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW00EB</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW00EC</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW00ED</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW00EE</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW00EF</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p>		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW00E8	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW00E9	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW00EA	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW00EB	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW00EC	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW00ED	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW00EE	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW00EF	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW00E8	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW00E9	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW00EA	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW00EB	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
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SW00ED	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW00EE	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
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No.	Name	Description																																																																																																																																																									
SW00F0 to SW00F7	CPU operating status of each station	<p>Stores the CPU operating status of each station.</p> <p>0: RUN, PAUSE</p> <p>1: STOP or moderate/major error occurring</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW00F0</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW00F1</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW00F2</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW00F3</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW00F4</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW00F5</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW00F6</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW00F7</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">Reserved stations and stations that surpass the maximum station No. are ignored.		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW00F0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW00F1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW00F2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW00F3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW00F4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW00F5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW00F6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW00F7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW00F0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW00F1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW00F2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW00F3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
SW00F4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65																																																																																																																																											
SW00F5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW00F6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW00F7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW0100 to SW0107	CPU moderate/major error status of each station	<p>Stores the moderate/major error occurrence status of each station.</p> <p>0: No moderate/major error</p> <p>1: Moderate/major error occurring</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW0100</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW0101</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW0102</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW0103</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW0104</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW0105</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW0106</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW0107</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">If an error occurs, the data immediately before the error is held.Reserved stations and stations that surpass the maximum station No. are ignored.If the communication cycle interval setting is less than 125μs, this will be fixed at "0: No moderate/major error".		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW0100	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW0101	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW0102	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW0103	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW0104	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW0105	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW0106	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW0107	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW0100	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW0101	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW0102	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW0103	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
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SW0105	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW0106	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW0107	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW0110 to SW0117	CPU minor error status of each station	<p>Stores the minor error occurrence status of each station.</p> <p>0: Normal, or a moderate or major error occurring</p> <p>1: Minor error occurring</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW0110</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW0111</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW0112</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW0113</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW0114</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW0115</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW0116</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW0117</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">Reserved stations and stations that surpass the maximum station No. are ignored.If the communication cycle interval setting is less than 125μs, the status of each station will be fixed at "0: Normal, or a moderate or major error occurring".		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW0110	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW0111	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW0112	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW0113	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW0114	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW0115	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW0116	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW0117	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW0110	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW0111	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW0112	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW0113	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
SW0114	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65																																																																																																																																											
SW0115	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW0116	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW0117	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											

No.	Name	Description																																																																																																																																																									
SW0160 to SW0167	Execution result of device station parameter automatic setting function	<p>When the device station parameter automatic setting is completed with an error, the bit of the target station is turned ON.</p> <p>OFF: Completed successfully</p> <p>ON: Completed with an error</p> <p>When completed with an error, the error code is stored in the 'Detailed execution result of device station parameter automatic setting' (SW0194).</p> <p>When completed with an error caused by the master station, the bit is not turned ON.</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW0160</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW0161</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW0162</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW0163</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW0164</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW0165</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW0166</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW0167</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p>		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW0160	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW0161	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW0162	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW0163	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW0164	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW0165	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW0166	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW0167	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW0160	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW0161	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW0162	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW0163	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
SW0164	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65																																																																																																																																											
SW0165	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW0166	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW0167	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW0194	Detailed execution result of device station parameter automatic setting	<p>When the device station parameter automatic setting is completed with an error, the error code is stored.*1</p> <p>When completed with an error caused by the device station, the bit of the target station of 'Execution result of device station parameter automatic setting function' (SW0160 to SW0167) is turned ON.</p>																																																																																																																																																									
SW01A0 to SW01A7	Station protocol version 2.0 support status	<p>Stores the protocol version 2.0 compatibility status of each station.</p> <p>0: Not supported</p> <p>1: Supported</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW01A0</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW01A1</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW01A2</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW01A3</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW01A4</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW01A5</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW01A6</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW01A7</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each number in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">Stations that surpass the maximum station No. are ignored.		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW01A0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW01A1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW01A2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW01A3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW01A4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW01A5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW01A6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW01A7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW01A0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW01A1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW01A2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW01A3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
SW01A4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65																																																																																																																																											
SW01A5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW01A6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW01A7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW01C0 to SW01C7	Information of CC-Link IE TSN Network synchronous communication function of each station	<p>Stores whether each station supports the CC-Link IE TSN Network synchronous communication function.</p> <p>0: Not supported</p> <p>1: Supported</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW01C0</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW01C1</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW01C2</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW01C3</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW01C4</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW01C5</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW01C6</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW01C7</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">Stations that surpass the maximum station No. are ignored.		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW01C0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW01C1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW01C2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW01C3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW01C4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW01C5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW01C6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW01C7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																																																																																																																																											
SW01C0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																																																																																																																											
SW01C1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17																																																																																																																																											
SW01C2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33																																																																																																																																											
SW01C3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49																																																																																																																																											
SW01C4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65																																																																																																																																											
SW01C5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81																																																																																																																																											
SW01C6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97																																																																																																																																											
SW01C7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											

No.	Name	Description																																																																																																																																																									
SW01C8 to SW01CF	Synchronous/non-synchronous operating status information of each station	<p>Stores the operating status of the CC-Link IE TSN Network synchronous communication function of each station.</p> <p>0: Non-synchronous 1: Synchronous</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW01C8</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW01C9</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW01CA</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW01CB</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW01CC</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW01CD</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW01CE</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW01CF</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No. — is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">Stations that surpass the maximum station No. are ignored.		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW01C8	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW01C9	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW01CA	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW01CB	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW01CC	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW01CD	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW01CE	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW01CF	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
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SW01CF	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW01D0 to SW01D7	Watchdog counter operating status information for each station	<p>Stores the watchdog counter operating status information for each station in CC-Link IE TSN communications. (Station No.1 to 120)</p> <p>0: Not operating 1: Operating</p> <p>Stations which are not performing data links are treated as "0: Not operating" because the information indicates that device stations are communicating using the watchdog counter.</p> <table><tr><td></td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>SW01D0</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW01D1</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW01D2</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW01D3</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW01D4</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW01D5</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW01D6</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW01D7</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No. — is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">Stations that surpass the maximum station No. are ignored.		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW01D0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW01D1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW01D2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW01D3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW01D4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW01D5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW01D6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW01D7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
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SW01D7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113																																																																																																																																											
SW02A0 to SW02A7	Motion control station setting status	<p>Stores the motion control station setting status of each station. (Station No.1 to 120)</p> <p>0: Standard station 1: Motion control station</p>																																																																																																																																																									
SW0470 to SW047F	NMT state machine	<p>Stores the communication status of the device station that supports CANopen communications.</p> <p>0: In the CANopen function initialization sequence, the NMT state machine is not yet in the Operational state or the device station is disconnected.</p> <p>1: In the CANopen function initialization sequence, the NMT state machine is in the Operational state.</p> <p>The value of the device station that does not support CANopen communications is fixed to 0.</p> <p>This value is stored by each module number of the device stations set in the Network Configuration Settings.</p>																																																																																																																																																									
SW04A0	Time synchronization method	<p>Stores the synchronization method.</p> <p>0: IEEE 1588 1: IEEE 802.1AS</p>																																																																																																																																																									

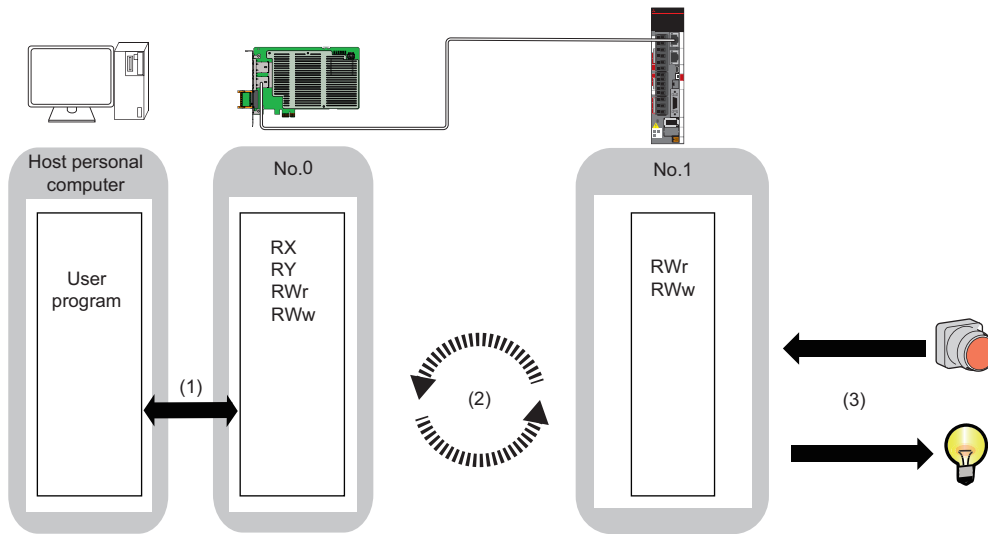
No.	Name	Description																																																																																																																																																									
SW04B0 to SW04B7	Time synchronization status of each station	<p>Stores the time synchronization status of each station. (Station No.: 1 to 120)</p> <p>0: Station that does not perform time synchronization</p> <p>1: Station that performs time synchronization</p> <p>The time synchronization method can be checked in 'Time synchronization method' (SW04A0).</p> <table><tr><th></th><th>b15</th><th>b14</th><th>b13</th><th>b12</th><th>b11</th><th>b10</th><th>b9</th><th>b8</th><th>b7</th><th>b6</th><th>b5</th><th>b4</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr><tr><td>SW04B0</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>SW04B1</td><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td></tr><tr><td>SW04B2</td><td>48</td><td>47</td><td>46</td><td>45</td><td>44</td><td>43</td><td>42</td><td>41</td><td>40</td><td>39</td><td>38</td><td>37</td><td>36</td><td>35</td><td>34</td><td>33</td></tr><tr><td>SW04B3</td><td>64</td><td>63</td><td>62</td><td>61</td><td>60</td><td>59</td><td>58</td><td>57</td><td>56</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>50</td><td>49</td></tr><tr><td>SW04B4</td><td>80</td><td>79</td><td>78</td><td>77</td><td>76</td><td>75</td><td>74</td><td>73</td><td>72</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td></tr><tr><td>SW04B5</td><td>96</td><td>95</td><td>94</td><td>93</td><td>92</td><td>91</td><td>90</td><td>89</td><td>88</td><td>87</td><td>86</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr><tr><td>SW04B6</td><td>112</td><td>111</td><td>110</td><td>109</td><td>108</td><td>107</td><td>106</td><td>105</td><td>104</td><td>103</td><td>102</td><td>101</td><td>100</td><td>99</td><td>98</td><td>97</td></tr><tr><td>SW04B7</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>120</td><td>119</td><td>118</td><td>117</td><td>116</td><td>115</td><td>114</td><td>113</td></tr></table> <p>Each No. in the table represents a station No.</p> <p>— is fixed to 0.</p> <p>■Conditions</p> <ul style="list-style-type: none">Stations that surpass the maximum station No. are ignored.		b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	SW04B0	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SW04B1	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	SW04B2	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	SW04B3	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	SW04B4	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	SW04B5	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	SW04B6	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	SW04B7	—	—	—	—	—	—	—	—	120	119	118	117	116	115	114	113
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*1 For 'Detailed execution result of device station parameter automatic setting' (SW0194), the following error codes are stored.

Error code	Overview	Cause
0C40H	Cancellation	Abnormal response was received from the device station and the device station parameter auto setting process was canceled.
0C41H	Parameter Update Cancellation	Abnormal response was received from the device station and the parameter update process for the device station parameter auto setting was canceled.
0C42H	System Error	An error occurred while the device station parameter auto setting was executing.
0C43H	Transmission Timeout	Transmission timeout occurred during the device station parameter auto setting communication.
0C44H	Receive Timeout	Receive timeout occurred during the device station parameter auto setting communication.
0C46H	SLMP Transmission Error	An error occurred during the SLMP transmission of the device station parameter auto setting.
0C47H	ROM drive Access Failure	Access to the rom drive failed during the device station parameter auto setting.
0C48H	No Target Station Parameter	The device station parameter file targeted during the device station parameter auto setting was not stored in the rom drive.

Appendix 4 Processing Time

This section describes the cyclic transmission delay time of CC-Link IE TSN.



(1) Bus communication

(2) Communication cycle interval (cyclic data transfer processing time): Page 110 Communication cycle interval

(3) Processing time of the device station: Manual for the device station used

The cyclic transmission delay time in the Motion control board consists of the following.

(2) Communication cycle interval (cyclic data transfer processing time) + (3) Processing time of the device station

Cyclic transmission delay time

Standard station

This section shows the formulas to calculate the following cyclic transmission delay time.

- The time between when the Motion control board turns ON or OFF and when the transmission destination CPU module device turns ON or OFF
- The time between when data is set in the Motion control board and when the data is stored in the transmission destination device

■ Master station ← remote station

When data is transmitted from a remote station (input) to the master station (RX/RWr).

Calculation value	Calculation formula
Normal value	$(LS \times 1) + Rio$
Maximum value	$(LS \times 2) + Rio$

- Variable

Name of variable	Description	Unit
LS	Communication cycle interval (can be checked with SW0060)	μs
Rio	Processing time of the remote station	μs

■ Master station → remote station

Same as data is transmitted from a remote station (input) to the master station (RX/RWr) when data is transmitted from the master station (RY/RWw) to a remote station (output).

■ Master station ← local station

When data is transmitted from a local station to the master station as follows:

- Master station (RX) ← local station (RY)
- Master station (RWr) ← local station (RWw)
- Master station (LB) ← local station (LB)
- Master station (LW) ← local station (LW)

Calculation value	Station-based block data assurance	No station-based block data assurance
Normal value	If $LS < SL$: $LS + (SL \times 1)$	$(LS \times 2) + (SL \times 1)$
	If $LS \geq SL$: $(LS \times 2)$	
Maximum value	$(LS \times 2) + (SL \times 1)$	$(LS \times 3) + (SL \times 1)$

- Variable

Name of variable	Description	Unit
LS	Communication cycle intervals (can be checked with SW0060)	μs
SL	Local station sequence scan time	μs

■ Master station → local station

When data is transmitted from the master station to a local station as follows:

- Master station (RX) → local station (RY)
- Master station (RW_r) → local station (RW_w)
- Master station (LB) → local station (LB)
- Master station (LW) → local station (LW)

Calculation value	Station-based block data assurance	No station-based block data assurance
Normal value	$(LS \times (n3 + 1)) + (SL \times 1)$	$(LS \times 2) + (SL \times 1)$
Maximum value	$(LS \times (n3 + 2)) + (SL \times 2)$	$(LS \times 3) + (SL \times 1)$

- Variable

Name of variable	Description	Unit
LS	Communication cycle intervals (can be checked with SW0060)	μs
SL	Local station sequence scan time	μs
n3	Round up the calculated value to the nearest integer of $(SL \div LS)$	—

Motion control station

This section shows the formulas to calculate the following cyclic transmission delay time.

- Time between when a device of the Motion control board turns ON or OFF and when a transmission destination device turns ON or OFF
- Time between when data is set to a device of the Motion control board and when the data is stored in a transmission destination device

■ Master station ← remote station

When the data is transmitted from the remote station (input) to the master station (RX/RW_r).

Calculation value	Calculation formula
Normal value	$(LS \times 1) + Rio$
Maximum value	$(LS \times 2) + Rio$

- Variable

Name of variable	Description	Unit
LS	Communication cycle interval (can be confirmed with 'Communication cycle intervals')	μs
Rio	Processing time of the remote station	μs

■ Master station → remote station

When data is transmitted from the master station (RY/RW_w) to the remote station (output).

Calculation value	Calculation formula
Normal value	$(LS \times 2) + Rio$
Maximum value	$(LS \times 3) + Rio$

- Variable

Name of variable	Description	Unit
LS	Communication cycle interval (can be confirmed with 'Communication cycle intervals' (SW0060))	μs
Rio	Processing time of the remote station	μs

Communication cycle interval

The minimum value of the communication cycle interval (cyclic data transfer processing time) is calculated by the following calculation formulas. The parts enclosed in double quotation marks (" ") in the table of variables are the values set for "Cyclic Settings" of the network parameter.

Communication mode	Communication speed of the master station	Reference
Unicast mode	1Gbps	Page 111 Unicast mode (1Gbps)
Multicast mode	1Gbps	Page 114 Multicast mode (1Gbps)

Precautions

■When cyclic transmission is not performed with a calculation value used as a setting value

The minimum values for communication cycle interval and cyclic transmission time calculated by the formulas are referential values. If cyclic transmission is not performed by setting the calculation value as the setting value, set a value obtained by adding the larger of the following to the cyclic transmission time.

- 10% of the minimum value of the calculated cyclic transmission time
- When the communication speed for the master station is set to 1Gbps: The number of device stations × 2μs

Each calculation value obtained from the calculation formulas are stored in the following SWs.


- SW0072: Communication cycle interval (calculation value) [μs]
- SW0073: Cyclic transmission time (calculation value) [μs]
- SW0078: Transient transmission time (calculation value) [μs]

■When the calculated value is greater than the setting

If each calculation result is larger than the set value of "Basic Period Setting" under "Basic Settings" as follows, an error occurs.


- 3010H: When the Communication cycle interval (calculation value) [μs] is larger than the set value of "Communication Period Interval Setting"
- 3011H: When the cyclic transmission time (calculation value) [μs] is larger than the set value of "Cyclic Transmission Time"
- 3013H: When the transient transmission time (calculation value) [μs] is larger than the displayed value of "Transient Transmission Time"

■Other precautions

- For the number of controllable axes with each communication cycle interval, refer to "Performance Specifications" in the following manual.
 Motion Control Board User's Manual (Motion Control)
- The operation formulas support the communication cycle interval setting of 125.00μs or longer. If it is set to 62.50μs, the operation formulas cannot be applied. The following table lists the numbers of connectable device stations when 62.50μs is set.

Communication cycle interval	MR-EM441G
62.50μs	4

- For the number of connectable axes with the communication cycle interval of 62.50μs, refer to "Performance Specifications" in the following manual.

 Motion Control Board User's Manual (Motion Control)

For 62.50μs, the referential values of cyclic transmission time, system reservation time, and transient transmission time are as follows. Adjustment may be required depending on the using environment.

Communication cycle interval	Cyclic transmission time	System reservation time	Transient transmission time
62.50μs	20.00μs	20.00μs	22.50μs

Condition

This section shows the calculation formulas for the communication cycle interval in the following conditions (If the main modules and extension modules are not specified in the descriptions of the variables in the calculation formulas for the communication cycle interval, the number of points to be set is the sum of main modules and extension modules).

Network Configuration Settings X											
StaNo.	No.	Instance Name	Model Name	IP Address	Station Type	Multidrop Number	Motion Control Station	Parameter Automatic Setting	Reserved Station	Station-specific mode setting	Comment
		▼ Motion Control Board	MR-EM441G	192.168.3.253	Master station						
1	1	■ R71GN11-T2	R71GN11-T2	192.168.3.1	Local station		<input checked="" type="checkbox"/>		<input type="checkbox"/>		master/local module
2	2	■ NZ2GN2B-60AD4	NZ2GN2B-60AD4	192.168.3.2	Remote station		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Analog Input
3	3	■ MR-J5W3-G	MR-J5W3-G	192.168.3.3	Remote station	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Motion Mode	General-Purpose AC Servo
4		■ MR-J5W3-G,BC_Axis	MR-J5W3-G,BC_Axis			1					General-Purpose AC Servo
5		■ MR-J5W3-G,BC_Axis_2	MR-J5W3-G,BC_Axis			2					General-Purpose AC Servo

Item	Module No.	Number of modules
Main module	No.1, No.2, No.3	3
Extension module	No.4, No.5	2
Local station	No.1	1
Remote station*1	No.2, No.3	2
Device station*1	No.1, No.2, No.3	3

*1 Extension modules are not included.

Unicast mode (1Gbps)

■ Calculation formula

The communication cycle interval [ns] is calculated as follows. Round up less than 1μs in α_c and α_p .

$\alpha_c + \alpha_p$ or 125000, whichever the larger

Cyclic transmission time [ns] = α_c

- α_c : A value obtained by adding No.5 to the highest value among the following No.1 to No.4.

No.	Calculation formula*1
1	A1 + A2 A1: $\{(50 \times n1) + (16 \times n2) + ndm\} \times 8 + (Sn - 1) \times 830 + 14000 + nh + nrp$ A2: $\{(50 \times en1) + (16 \times en2) + endm\} \times 8$
2	B1 + B2 B1: $\{(30 \times n1) + (16 \times n2) + ndm\} \times 4 + (1661 \times n1) + (Sn - 1) \times 830 + 14300 + nh + nrp$ B2: $\{(30 \times en1) + (16 \times en2) + endm\} \times 4 + (1661 \times en1)$
3	C1 + C2 C1: $\{(50 \times n3) + (20 \times n4) + nds\} \times 8 + 14000 + nh + nrp$ C2: $\{(50 \times en3) + (20 \times en4) + ends\} \times 8$
4	D1 + D2 D1: $\{(50 \times n5) + (20 \times n6) + ndl\} \times 8 + (Sn - 1) \times 830 + 14000 + nh + nrp$ D2: $\{(50 \times en5) + (20 \times en6) + endl\} \times 8$
5	E × n7 E: $(Sn - 1) \times 830 + 39102$

*1 Meanings of symbols used in the table are as follows.

A1, B1, C1, D1: Calculation formulas of main modules

A2, B2, C2, D2: Calculation formulas of extension modules

Cyclic transmission time [ns] = α_p

- α_p : $p1 + p3 + kp$

■ Variable

Round up the value after decimal point of each variable before assigning it to the calculation formula.

Name of variable	Description
n1	$(ndm + (16 \times n2)) / 1488$ or Sn whichever is larger
n2	$Sn \times (RYb + RWwb) + Ln \times (LBmb + LWmb)$ RYb: Value of (Total number of points of "RY Setting" of main modules) / $(11776 \times Sn)$ rounded up to the nearest integer RWwb: Value of (Total number of points of "RWw Setting" of main modules) / $(736 \times Sn)$ rounded up to the nearest integer LBmb: Value of (Number of points of "LB setting" set in the master station) / 11776 rounded up to the nearest integer LWmb: Value of (Number of points of "LW setting" set in the master station) / 736 rounded up to the nearest integer
ndm	$((\text{Total number of points of "RY Setting" of main modules} / 8) + ((\text{Total number of points of "RWw Setting" of main modules} \times 2) + ((\text{Number of points of "LB setting" set in the master station} / 8) \times ((\text{Number of points of "LW setting" set in the master station} \times 2) \times Ln$

Name of variable	Description
Sn	Number of device stations
Ln	Number of local stations
nh	Switching hub delay time × Number of switching hubs connected to the network Switching hub delay time: 50000*1
nrp	If "Network Topology" in "Basic Settings" is "Line/Star": 0
n3	$S_n \times n_{hs}$ $n_{hs}: (nds + (20 \times n_4)) / (1488 \times S_n)$ rounded up to the nearest integer
n4	$S_n \times (RXb + RWrb) + L_n \times (LBxmb + LWxmb) + S_n$ RXb: Value of (Total number of points of "RX Setting" of main modules) / (11744 × Sn) rounded up to the nearest integer RWrb: Value of (Total number of points of "RWr Setting" of main modules) / (734 × Sn) rounded up to the nearest integer LBxmb: Value of (Total number of points of "LB setting" excluding master station) / (11744 × Ln) rounded up to the nearest integer LWxmb: Value of (Total number of points of "LW setting" excluding master station) / (734 × Ln) rounded up to the nearest integer
nds	$((\text{Total number of points of "RX Setting" of main modules} / 8) + ((\text{Total number of points of "RWr Setting" of main modules} \times 2) + ((\text{Total number of points of "LB setting" excluding the master station} / 8) + ((\text{Total number of points of "LW setting" excluding the master station} \times 2) + 8 \times S_n$
n5	$(ndl + 20 \times n_6) / 1488$
n6	$(ndl - 8) / 1468 + 1$
ndl	$(RXl / 8) + (RWrl \times 2) + (LBl / 8) + (LWl \times 2) + 8$ RXl: Number of points of "RX Setting" of the device station*2 to be used as the maximum number of link points RWrl: Number of points of "RWr Setting" of the device station*2 to be used as the maximum number of link points LBl: Number of points of "LB setting" of the device station*2 to be used as the maximum number of link points LWl: Number of points of "LW setting" of the device station*2 to be used as the maximum number of link points
n7	0
en1	$\sum_{i=1}^{120} en1_i$ <p> $en1_i = ((endm_i + en2_i \times 16) / 1488)^3 - k_i$ However, if $endm_i$ is 0, $en1_i$ becomes 0. $k_i = 1$ if $mf_i > 16$, $k_i = 0$ if $mf_i \leq 16$ $mf_i = 1488 - \text{mod}$ $\text{mod: Remainder of } \{((mRy_i + (mRy_i / 1472)^3 \times 16) + (mRWw_i + (mRWw_i / 1472)^3 \times 16)) / 1488\}$ However, if the calculation of mf_i is 1488, this value becomes 0. i: Station No. mRy_i: Number of points of "RY Setting" of the main module of the station No.i / 8 $mRWw_i$: Number of points of "RWw Setting" of the main module of the station No.i × 2 </p>
en2	$\sum_{i=1}^{120} en2_i$ <p> $en2_i = eRyn_i + eRWwn_i + ((endm_i + (eRyn_i + eRWwn_i) \times 16) / 1488)^3 - 1$ However, if $endm_i$ is 0, $en2_i$ becomes 0. i: Station No. $eRyn_i$: 0 (fixed) $eRWwn_i$: Total number of extension modules which have a number of points of "RWw Setting" of the station No.i larger than 0 </p>
endm	$\sum_{i=1}^{120} endm_i$ <p> $endm_i = eRyAll_i / 8 + eRWwAll_i \times 2$ i: Station No. $eRyAll_i$: 0 (fixed) $eRWwAll_i$: Total number of points of "RWw Setting" of the extension modules of the station No.i </p>

Name of variable	Description
en3	$\sum_{i=1}^{120} en3_i$ <p> $en3_i = ((ends_i + en4_i \times 20) / 1488)^3 - k_i$ However, if $ends_i$ is 0, $en3_i$ becomes 0. $k_i = 1$ if $sf_i > 20$, $k_i = 0$ if $sf_i \leq 20$ $sf_i = 1488 - \text{mod}$ mod: Remainder of $\{((mRx_i + (mRx_i / 1468)^3 \times 20) + (mRWr_i + (mRWr_i / 1468)^3 \times 20)) / 1488\}$ However, if the calculation result of sf_i is 1488, this value becomes 0. i: Station No. mRx_i: Number of points of "RX Setting" of the main module of the station No.i / 8 $mRWr_i$: Number of points of "RWr Setting" of the main module of the station No.i $\times 2$ </p>
en4	$\sum_{i=1}^{120} en4_i$ <p> $en4_i = eRxn_i + eRWrn_i + ((ends_i + (eRxn_i + eRWrn_i) \times 20) / 1488)^3 - 1$ However, if $ends_i$ is 0, $en4_i$ becomes 0. i: Station No. $eRxn_i$: 0 (fixed) $eRWrn_i$: Number of extension modules which have a number of points of "RWr Setting" of the station No.i larger than 0 </p>
ends	$\sum_{i=1}^{120} ends_i$ <p> $ends_i = eRxAll_i / 8 + eRWrAll_i \times 2$ i: Station No. $eRxAll_i$: 0 (fixed) $eRWrAll_i$: Total number of points of "RWr Setting" of the extension modules of the station No.i </p>
en5	<p> $((endl + 20 \times en6) / 1488)^3 - k_i$ However, if $endl$ is 0, $en5$ becomes 0. $k_i = 1$ if $sf_i > 20$, $k_i = 0$ if $sf_i \leq 20$ $sf_i = 1488 - \text{mod}$ mod: Remainder of $\{((mRx_i + (mRx_i / 1468)^3 \times 20) + (mRWr_i + (mRWr_i / 1468)^3 \times 20)) / 1488\}$ However, if the calculation result of sf_i is 1488, this value becomes 0. i: Station No. of the device station to be used as the maximum number of link points^{*2} mRx_i: Number of points of "RX Setting" of the main module of the station No.i / 8 $mRWr_i$: Number of points of "RWr Setting" of the main module of the station No.i $\times 2$ </p>
en6	<p> $eRxn_i + eRWrn_i + ((endl + (eRxn_i + eRWrn_i) \times 20) / 1488)^3 - 1$ However, if $endl$ is 0, the value of $en6$ becomes 0. i: Station No. of the device station to be used as the maximum number of link points^{*2} $eRxn_i$: 0 (fixed) $eRWrn_i$: Total number of extension modules which have a number of points of "RWr Setting" of the station No.i larger than 0 </p>
endl	<p> $eRxAll_i / 8 + eRWrAll_i \times 2$ i: Station No. of the device station to be used as the maximum number of link points^{*2} $eRxAll_i$: 0 (fixed) $eRWrAll_i$: Total number of points of "RWr Setting" of the extension modules of the device station to be used as the maximum number of link points^{*2} </p>
p1: Processing time of RX/Ry/RWr/RWw	<p> $\{((\text{Total number of points of "RX Setting"}) + (\text{Total number of points of "RY Setting"})) / 8 + ((\text{Total number of points of "RWr Setting"}) + (\text{Total number of points of "RWw Setting"})) \times 2\} \times 5 + (SMn \times 1300) + ((Sn - SMn) \times 3300)$ However, if Total number of points of "RY Setting" = Total number of points of "RX Setting" = Total number of points of "RWr Setting" = Total number of points of "RWw Setting" = 0, $p1 = 0$ </p>
p3: Diagnostic information processing time	$Sn \times 40$
SMn	Number of motion control stations
kp	35000 However, if there is a standard station, the value becomes 78000

*1 The switching hub delay time changes depending on the switching hub model and settings.

*2 This is the device station with the largest calculation value derived from ("RX Setting" / 8) + ("RWr Setting" $\times 2$) for each device station (including extension modules).

*3 Round up the values in the brackets.

Multicast mode (1Gbps)

■ Calculation formula

The communication cycle interval [ns] is calculated as follows. Round up less than $1\mu\text{s}$ in α_c and α_p .

$\alpha_c + \alpha_p$ or 125000, whichever the larger.

Cyclic transmission time [ns] = α_c

- α_c : The larger of No.1 or No.2 + No.5 in the following.

No.	Calculation formula*1	
1	A1 + A2 + (the value obtained by the calculation formula in No.3 or No.4, whichever is larger)	$A1: \{(50 \times (n1r + n1l)) + (16 \times (n2r + n2l)) + (ndmr + ndml)\} \times 8 + (Sn-1) \times 830 + 14000 + nh + nrp$ $A2: \{(50 \times en1r) + (16 \times en2r) + endmr\} \times 8$
2	B1 + B2 + (the value obtained by the calculation formula in No.3 or No.4, whichever is larger)	$B1: \{(30 \times (n1r + n1l)) + (16 \times (n2r + n2l)) + (ndmr + ndml)\} \times 4 + (1661 \times (n1r + n1l)) + (Sn - 1) \times 830 + 14300 + nh + nrp$ $B2: \{(30 \times en1r) + (16 \times en2r) + endmr\} \times 4 + (1661 \times en1r)$
3	C1 + C2	$C1: \{(50 \times n3) + (20 \times n4) + nds\} \times 8 + 14000 + nh$ $C2: \{(50 \times en3) + (20 \times en4) + ends\} \times 8$
4	D1 + D2	$D1: \{(50 \times n5) + (20 \times n6) + ndl\} \times 8 + (Sn - 1) \times 830 + 14000 + nh$ $D2: \{(50 \times en5) + (20 \times en6) + endl\} \times 8$
5	E × n7	$E: (Sn - 1) \times 830 + 39102$

*1 Meanings of symbols used in the table are as follows.

A1, B1, C1, D1: Calculation formulas of main modules

A2, B2, C2, D2: Calculation formulas of extension modules

Cyclic processing time [ns] = $\alpha_p + \alpha_{sp}$

- α_p : $p1 + p2 + p3 + kp$

■ Variable

Round up the value after decimal point of each variable before assigning it to the calculation formula.

Name of variable	Description
n1r	$(ndmr + (16 \times n2r)) / 1488$ or Rn , whichever is larger
n1l	Value of $(ndml + (16 \times n2l)) / 1488$ rounded up to the nearest integer
n2r	$Rn \times (RYrb + RWwrb)$ RYrb: Value of (Total number of points of "RY setting" set in the remote station (main modules)) / $(11776 \times Rn)$ rounded up to the nearest integer RWwrb: Value of (Total number of points of "RWw setting" set in the remote station (main modules)) / $(736 \times Rn)$ rounded up to the nearest integer
n2l	$RYlb + RWwlb + LBmb + LWmb + 1$ RYlb: Value of (Total number of points of "RY setting"*1) / 11776 rounded up to the nearest integer RWwlb: Value of (Total number of points of "RWw setting"*1) / 736 rounded up to the nearest integer LBmb: Value of (Number of points of "LB setting" set in the master station) / 11776 rounded up to the nearest integer LWmb: Value of (Number of points of "LW setting" set in the master station) / 736 rounded up to the nearest integer
ndmr	$((\text{Total number of points of "RY setting" set in the remote station (main modules)}) / 8) + ((\text{Total number of points of "RWw setting" set in the remote station (main modules)}) \times 2)$
ndml	$((\text{Total number of points of "RY setting"}^*1) / 8) + ((\text{Total number of points of "RWw setting"}^*1) \times 2) + ((\text{Number of points of "LB setting" set in the master station}) / 8) + ((\text{Number of points of "LW setting" set in the master station}) \times 2) + 24$
Sn	Number of device stations
Rn	Number of remote stations
Ln	Number of local stations
nh	Switching hub delay time × Number of switching hubs connected to the network Switching hub delay time: 50000*2
nrp	When "Network Topology" under "Basic Settings" is set to "Line/Star": 0
n3	$Sn \times nhs$ nhs: Value of $(nds + (20 \times n4)) / (1488 \times Sn)$ rounded up to the nearest integer
n4	$Sn \times (RXb + RWrb) + Ln \times (LBxmb + LWxmb) + Sn$ RXb: Value of (Total number of points of "RX setting" of main modules) / $(11744 \times Sn)$ rounded up to the nearest integer RWrb: Value of (Total number of points of "RWrb setting" of main modules) / $(734 \times Sn)$ rounded up to the nearest integer LBxmb: Value of (Total number of points of "LB setting" excluding master station) / $(11744 \times Ln)$ rounded up to the nearest integer LWxmb: Value of (Total number of points of "LW setting" excluding master station) / $(734 \times Ln)$ rounded up to the nearest integer

Name of variable	Description
nds	$((\text{Total number of points of "RX setting" of main modules}) / 8) + ((\text{Total number of points of "RWrr setting" of main modules}) \times 2) + ((\text{Total number of points of "LB setting" excluding the master station}) / 8) + ((\text{Total number of points of "LW setting" excluding the master station}) \times 2) + 8 \times S_n$
n5	$(ndl + 20 \times n6) / 1488$
n6	$(ndl - 8) / 1468 + 1$
ndl	$(RXI / 8) + (RWrr / 2) + (LBI / 8) + (LWI \times 2) + 8$ RXI: Number of points of "RX setting" of main modules of the device station ^{*3} to be used as the maximum number of link points RWrr: Number of points of "RWrr setting" of main modules of the device station ^{*3} to be used as the maximum number of link points LBI: Number of points of "LB setting" of the device station ^{*3} to be used as the maximum number of link points LWI: Number of points of "LW setting" of the device station ^{*3} to be used as the maximum number of link points
n7	0
en1r	$\sum_{i=1}^{120} en1r_i$ $en1r_i = ((endmr_i + en2r_i \times 16) / 1488)^4 - kr_i$ <p>When station No.i represents a station other than a remote station, $en1r_i$ is 0. When $endmr_i$ is 0, $en1r_i$ is 0. When $mfr_i > 16$, $kr_i = 1$, and when $mfr_i \leq 16$, $kr_i = 0$. $mfr_i = 1488 - \text{mod}$ mod: Remainder of $\{((mRyr_i + (mRyr_i / 1472)^4 \times 16) + (mRWwr_i + (mRWwr_i / 1472)^4 \times 16)) / 1488\}$ However, the value is 0 when the calculation result of mfr_i is 1488. i: Station No. mRyr_i: Number of points of "RY setting" of main modules with station No.i / 8 mRWwr_i: Number of points of "RWw setting" of main modules with station No.i $\times 2$</p>
en2r	$\sum_{i=1}^{120} en2r_i$ $en2r_i = eRym_i + eRWwrn_i + ((endmr_i + (eRym_i + eRWwrn_i) \times 16) / 1488)^4 - 1$ <p>When station No.i represents a station other than a remote station, $en2r_i$ is 0. When $endmr_i$ is 0, $en2r_i$ is 0. i: Station No. eRym_i: 0 (fixed) eRWwrn_i: Total number of extension modules with station No.i whose number of points of "RWw setting" is more than 0</p>
endmr	$\sum_{i=1}^{120} endmr_i$ $endmr_i = eRyrAll_i / 8 + eRWwrAll_i \times 2$ <p>When station No.i represents a station other than a remote station, $endmr_i$ is 0. i: Station No. eRyrAll_i: 0 (fixed) eRWwrAll_i: Total number of points of "RWw setting" of extension modules with station No.i</p>
en3	$\sum_{i=1}^{120} en3_i$ $en3_i = ((ends_i + en4_i \times 20) / 1488)^4 - k_i$ <p>However, when $ends_i$ is 0, $en3_i$ is 0. When $sf_i > 20$, $k_i = 1$, and when $sf_i \leq 20$, $k_i = 0$. $sf_i = 1488 - \text{mod}$ mod: Remainder of $\{((mRx_i + (mRx_i / 1468)^4 \times 20) + (mRWrr_i + (mRWrr_i / 1468)^4 \times 20)) / 1488\}$ However, the value is 0 when the calculation result of sf_i is 1488. i: Station No. mRx_i: Number of points of "RX setting" of main modules with station No.i / 8 mRWrr_i: Number of points of "RWrr setting" of main modules with station No.i $\times 2$</p>
en4	$\sum_{i=1}^{120} en4_i$ $en4_i = eRxn_i + eRWrn_i + ((ends_i + (eRxn_i + eRWrn_i) \times 20) / 1488)^4 - 1$ <p>However, when $ends_i$ is 0, $en4_i$ is 0. i: Station No. eRxn_i: 0 (fixed) eRWrn_i: Number of extension modules with station No.i whose number of points of "RWrr setting" is more than 0</p>

Name of variable	Description
ends	$\sum_{i=1}^{120} \text{ends}_i$ <p> $\text{ends}_i = \text{eRxAll}_i / 8 + \text{eRWrAll}_i \times 2$ i: Station No. eRxAll_i: 0 (fixed) eRWrAll_i: Total number of points of "RWr setting" of extension modules with station No.i </p>
en5	$((\text{endl} + 20 \times \text{en6}) / 1488)^4 - k_i$ <p> However, when endl is 0, en5 is 0. When $\text{sf}_i > 20$, $k_i = 1$, and when $\text{sf}_i \leq 20$, $k_i = 0$. $\text{sf}_i = 1488 - \text{mod}$ mod: Remainder of $\{((\text{mRx}_i + (\text{mRx}_i / 1468)^4 \times 20) + (\text{mRWr}_i + (\text{mRWr}_i / 1468)^4 \times 20)) / 1488\}$ However, the value is 0 when the calculation result of sf_i is 1488. i: Station No. of the device station^{*3} to be used as the maximum number of link points mRx_i: Number of points of "RX setting" of main modules with station No.i / 8 mRWr_i: Number of points of "RWr setting" of main modules with station No.i $\times 2$ </p>
en6	$\text{eRxIn}_i + \text{eRWrIn}_i + ((\text{endl} + (\text{eRxIn}_i + \text{eRWrIn}_i) \times 20) / 1488)^4 - 1$ <p> However, when endl is 0, the value for en6 is 0. i: Station No. of the device station^{*3} to be used as the maximum number of link points eRxIn_i: 0 (fixed) eRWrIn_i: Total number of extension modules with station No.i whose number of points of "RWr setting" is more than 0 </p>
endl	$\text{eRxAll}_i / 8 + \text{eRWrAll}_i \times 2$ <p> i: Station No. of the device station^{*3} to be used as the maximum number of link points eRxAll_i: 0 (fixed) eRWrAll_i: Total number of points of "RWr setting" of extension modules of the device station^{*3} to be used as the maximum number of link points </p>
p1: RX/RY/RWr/RWw processing time	$\{((\text{Total number of points of "RX setting"}) + (\text{Total number of points of "RY setting"}^{*1})) / 8 + ((\text{Total number of points of "RWr setting"}) + (\text{Total number of points of "RWw setting"}^{*1})) \times 2\} \times 5 + (\text{SMn} \times 1300) + ((\text{Sn} - \text{SMn}) \times 3300)$ <p> However, if Total number of points of "RY setting"^{*1} = Total number of points of "RX setting" = Total number of points of "RWr setting" = Total number of points of "RWw setting"^{*1} = 0, then p1 = 0. </p>
p2: LB/LW processing time	$\{((\text{Total number of points of "LB setting" excluding master station}) / 8) + ((\text{Total number of points of "LW setting" excluding master station}) \times 2) + ((\text{Number of points of "LB setting" set in the master station}) / 8) + ((\text{Number of points of "LW setting" set in the master station}) \times 2)\} \times 5 + (\text{Sn} \times 6000)$ <p> However, if Total number of points of "LB setting" = Total number of points of "LW setting" = 0, then p2 = 0. </p>
p3: Diagnostic information processing time	$\text{Sn} \times 40$
SMn	Number of motion control stations
kp	35000 However, if there is a standard station, the value becomes 78000

*1 Total number of points is the smallest value set in "Start" to the largest value set in "End" of "Cyclic Settings".

*2 The switching hub delay time changes depending on the switching hub model and settings.

*3 This is the device station with the largest calculation value derived from $((\text{"RX setting"} + \text{"LB setting"}) / 8) + ((\text{"RWr setting"} + \text{"LW setting"}) \times 2)$ for each device station (including extension modules).

*4 Round up the values in the brackets.

Appendix 5 Connectable device to CC-Link IE TSN

This section describes how to set and use the motion system when a connectable device to CC-Link IE TSN is connected with the Motion control board.

For details on the wiring and the parameters, refer to the manual of each device.

MR-J5(W)-G (Cyclic synchronous mode) connection method

For details about wiring and parameters of MR-J5(W)-G, refer to MR-J5(W)-G manuals.

Precautions

When some axes of MR-J5W_ _G_ are connected as the axis, the rest of axes cannot be connected as the remote I/O.

MR-J5(W)-G (other than Cyclic synchronous mode) connection method

The Motion control board does not support the MR-J5(W)-G (other than the Cyclic synchronous mode) connection method.

Precautions

When some axes of MR-J5W_ _G_ are connected as the axis, the rest of axes cannot be connected as the remote I/O.

Precautions

By using firmware version combinations of MR-J5(W)-G, "Watchdog Counter Error (error code: 1C41H)" may occur at connecting.

When this symptom occurs, update the firmware of MR-J5(W)-G.

Connection method with remote station other than MR-J5(W)-G

This section describes how to set and use the remote station other than MR-J5(W)-G when connected as the remote I/O. For details about wiring and parameters of the remote I/O, refer to the remote I/O manuals.

An example for how to set and use the remote I/O when connecting the remote I/O module manufactured by Mitsubishi Electric Corporation (NZ2GN2B-60AD4) as the remote I/O is shown below.

Setting method

The items that require setting are as follows.

- Network parameter setting [Motion test tool]
- Device parameter setting [Motion test tool]

■Network parameter setting [Motion test tool]

🔗 "CC-Link IE TSN Network Parameter" ⇒ [Edit]

Set the network parameter.

For details and how to set the network parameter setting items, refer to the following.

📖 Page 60 Setting Parameters

- Network Configuration Settings

Add NZ2GN2B-60AD4.

StaNo.	No.	Instance Name	Model Name	IP Address	Station Type	Multidrop Number	Motion Control Station	Parameter Automatic Setting	Reserved Station	Station-specific mode setting	Comment
		▼ Motion Control Board	MR-EM441G	192.168.3.253	Master station						
1	1	NZ2GN2B-60AD4	NZ2GN2B-60AD4		Remote station		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Analog Input

When using NZ2GN2B-60AD4 as a standard station, uncheck "Motion Control Station".

StaNo.	No.	Instance Name	Model Name	IP Address	Station Type	Multidrop Number	Motion Control Station	Parameter Automatic Setting	Reserved Station	Station-specific mode setting	Comment
		▼ Motion Control Board	MR-EM441G	192.168.3.253	Master station						
1	1	NZ2GN2B-60AD4	NZ2GN2B-60AD4		Remote station		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Analog Input

- IP Address Settings

Set an IP address.

StaNo.	No.	Instance Name	Model Name	IP Address	Subnet Mask
		▼ Motion Control Board	MR-EM441G	192.168.3.253	255.255.255.0
1	1	NZ2GN2B-60AD4	NZ2GN2B-60AD4	192.168.3.1	

- Cyclic Settings

Set link devices depending on the use appropriately.

Describe an example for when allocating link devices as follows.

RX Setting			RY Setting			RWr Setting			RWw Setting		
Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
32	0x0010	0x002F	32	0x0020	0x003F	16	0x0030	0x003F	16	0x0040	0x004F

Network Configuration Settings | IP Address Settings | Cyclic Settings X

Simple view Assignment Method: Points/Start Check Reallocate address

Cyclic Transmission Time (Min.): 17.00 us Communication Period Interval (Min.): 125.00 us

StaNo.	No.	Instance Name	Model Name	IP Address	Station Type	Multidrop Number	Link Device								CANopen		NetworkSync	Communication Period										
							RX Setting	RY Setting	RW Setting	RWw Setting	LB Setting	LW Setting	TPDO	RPDO														
							Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End	TPDO Setting	Size(Byte)	RPDO Setting	Size(Byte)			
1	1	▼ Motion Control Board	MR-EM441G	192.168.3.253	Master station		32	0010	002F	32	2000	201F	16	0030	003F	16	0040	004F									Do not	Basic Period

Set "NetworkSync" to "Do" when using CC-Link IE TSN network synchronous communication function.

Network Configuration Settings | IP Address Settings | Cyclic Settings X

Detail view Check Reallocate address

Cyclic Transmission Time (Min.): 17.00 us Communication Period Interval (Min.): 125.00 us

StaNo.	No.	Instance Name	Model Name	IP Address	Station Type	Multidrop Number	Link Device								CANopen		NetworkSync	Communication Period								
							RX ...	RY S...	RW...	RW...	LB S...	LW ...	TPDO	RPDO												
							Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	TPDO Setting	RPDO Setting			
		▼ Motion Control Board	MR-EM441G	192.168.3.253	Master station																					
1	1	▼ NZ2GN2B-60AD4	NZ2GN2B-60AD4	192.168.3.1	Remote station		32	32	16	16															Do	Basic Period

■Device parameter setting [Motion test tool]

🔗 "CC-Link IE TSN Network Parameter" ⇒ [Edit]

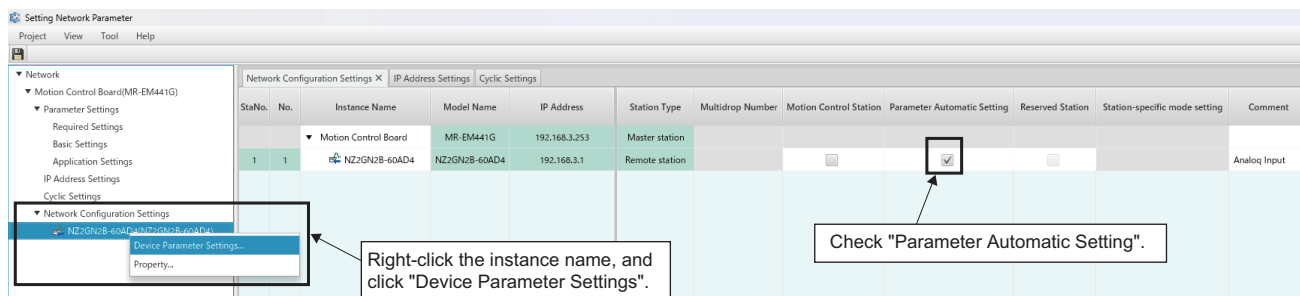
Set parameters of NZ2GN2B-60AD4.

- Auto parameter setting

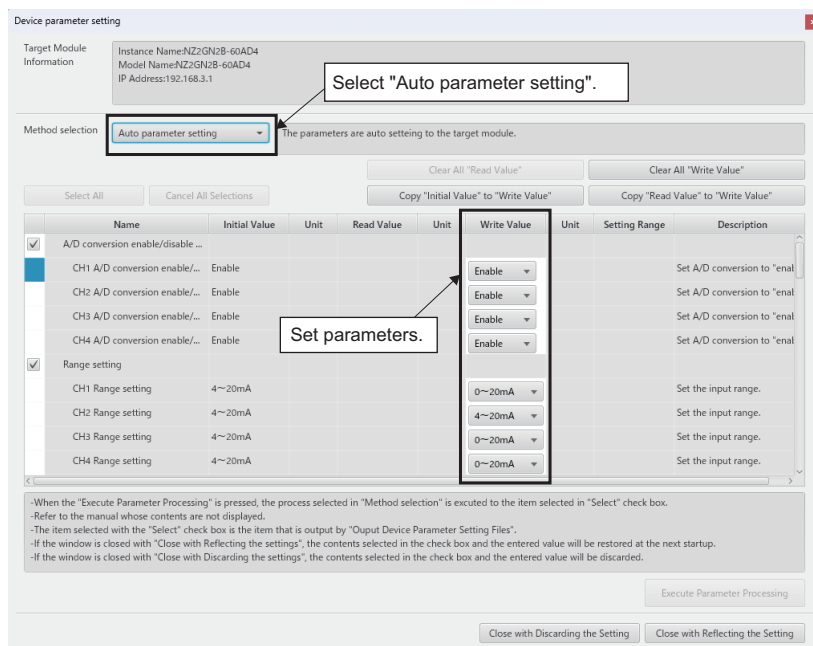
Parameters of NZ2GN2B-60AD4 are saved in the Motion control board, and the parameters will be automatically set when NZ2GN2B-60AD4 is returned/connected. For details of parameter automatic setting function, refer to the following.

📖 Page 56 Device station parameter automatic setting

1. Check "Parameter Automatic Setting" in the "Network Configuration Setting" window, and open "Network Parameter" window.



2. Select "Auto parameter setting" from "Method selection", and set parameters.

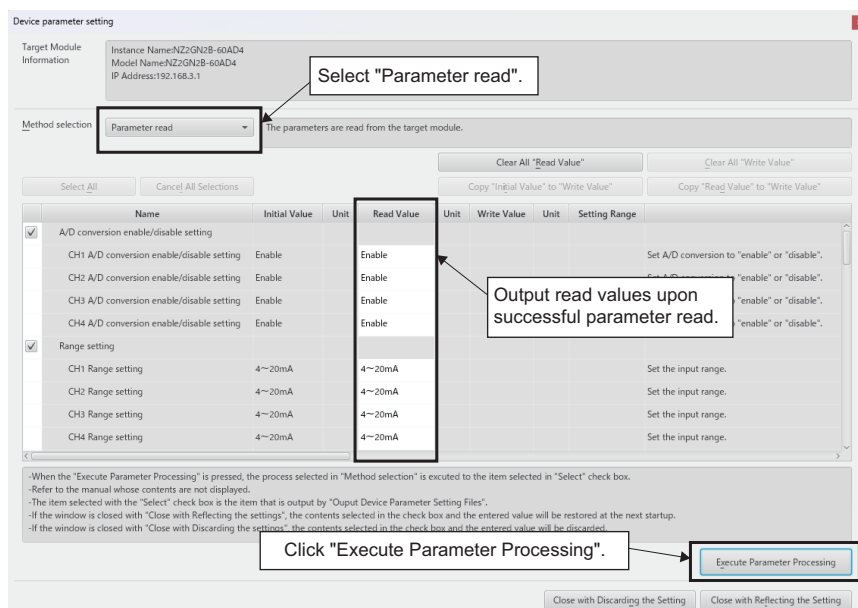


- Parameter read

Read parameters from NZ2GN2B-60AD4 during link-up.

The network parameter of the Motion control board must be set and written to the Motion control board when reading parameters.

1. Select "Parameter read" from "Method selection", and read parameters.

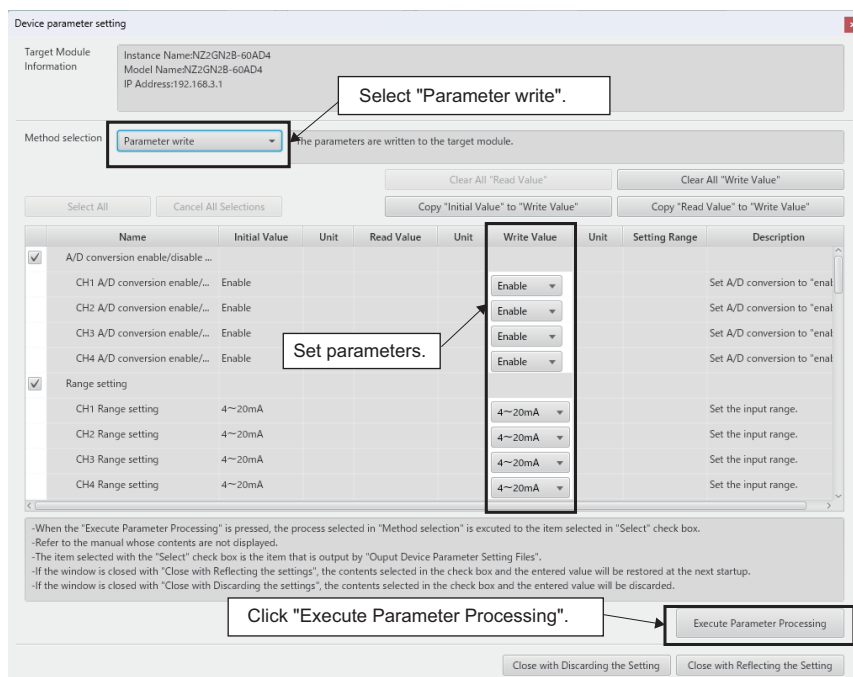


- Parameter write

Write parameters to NZ2GN2B-60AD4 during link-up.

The network parameter of the Motion control board must be set and written to the Motion control board when writing parameters.

1. Select "Parameter write" from "Method selection", and write parameters.



A


How to use

The control method of the remote I/O differs depending on whether the station is a motion control station and a standard station.

The remote I/O is controlled by a motion control station in the I/O device area. For details about the I/O device, refer to "I/O Device" in the following manual.

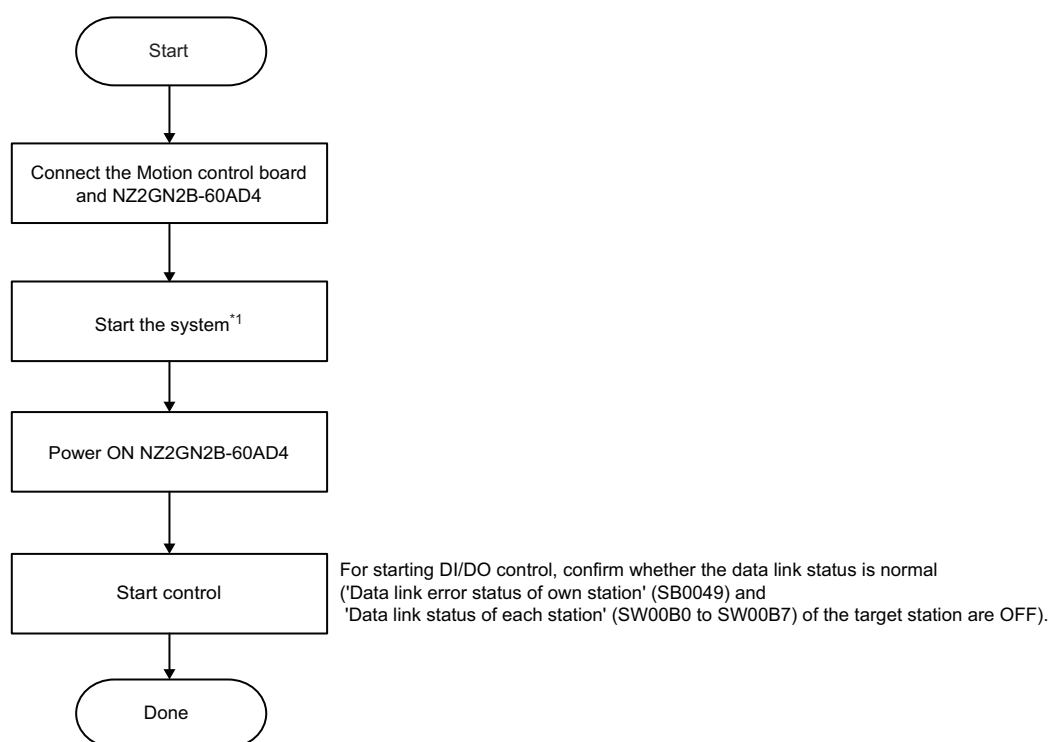
 Motion Control Board User's Manual (Motion Control)

The remote I/O is controlled by a standard station in the link device area.

When setting "Cyclic Settings" described above ( Page 118 Network parameter setting [Motion test tool]), areas that are used for control NZ2GN2B-60AD4 are shown below.


Link devices of NZ2GN2B-60AD4	Areas of the Motion control board that are used for control NZ2GN2B-60AD4	
	Motion control station	Standard station
RX0 to RX1F	Input bit device: RX10 to RX2F	Remote input: RX10 to RX2F
RY0 to RY1F	Output bit device: RY20 to RY3F	Remote output: RY20 to RY3F
RWr0 to RWrF	Input word device: RWr30 to RWr3F	Remote register: RWr30 to RWr3F
RWw0 to RWwF	Output word device: RWw40 to RWw4F	Remote register: RWw40 to RWw4F

The procedure to control NZ2GN2B-60AD4 is shown below.



*1 If the data link up with the device station is executed before starting the system, the output device status or the link device status is sent to the device station, and unintended operation may occur before starting the control. Therefore, turn on the device station to be connected later or configure the system so that the device station control starts after starting the system.

Precautions

- When using the device station parameter automatic setting, for confirming if the device to be used is compatible with the device station parameter automatic setting, refer to the remote I/O manual. ( Page 56 Device station parameter automatic setting)
- Errors do not occur at disconnection. For confirming if the target station is data linked, confirm with 'Data link status of each station' (SW00B0 to SW00B7).
- For the operation of the remote I/O when a moderate error or a major error occurs at the master station, refer to the manual of the remote I/O to be connected.

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REVISIONS

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

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August 2023	IB(NA)-0300600ENG-A	First edition
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Japanese manual number: IB-0300593-B

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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 is 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 control board, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the Motion control board, and a backup or fail-safe function should operate on an external system to the Motion control board when any failure or malfunction occurs.

(2) Our Motion control board 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.

(3) Mitsubishi shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

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MODEL: EM441-U-NET-E

MODEL CODE: 1XB058

mitsubishi electric corporation

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